

EGS Brachy

Generated by Doxygen 1.8.11

Contents

1 Main Page	1
1.1 General Information	1
1.2 License	1
1.3 Installation instructions (including EGSnrc installation)	2
1.4 Usage	2
1.4.1 Run Control	2
1.4.2 Run Modes	3
1.4.3 Geometry Specification	3
1.4.3.1 Using CT data to create phantoms	5
1.4.3.2 The geometry library	6
1.4.4 Scoring options	6
1.4.4.1 Volume correction files	7
1.4.4.2 Spectrum Scoring Options	8
1.4.4.3 Phase Space Scoring Options	9
1.4.5 Source definition	9
1.4.5.1 Variable source weighting	11
1.4.5.2 Phase Space Sources	11
1.4.6 Transport Parameters	12
1.4.7 Variance Reduction	12
1.4.7.1 Particle Recycling	12
1.4.7.2 Range Rejection	13
1.4.7.3 Bremsstrahlung Splitting	13
1.4.7.4 Bremsstrahlung Cross Section Enhancement	13

1.4.8	Voxel volume correction details	14
1.4.8.1	Fast voxel volume corrections for sources	14
1.4.8.2	General purpose volume corrections	14
1.4.8.3	Volume calculations from file	15
1.4.8.4	Random Number Generator for volume corrections	15
1.4.8.5	Manually specifying voxel volumes	16
1.4.9	Output files	16
1.4.9.1	3ddose files	16
1.4.9.2	egsphant file	16
1.4.9.3	Voxel info files	17
1.4.10	Running a simulation	17
1.5	Test Suite	17
1.5.1	Setup	17
1.5.2	Running the test suite	17
1.5.3	A list of the current tests	18
1.6	The egs_brachy Library	18
1.6.1	The Geometry Library	18
1.6.2	Transport Parameters	18
1.6.3	Spectra	19
1.6.4	Media & Muen Data	19
1.6.5	Example egsinp files	19
1.7	Documentation	19
2	geom	21
2.1	Source Library	21
2.1.1	I125 LDR Sources	21
2.1.1.1	OncoSeed_6711	21
2.1.2	Ir192 HDR Sources	21
2.1.2.1	MBDCA-WG	21
2.1.2.2	microSelectron-v2	22
2.1.3	Pd103 LDR Sources	22
2.1.3.1	TheraSeed_200	22
2.1.4	point source Sources	22
2.1.4.1	sphere	22
2.1.5	xray Sources	22
2.1.5.1	eshell	22
2.2	Phantom Library	22
2.3	Applicator Library	28
2.4	Eye Plaques Library	28
2.5	Transformation Sets	28

3 media	31
3.1 Pegless run materials	31
3.2 Materials with Muen data	40
3.2.1 PeppaBreastHDR192Ir_MBDCA-WG_muen.muendat	40
3.2.2 brachy_xcom_1.5MeV.muendat	41
3.2.3 brachy_xcom_1.5MeV_egsphant.muendat	42
4 spectra	49
5 tests	51
6 transport	55
7 CLRP egs++ brachytherapy source models	57
8 Namespace Index	59
8.1 Namespace List	59
9 Hierarchical Index	61
9.1 Class Hierarchy	61
10 Class Index	63
10.1 Class List	63
11 File Index	65
11.1 File List	65

12 Namespace Documentation	69
12.1 doc_utils Namespace Reference	69
12.1.1 Function Documentation	69
12.1.1.1 find_file_descriptions(dir_path, include_key=None)	69
12.2 eb_tests Namespace Reference	69
12.3 eb_tests.brem_cyl Namespace Reference	70
12.4 eb_tests.brem_cyl.test Namespace Reference	70
12.4.1 Detailed Description	70
12.4.2 Function Documentation	70
12.4.2.1 compare_results(egslist, inp_name)	70
12.4.3 Variable Documentation	70
12.4.3.1 DOSRZ_NRC_DOSES	70
12.4.3.2 EGSINP	71
12.4.3.3 expected_doses	71
12.4.3.4 TIME_LIMIT_S_PER_MHZ	71
12.5 eb_tests.flu_cutoff Namespace Reference	71
12.6 eb_tests.flu_cutoff.test Namespace Reference	71
12.6.1 Detailed Description	72
12.6.2 Function Documentation	72
12.6.2.1 compare_results(egslist, inp_name)	72
12.6.3 Variable Documentation	72
12.6.3.1 EGSINP	72
12.6.3.2 TIME_LIMIT_S_PER_MHZ	72
12.7 eb_tests.iaea Namespace Reference	72
12.7.1 Variable Documentation	72
12.7.1.1 HEN_HOUSE	72
12.7.1.2 IAEA_DLL	73
12.7.1.3 iaeadll	73
12.8 eb_tests.iaea_errors Namespace Reference	73
12.8.1 Variable Documentation	73

12.8.1.1 error_messages	73
12.8.1.2 new_source_errors	73
12.9 eb_tests.iaea_types Namespace Reference	74
12.9.1 Variable Documentation	74
12.9.1.1 all_particles	74
12.9.1.2 electrons	74
12.9.1.3 iaea_file_modes	74
12.9.1.4 IAEA_Float	74
12.9.1.5 IAEA_I16	75
12.9.1.6 IAEA_I32	75
12.9.1.7 IAEA_I64	75
12.9.1.8 max_sources	75
12.9.1.9 neutrons	75
12.9.1.10 particle_types	75
12.9.1.11 photons	75
12.9.1.12 PIAEA_Float	75
12.9.1.13 PIAEA_I16	76
12.9.1.14 PIAEA_I32	76
12.9.1.15 PIAEA_I64	76
12.9.1.16 positrons	76
12.9.1.17 protons	76
12.10eb_tests.phsp_run Namespace Reference	76
12.11eb_tests.phsp_run.test Namespace Reference	76
12.11.1 Detailed Description	76
12.11.2 Function Documentation	77
12.11.2.1 compare_results(egslst, inp_name)	77
12.11.3 Variable Documentation	77
12.11.3.1 EGSINP	77
12.11.3.2 TIME_LIMIT_S_PER_MHZ	77
12.12eb_tests.phsp_scoring Namespace Reference	77

12.13eb_tests.phsp_scoring.test Namespace Reference	77
12.13.1 Detailed Description	77
12.13.2 Function Documentation	78
12.13.2.1 compare_results(egslst, inp_name)	78
12.13.3 Variable Documentation	78
12.13.3.1 EGSINP	78
12.13.3.2 EXPECTED	78
12.13.3.3 MAX_E	78
12.13.3.4 NHIST	78
12.13.3.5 RM	78
12.13.3.6 SOURCE_WEIGHTS	78
12.13.3.7 TIME_LIMIT_S_PER_MHZ	78
12.14eb_tests.recycling Namespace Reference	79
12.15eb_tests.recycling.test Namespace Reference	79
12.15.1 Detailed Description	79
12.15.2 Function Documentation	79
12.15.2.1 compare_results(egslst, inp_name)	79
12.15.3 Variable Documentation	79
12.15.3.1 EGSINP	79
12.15.3.2 TIME_LIMIT_S_PER_MHZ	79
12.16eb_tests.scatter Namespace Reference	79
12.17eb_tests.scatter.test Namespace Reference	80
12.17.1 Detailed Description	80
12.17.2 Function Documentation	80
12.17.2.1 compare_results(egslst, inp_name)	80
12.17.2.2 get_n_highest_doses(doses, uncs, n=NCOMPARE)	80
12.17.3 Variable Documentation	80
12.17.3.1 EGSINP	80
12.17.3.2 NCOMPARE	80
12.17.3.3 TIME_LIMIT_S_PER_MHZ	80

12.18eb_tests.seeds_in_xyz Namespace Reference	81
12.19eb_tests.seeds_in_xyz.test Namespace Reference	81
12.19.1 Detailed Description	81
12.19.2 Function Documentation	81
12.19.2.1 compare_results(egslst, inp_name)	81
12.19.3 Variable Documentation	81
12.19.3.1 EGSINP	81
12.19.3.2 TIME_LIMIT_S_PER_MHZ	81
12.20eb_tests.seeds_in_xyz_genvelope Namespace Reference	81
12.21eb_tests.seeds_in_xyz_genvelope.test Namespace Reference	82
12.21.1 Detailed Description	82
12.21.2 Function Documentation	82
12.21.2.1 compare_results(egslst, inp_name)	82
12.21.3 Variable Documentation	82
12.21.3.1 EGSINP	82
12.21.3.2 TIME_LIMIT_S_PER_MHZ	82
12.22eb_tests.simple_dose_sph Namespace Reference	82
12.23eb_tests.simple_dose_sph.test Namespace Reference	82
12.23.1 Detailed Description	83
12.23.2 Function Documentation	83
12.23.2.1 compare_results(egslst, inp_name)	83
12.23.3 Variable Documentation	83
12.23.3.1 EGSINP	83
12.23.3.2 expected_doses	83
12.23.3.3 TIME_LIMIT_S_PER_MHZ	83
12.24eb_tests.single_generator Namespace Reference	84
12.25eb_tests.single_generator.test Namespace Reference	84
12.25.1 Detailed Description	84
12.25.2 Function Documentation	84
12.25.2.1 compare_results(egslst, inp_name)	84

12.25.3 Variable Documentation	84
12.25.3.1 EGSINP	84
12.25.3.2 TIME_LIMIT_S_PER_MHZ	84
12.26eb_tests.source_energies Namespace Reference	84
12.27eb_tests.source_energies.test Namespace Reference	85
12.27.1 Detailed Description	85
12.27.2 Function Documentation	85
12.27.2.1 compare_results(egslst, inp_name)	85
12.27.3 Variable Documentation	85
12.27.3.1 EGSINP	85
12.27.3.2 expected_results	85
12.27.3.3 TIME_LIMIT_S_PER_MHZ	85
12.28eb_tests.spec_absolute Namespace Reference	86
12.29eb_tests.spec_absolute.test Namespace Reference	86
12.29.1 Detailed Description	86
12.29.2 Function Documentation	86
12.29.2.1 compare_results(egslst, inp_name)	86
12.29.2.2 expected(e)	86
12.29.3 Variable Documentation	86
12.29.3.1 EGSINP	86
12.29.3.2 EMAX	87
12.29.3.3 EMIN	87
12.29.3.4 TIME_LIMIT_S_PER_MHZ	87
12.30eb_tests.spec_eflu Namespace Reference	87
12.31eb_tests.spec_eflu.test Namespace Reference	87
12.31.1 Detailed Description	87
12.31.2 Function Documentation	88
12.31.2.1 compare_results(egslst, inp_name)	88
12.31.2.2 expected(e)	88
12.31.3 Variable Documentation	88

12.31.3.1 AVG_E	88
12.31.3.2 BIN_WIDTH	88
12.31.3.3 EGSINP	88
12.31.3.4 EMAX	88
12.31.3.5 EMIN	88
12.31.3.6 N_BINS_IN_RANGE	88
12.31.3.7 NHIST	88
12.31.3.8 SCORED_IN_BIN	89
12.31.3.9 SCORED_IN_BIN_PER_MEV	89
12.31.3.10 TIME_LIMIT_S_PER_MHZ	89
12.31.3.11 TOTAL_E	89
12.32 eb_tests.spec_vox Namespace Reference	89
12.33 eb_tests.spec_vox.test Namespace Reference	89
12.33.1 Detailed Description	90
12.33.2 Function Documentation	90
12.33.2.1 compare_results(egslist, inp_name)	90
12.33.2.2 expected(e)	90
12.33.3 Variable Documentation	90
12.33.3.1 BIN_WIDTH	90
12.33.3.2 EGSINP	90
12.33.3.3 EMAX	90
12.33.3.4 EMIN	90
12.33.3.5 N_BINS_IN_RANGE	90
12.33.3.6 R1	90
12.33.3.7 R2	91
12.33.3.8 SCORED_IN_BIN	91
12.33.3.9 TIME_LIMIT_S_PER_MHZ	91
12.33.3.10 TRACK_LENGTH	91
12.33.3.11 VOLUME	91
12.34 eb_tests.stepped_source Namespace Reference	91

12.35eb_tests.stepped_source.test Namespace Reference	91
12.35.1 Detailed Description	92
12.35.2 Function Documentation	92
12.35.2.1 compare_results(egslst, inp_name)	92
12.35.2.2 get_n_highest_dose_pairs(dose1, dose2, n=NCOMPARE)	92
12.35.3 Variable Documentation	92
12.35.3.1 EGSINP	92
12.35.3.2 NCOMPARE	92
12.35.3.3 TIME_LIMIT_S_PER_MHZ	92
12.36eb_tests.tg43mode Namespace Reference	92
12.37eb_tests.tg43mode.test Namespace Reference	92
12.37.1 Detailed Description	93
12.37.2 Function Documentation	93
12.37.2.1 compare_results(egslst, inp_name)	93
12.37.2.2 get_n_highest_dose_pairs(dose1, dose2, n=NCOMPARE)	93
12.37.3 Variable Documentation	93
12.37.3.1 EGSINP	93
12.37.3.2 NCOMPARE	93
12.37.3.3 TIME_LIMIT_S_PER_MHZ	93
12.38eb_tests.tg43mode_recycle Namespace Reference	93
12.39eb_tests.tg43mode_recycle.test Namespace Reference	94
12.39.1 Detailed Description	94
12.39.2 Function Documentation	94
12.39.2.1 compare_results(egslst, inp_name)	94
12.39.2.2 get_n_highest_dose_pairs(dose1, dose2, n=NCOMPARE)	94
12.39.3 Variable Documentation	94
12.39.3.1 EGSINP	94
12.39.3.2 NCOMPARE	94
12.39.3.3 TIME_LIMIT_S_PER_MHZ	94
12.40eb_tests.tg43mode_zeroweight Namespace Reference	95

12.41eb_tests.tg43mode_zeroweight.test Namespace Reference	95
12.41.1 Detailed Description	95
12.41.2 Function Documentation	95
12.41.2.1 compare_results(egslst, inp_name)	95
12.41.2.2 get_n_highest_dose_pairs(dose1, dose2, n=NCOMPARE)	95
12.41.3 Variable Documentation	95
12.41.3.1 EGSINP	95
12.41.3.2 NCOMPARE	96
12.41.3.3 TIME_LIMIT_S_PER_MHZ	96
12.42eb_tests.utils Namespace Reference	96
12.42.1 Function Documentation	96
12.42.1.1 compare_3ddose_files(f1, f2, max_percent_diff=None)	96
12.42.1.2 doses_approx_equal(d1, d1_unc, d2, d2_unc, max_percent_diff=None, compare_unc=True, max_unc_p	96
12.42.1.3 extract_all_doses(egslst)	96
12.42.1.4 read3ddose(fname)	97
12.42.1.5 read_csv_spectrum(fname)	97
12.42.1.6 values_close(a, b, max_percent_diff=0.001)	97
12.42.1.7 values_close_abs(a, b, max_diff=0.001)	97
12.42.2 Variable Documentation	97
12.42.2.1 REG_DOSE_UNC_RE	97
12.43eb_tests.variable_activity Namespace Reference	97
12.44eb_tests.variable_activity.test Namespace Reference	97
12.44.1 Detailed Description	97
12.44.2 Function Documentation	98
12.44.2.1 compare_results(egslst, inp_name)	98
12.44.3 Variable Documentation	98
12.44.3.1 EGSINP	98
12.44.3.2 TIME_LIMIT_S_PER_MHZ	98
12.45eb_tests.variable_w_recycling Namespace Reference	98
12.46eb_tests.variable_w_recycling.test Namespace Reference	98

12.46.1 Detailed Description	98
12.46.2 Function Documentation	99
12.46.2.1 compare_results(egslst, inp_name)	99
12.46.3 Variable Documentation	99
12.46.3.1 BENCHMARK_DOSES	99
12.46.3.2 EGSINP	99
12.46.3.3 TIME_LIMIT_S_PER_MHZ	99
12.47eb_tests.volume_correction Namespace Reference	99
12.48eb_tests.volume_correction.test Namespace Reference	99
12.48.1 Detailed Description	100
12.48.2 Function Documentation	100
12.48.2.1 approx_equal(a, b, eps=0.001)	100
12.48.2.2 compare_results(egslst, inp_name)	100
12.48.2.3 read_vols(phant, inp_name)	100
12.48.3 Variable Documentation	100
12.48.3.1 EGSINP	100
12.48.3.2 expected_volumes	100
12.48.3.3 TIME_LIMIT_S_PER_MHZ	100
12.49ebvolcor Namespace Reference	101
12.49.1 Typedef Documentation	101
12.49.1.1 HitCounterT	101
12.49.1.2 PhantRegT	101
12.49.1.3 RegVolume	102
12.49.2 Enumeration Type Documentation	102
12.49.2.1 VolCorMode	102
12.49.3 Function Documentation	102
12.49.3.1 getShapeVolume(EGS_Input *shape_inp)	102
12.49.3.2 isGZip(istream &vfile)	102
12.49.3.3 loadVolumes(string fname, vector< RegVolume > ®_volumes)	102
12.49.3.4 readVolumes(istream &vfile, vector< RegVolume > ®_volumes)	103

12.50gen_docs Namespace Reference	103
12.50.1 Function Documentation	103
12.50.1.1 gen_docs()	103
12.50.2 Variable Documentation	103
12.50.2.1 modules	103
12.51gen_geom Namespace Reference	103
12.51.1 Function Documentation	104
12.51.1.1 gen_docs(fname)	104
12.51.1.2 gen_geom_docs(droot, title, is_sources=False)	104
12.51.1.3 get_filetype_links(dir_path, extension)	104
12.51.1.4 get_images(dir_path)	104
12.51.1.5 get_readme(dir_path)	104
12.51.2 Variable Documentation	104
12.51.2.1 abs_root	104
12.51.2.2 geom	104
12.51.2.3 outfile	105
12.51.2.4 root	105
12.52gen_media Namespace Reference	105
12.52.1 Function Documentation	105
12.52.1.1 gen_docs(fname)	105
12.52.1.2 get_muen()	105
12.52.1.3 get_pegless_materials()	105
12.52.2 Variable Documentation	105
12.52.2.1 abs_root	105
12.52.2.2 media_file	106
12.52.2.3 muen_dir	106
12.52.2.4 outfile	106
12.52.2.5 root	106
12.53gen_specs Namespace Reference	106
12.53.1 Function Documentation	106

12.53.1.1 gen_docs(fname)	106
12.53.1.2 get_spectra()	106
12.53.2 Variable Documentation	107
12.53.2.1 abs_root	107
12.53.2.2 outfile	107
12.53.2.3 root	107
12.53.2.4 specs	107
12.54gen_tests Namespace Reference	107
12.54.1 Function Documentation	107
12.54.1.1 gen_docs(fname)	107
12.54.1.2 get_tests()	107
12.54.2 Variable Documentation	108
12.54.2.1 globber	108
12.54.2.2 outfile	108
12.54.2.3 root_tests	108
12.55gen_transport Namespace Reference	108
12.55.1 Function Documentation	108
12.55.1.1 gen_docs(fname)	108
12.55.2 Variable Documentation	108
12.55.2.1 abs_root	108
12.55.2.2 outfile	108
12.55.2.3 root	109
12.55.2.4 transport	109
12.56muen Namespace Reference	109
12.56.1 Typedef Documentation	109
12.56.1.1 MuenAtET	109
12.56.1.2 MuenMapT	109
12.56.2 Function Documentation	110
12.56.2.1 split(const std::string &s, char delim, std::vector< std::string > &elems)	110
12.56.2.2 split(const std::string &s, char delim)	110

12.57run_tests Namespace Reference	110
12.57.1 Function Documentation	111
12.57.1.1 cleanup()	111
12.57.1.2 create_egsinp(test_module)	111
12.57.1.3 dyn_import(name)	111
12.57.1.4 find_cpu_time(egslst)	111
12.57.1.5 find_tests()	111
12.57.1.6 run_all_tests()	111
12.57.1.7 run_simulation()	111
12.57.2 Variable Documentation	111
12.57.2.1 CPU_MHZ	111
12.57.2.2 cpu_speed_cmd	111
12.57.2.3 EGS_BRACHY	112
12.57.2.4 EGS_HOME	112
12.57.2.5 FAIL_FMT	112
12.57.2.6 p	112
12.57.2.7 PASS_FMT	112
12.57.2.8 source	112
12.57.2.9 stderr	112
12.57.2.10stdin	113
12.57.2.11stdout	113
12.57.2.12TEST_EGSINP_FILE	113
12.57.2.13TEST_EGSINP_PATH	113
12.57.2.14TEST_EGSINP_PATH_ROOT	113
12.57.2.15timing_hard_fail	113
12.57.2.16TIMING_MARGIN	113
12.57.2.17TIMING_WARN_FMT	113
12.57.2.18USER_CODE	113
12.57.2.19VERBOSE	113

13 Class Documentation	115
13.1 BaseSpectrumScorer Class Reference	115
13.1.1 Detailed Description	117
13.1.2 Constructor & Destructor Documentation	117
13.1.2.1 BaseSpectrumScorer(EGS_Input *input, EGS_BaseSource *src, GeomInfo *ginfo, Publisher *publisher)	
13.1.2.2 ~BaseSpectrumScorer()	117
13.1.3 Member Function Documentation	117
13.1.3.1 addState(istream &data)	117
13.1.3.2 getBin(EGS_Float E) const	118
13.1.3.3 getBinWidth() const	118
13.1.3.4 getFileExtension() const	118
13.1.3.5 getFileName(string root) const	118
13.1.3.6 getInfo() const	118
13.1.3.7 getParticleEnergy(const EGS_Particle *p) const	118
13.1.3.8 getParticleName() const	118
13.1.3.9 getResult(int bin, EGS_Float &r, EGS_Float &dr)	118
13.1.3.10 getSpectrumScorer(EGS_Input *inp, EGS_BaseSource *source, GeomInfo *ginfo, Publisher *publisher)	
13.1.3.11 getSubTitle() const	119
13.1.3.12 getTitle() const	119
13.1.3.13 getXAxisLabel() const	119
13.1.3.14 getYAxisLabel() const	119
13.1.3.15 isValid() const	119
13.1.3.16 outputCSV(string filename)	119
13.1.3.17 outputData(ostream *ofile)	119
13.1.3.18 outputEGSnrc(string filename)	120
13.1.3.19 outputResults(string root_name)	120
13.1.3.20 outputTotal()	120
13.1.3.21 outputXMGR(string filename)	120
13.1.3.22 readData(istream *ifile)	120
13.1.3.23 resetCounter()	120

13.1.3.24 score(EB_Message message, void *data=0)=0	120
13.1.3.25 setEffectiveHistories(EGS_Float effective_histories)	120
13.1.3.26 update(EB_Message message, void *data=0)	121
13.1.4 Member Data Documentation	121
13.1.4.1 bin_width	121
13.1.4.2 bins	121
13.1.4.3 cur_history	121
13.1.4.4 DEFAULT_NBINS	121
13.1.4.5 e_max	121
13.1.4.6 e_min	121
13.1.4.7 eff_history	122
13.1.4.8 egsnrc_mode	122
13.1.4.9 fextension	122
13.1.4.10 format	122
13.1.4.11 nbins	122
13.1.4.12 particle_type	122
13.1.4.13 source	122
13.1.4.14 total_scored	122
13.1.4.15 valid	123
13.2 EB_Application Class Reference	123
13.2.1 Detailed Description	128
13.2.2 Member Enumeration Documentation	128
13.2.2.1 RunMode	128
13.2.3 Constructor & Destructor Documentation	128
13.2.3.1 EB_Application(int argc, char **argv)	128
13.2.3.2 ~EB_Application()	128
13.2.4 Member Function Documentation	129
13.2.4.1 addRecycledParticlesToStack(EGS_Particle *p, bool new_hist=false)	129
13.2.4.2 addState(istream &data)	129
13.2.4.3 ausgab(int iarg)	129

13.2.4.4 calcEffectiveHistories()	129
13.2.4.5 clearAusgabCalls()	129
13.2.4.6 combineResults()	129
13.2.4.7 copyParticleToSourceLoc(EGS_Particle *p, int source, bool kill_orig, bool rotate, EGS_Float new_wt)	129
13.2.4.8 correctVolumes()	129
13.2.4.9 createPhantoms()	130
13.2.4.10 createTransforms(EGS_Input *input)	130
13.2.4.11 describeSimulation()	130
13.2.4.12 describeUserCode() const	130
13.2.4.13 discardTopParticle(int idisc=1)	130
13.2.4.14 doPhotonSplitting(int)	130
13.2.4.15 egsAdvApplicationOutputData(ostream *)	130
13.2.4.16 egsAdvApplicationReadData(istream *)	130
13.2.4.17 egsApplicationOutputData(ostream *)	131
13.2.4.18 egsApplicationReadData(istream *)	131
13.2.4.19 egsBrachyOutputData(ostream *)	131
13.2.4.20 egsBrachyReadData(istream *)	131
13.2.4.21 enableAusgabCalls(int ncalls, AusgabCall calls[])	131
13.2.4.22 enterNewRegion()	131
13.2.4.23 getCurrentResult(double &sum, double &sum2, double &norm, double &count)	131
13.2.4.24 getOutputVolcorFormat()	131
13.2.4.25 getPhantomByName(string name)	132
13.2.4.26 initAusgabCalls()	132
13.2.4.27 initBCSE(EGS_Input *)	132
13.2.4.28 initCrossSections()	132
13.2.4.29 initDoseScaling(EGS_Input *)	132
13.2.4.30 initEDepScoring(EGS_Input *)	132
13.2.4.31 initGCRScoring(EGS_Input *)	132
13.2.4.32 initGeometry()	133
13.2.4.33 initMuenData(EGS_Input *)	133

13.2.4.34 initOutputFiles(EGS_Input *)	133
13.2.4.35 initPHSPScoring(EGS_Input *)	133
13.2.4.36 initRunControl()	133
13.2.4.37 initRunMode()	133
13.2.4.38 initRussianRoulette(EGS_Input *)	133
13.2.4.39 initScatScoring(EGS_Input *)	134
13.2.4.40 initScoring()	134
13.2.4.41 initSimulation()	134
13.2.4.42 initSource()	134
13.2.4.43 initSourceTransforms()	134
13.2.4.44 initSpectrumScoring(EGS_Input *)	134
13.2.4.45 initTrackLengthScoring(EGS_Input *)	134
13.2.4.46 initVarianceReduction()	134
13.2.4.47 initXCCScaling(EGS_Input *)	135
13.2.4.48 isStuck()	135
13.2.4.49 outputData()	135
13.2.4.50 outputDataHelper(ostream *)	135
13.2.4.51 outputResults()	135
13.2.4.52 printIncludedFiles()	135
13.2.4.53 readData()	135
13.2.4.54 readDataHelper(istream *)	135
13.2.4.55 resetCounter()	136
13.2.4.56 runSimulation()	136
13.2.4.57 simulateSingleShower()	136
13.2.4.58 startNewParticle()	136
13.2.4.59 startNewShower()	136
13.2.5 Member Data Documentation	136
13.2.5.1 active_source	136
13.2.5.2 base_transform	136
13.2.5.3 base_transform_inv	136

13.2.5.4 bcse_factor	137
13.2.5.5 bcse_med_num	137
13.2.5.6 cur_R	137
13.2.5.7 DEFAULT_BCSE_FACTOR	137
13.2.5.8 do_bcse	137
13.2.5.9 do_brem_split	137
13.2.5.10 effective_histories	137
13.2.5.11 escoring	137
13.2.5.12 extra_scoring_doses	137
13.2.5.13 extra_scoring_doses_edep	137
13.2.5.14 extra_scoring_mass	138
13.2.5.15 extra_scoring_reg	138
13.2.5.16 extra_scoring_vols	138
13.2.5.17 file_vc_results	138
13.2.5.18 flu_cutoff	138
13.2.5.19 gcr_phantom	138
13.2.5.20 gcr_phantom_reg	138
13.2.5.21 gen_vc_results	138
13.2.5.22 ginfo	139
13.2.5.23 global_e_max_rr	139
13.2.5.24 global_ecut	139
13.2.5.25 global_i_do_rr	139
13.2.5.26 global_pcut	139
13.2.5.27 gz_data_in	139
13.2.5.28 gz_data_out	139
13.2.5.29 is_phsp_source	139
13.2.5.30 last_position	140
13.2.5.31 last_R	140
13.2.5.32 latch_control	140
13.2.5.33 media_muen	140

13.2.5.34 media_muen_names	140
13.2.5.35 n_stuck	140
13.2.5.36 nbr_split	140
13.2.5.37 nsources	140
13.2.5.38 output_3ddose_files	140
13.2.5.39 output_dose_format	141
13.2.5.40 output_egsdat_format	141
13.2.5.41 output_egsphant	141
13.2.5.42 output_egsphant_format	141
13.2.5.43 output_volcor_format	141
13.2.5.44 output_volcor_phantoms	141
13.2.5.45 output_voxinfo	141
13.2.5.46 output_voxinfo_format	141
13.2.5.47 p_init_locs	142
13.2.5.48 pevent_pub	142
13.2.5.49 phantom_geoms	142
13.2.5.50 phsp	142
13.2.5.51 record_n_init	142
13.2.5.52 recycle_opts	142
13.2.5.53 revision	142
13.2.5.54 run_mode	142
13.2.5.55 run_mode_name	143
13.2.5.56 score_edep	143
13.2.5.57 score_scat	143
13.2.5.58 score_tlen	143
13.2.5.59 single_generator	143
13.2.5.60 source_e_max_rr	143
13.2.5.61 source_ecut	143
13.2.5.62 source_envelope_geom	143
13.2.5.63 source_i_do_rr	144

13.2.5.64 source_pcut	144
13.2.5.65 source_transforms	144
13.2.5.66 source_vc_results	144
13.2.5.67 source_weights	144
13.2.5.68 spectrum_scorers	144
13.2.5.69 steps_at_same_loc	144
13.2.5.70 steps_in_other	144
13.2.5.71 steps_in_phantoms	144
13.2.5.72 steps_in_sources	145
13.2.5.73 superpos_geom	145
13.2.5.74 timing_blocks	145
13.3 EB_IAEASource Class Reference	145
13.3.1 Detailed Description	147
13.3.2 Constructor & Destructor Documentation	147
13.3.2.1 EB_IAEASource(EGS_Input *, EGS_ObjectFactory *f=0)	147
13.3.2.2 ~EB_IAEASource()	147
13.3.3 Member Function Documentation	147
13.3.3.1 addState(istream &data)	147
13.3.3.2 getEmax() const	147
13.3.3.3 getFluence() const	147
13.3.3.4 getNextParticle(EGS_RandomGenerator *rndm, int &q, int &latch, EGS_Float &E, EGS_Float &wt, EGS_	
13.3.3.5 initSourceParams()	148
13.3.3.6 isValid() const	148
13.3.3.7 openPHSPFile()	148
13.3.3.8 resetCounter()	148
13.3.3.9 setSimulationChunk(EGS_I64 nstart, EGS_I64 nrun)	148
13.3.3.10 setState(istream &data)	148
13.3.3.11 storeState(ostream &data) const	148
13.3.4 Member Data Documentation	148
13.3.4.1 count	148

13.3.4.2 Emax	149
13.3.4.3 Emin	149
13.3.4.4 i_parallel	149
13.3.4.5 iaea_header_ext	149
13.3.4.6 is_valid	149
13.3.4.7 n_parallel	149
13.3.4.8 next_source_id	149
13.3.4.9 Nfirst	149
13.3.4.10 Nincident	149
13.3.4.11 Nlast	150
13.3.4.12 Nparticle	150
13.3.4.13 Nphoton	150
13.3.4.14 Npos	150
13.3.4.15 Nread	150
13.3.4.16 Nused	150
13.3.4.17 p_source_id	150
13.3.4.18 phsp_file	150
13.3.4.19 phsp_file_name	151
13.3.4.20 source_id	151
13.4 EB_Phantom Class Reference	151
13.4.1 Detailed Description	154
13.4.2 Member Enumeration Documentation	154
13.4.2.1 GeomDirections	154
13.4.3 Constructor & Destructor Documentation	155
13.4.3.1 EB_Phantom(EGS_Application *, EGS_BaseGeometry *, set< int > global_regions, int nsources, Publics	155
13.4.3.2 ~EB_Phantom()	155
13.4.4 Member Function Documentation	155
13.4.4.1 addState(istream &ifile)	155
13.4.4.2 avgVoxelVol()	155
13.4.4.3 canWrite3ddose(const string &geom_type)	155

13.4.4.4 enableInteractionScoring()	155
13.4.4.5 enableScatterScoring()	155
13.4.4.6 enableTLenScoring()	156
13.4.4.7 getCorrectedVolume(int ireg)	156
13.4.4.8 getCurrentScore(int ireg, double &sum, double &sum2)	156
13.4.4.9 getEGSdatScoringArrays(vector< EGS_ScoringArray * > &scores)	156
13.4.4.10 getRealMass(int ireg)	156
13.4.4.11 getRealRho(int ireg)	156
13.4.4.12 getRegionResults()	156
13.4.4.13 getRegionsWithCorrections()	157
13.4.4.14 getResult(EGS_ScoringArray *, int ireg, string type, EGS_Float &r, EGS_Float &dr)	157
13.4.4.15 getScoringArrays(vector< EGS_ScoringArray * > &scores, vector< string > &types, vector< string > &names)	157
13.4.4.16 getTlenNorm(int ireg)	157
13.4.4.17 getUncorrectedMass(int ireg)	157
13.4.4.18 getUncorrectedVolume(int ireg)	157
13.4.4.19 globalRegIsInPhant(int global_reg)	157
13.4.4.20 globalToLocal(int global_reg)	157
13.4.4.21 needsUserVolumes(const string &geom_type)	158
13.4.4.22 output3DBounds(ostream &out)	158
13.4.4.23 output3ddoseResults(string)	158
13.4.4.24 output3DDoses(ostream &out, EGS_ScoringArray *score, string type)	158
13.4.4.25 outputData(ostream *ofile)	158
13.4.4.26 outputDoseStats(EGS_ScoringArray *score, string type)	158
13.4.4.27 outputEGSPphant(string)	158
13.4.4.28 outputResults(int top_n=20, string output_3ddose=""text"", string output_egsphant=""text"", string output_phant)	159
13.4.4.29 outputTopDoses(int top_n, vector< RegionResult > region_results)	159
13.4.4.30 outputVolumeCorrection(string format)	159
13.4.4.31 outputVoxelInfo(string format)	159
13.4.4.32 readData(istream *ifile)	159
13.4.4.33 resetCounter()	159

13.4.4.34 scoreEdep(int ir, EGS_Float dose)	159
13.4.4.35 scoreTlen(int ir, EGS_Float dose, EGS_Particle *p)	159
13.4.4.36 setCorrectedVolume(int ir, double fraction)	159
13.4.4.37 setDoseScale(EGS_Float)	160
13.4.4.38 setEffectiveHistories(EGS_Float current_case)	160
13.4.4.39 setHistory(EGS_I64 current_case)	160
13.4.4.40 update(EB_Message message, void *data)	160
13.4.4.41 writeEGSPphant(ostream &)	160
13.4.4.42 writeVolumeCorrection(ostream &)	160
13.4.4.43 writeVoxellInfo(ostream &)	160
13.4.5 Member Data Documentation	161
13.4.5.1 app	161
13.4.5.2 autovol_phantom_geom_types	161
13.4.5.3 can_write_3ddose	161
13.4.5.4 corrected_volumes	161
13.4.5.5 cur_history	161
13.4.5.6 dose_scale	161
13.4.5.7 edep_score	161
13.4.5.8 effective_histories	161
13.4.5.9 geometry	162
13.4.5.10 global_reg_start	162
13.4.5.11 global_reg_stop	162
13.4.5.12 global_regions	162
13.4.5.13 mscat_score	162
13.4.5.14 needs_user_geoms	162
13.4.5.15 nsources	162
13.4.5.16 prim_score	162
13.4.5.17 publisher	163
13.4.5.18 sscat_score	163
13.4.5.19 threeddose_geom_types	163

13.4.5.20 <code>tlen_score</code>	163
13.4.5.21 <code>total_radiant_e</code>	163
13.5 EB_Timer Class Reference	163
13.5.1 Detailed Description	164
13.5.2 Constructor & Destructor Documentation	164
13.5.2.1 <code>EB_Timer(string tname, int level)</code>	164
13.5.3 Member Function Documentation	164
13.5.3.1 <code>getDuration()</code>	164
13.5.3.2 <code>getElapsedTime()</code>	164
13.5.3.3 <code>getLevel()</code>	164
13.5.3.4 <code>getName()</code>	164
13.5.3.5 <code>getStartTime()</code>	164
13.5.3.6 <code>getStop()</code>	164
13.5.3.7 <code>isRunning()</code>	165
13.5.3.8 <code>isStopped()</code>	165
13.5.3.9 <code>start()</code>	165
13.5.3.10 <code>stop()</code>	165
13.5.4 Member Data Documentation	165
13.5.4.1 <code>name</code>	165
13.5.4.2 <code>nested_level</code>	165
13.5.4.3 <code>start_time</code>	165
13.5.4.4 <code>stop_time</code>	165
13.5.4.5 <code>timer</code>	165
13.6 EB_TimingTree Class Reference	166
13.6.1 Detailed Description	166
13.6.2 Constructor & Destructor Documentation	166
13.6.2.1 <code>EB_TimingTree()</code>	166
13.6.2.2 <code>~EB_TimingTree()</code>	166
13.6.3 Member Function Documentation	166
13.6.3.1 <code>addTimer(string name)</code>	166

13.6.3.2 outputInfo()	166
13.6.3.3 stopTimer()	167
13.6.4 Member Data Documentation	167
13.6.4.1 level	167
13.6.4.2 running_blocks	167
13.6.4.3 stopped_blocks	167
13.7 EnergyFluenceSpectrumInVoxel Class Reference	167
13.7.1 Detailed Description	168
13.7.2 Constructor & Destructor Documentation	168
13.7.2.1 EnergyFluenceSpectrumInVoxel(EGS_Input *input, EGS_BaseSource *src, GeomInfo *ginfo, Publisher *pub)	168
13.7.3 Member Function Documentation	168
13.7.3.1 getFileExtension() const	168
13.7.3.2 getResult(int bin, EGS_Float &r, EGS_Float &dr)	169
13.7.3.3 getTitle() const	169
13.7.3.4 getYAxisLabel() const	169
13.7.3.5 outputTotal()	169
13.7.3.6 score(EB_Message message, void *data=0)	169
13.7.4 Member Data Documentation	169
13.7.4.1 geometry	169
13.7.4.2 local_scoring_region	169
13.7.4.3 region_volume	170
13.7.4.4 scoring_region	170
13.8 EnergyScoringStats Class Reference	170
13.8.1 Detailed Description	171
13.8.2 Constructor & Destructor Documentation	171
13.8.2.1 EnergyScoringStats(Publisher *publisher)	171
13.8.3 Member Function Documentation	171
13.8.3.1 addState(istream &data)	171
13.8.3.2 energyEscapingGeom()	171
13.8.3.3 energyEscapingSources()	172

13.8.3.4	escapingGeomRatio()	172
13.8.3.5	escapingSourcesRatio()	172
13.8.3.6	getParticleEnergy(const EGS_Particle *p, bool subtractRM=true)	172
13.8.3.7	outputData(ostream *ofile)	172
13.8.3.8	outputResults()	172
13.8.3.9	readData(istream *ifile)	172
13.8.3.10	resetCounter()	172
13.8.3.11	scoreEnergyInitialized(EGS_Float E)	173
13.8.3.12	scoreParticleEscapingGeom(EGS_Particle *p)	173
13.8.3.13	scoreParticleEscapingSource(EGS_Particle *p)	173
13.8.3.14	scoreParticleInitialized(EGS_Particle *p)	173
13.8.3.15	totalEnergyInitialized()	173
13.8.3.16	update(EB_Message message, void *particle)	173
13.8.4	Member Data Documentation	173
13.8.4.1	energy_escaping_geom	173
13.8.4.2	energy_escaping_sources	174
13.8.4.3	total_energy_initialized	174
13.9	EnergyWeightedSurfaceSpectrum Class Reference	174
13.9.1	Detailed Description	175
13.9.2	Constructor & Destructor Documentation	175
13.9.2.1	EnergyWeightedSurfaceSpectrum(EGS_Input *input, EGS_BaseSource *src, GeomInfo *ginfo, Publisher *pub)	175
13.9.3	Member Function Documentation	175
13.9.3.1	getFileExtension() const	175
13.9.3.2	getResult(int bin, EGS_Float &r, EGS_Float &dr)	175
13.9.3.3	getSubTitle() const	175
13.9.3.4	getTitle() const	176
13.9.3.5	getYAxisLabel() const	176
13.9.3.6	outputTotal()	176
13.9.3.7	score(EB_Message message, void *data=0)	176
13.10	ebvolcor::FileResults Struct Reference	176

13.10.1 Detailed Description	177
13.10.2 Constructor & Destructor Documentation	177
13.10.2.1 FileResults()	177
13.10.2.2 FileResults($\text{map} < \text{string}, \text{string} >$ phant_files)	177
13.10.3 Member Function Documentation	177
13.10.3.1 outputResults()	177
13.10.4 Member Data Documentation	177
13.10.4.1 nreg	177
13.10.4.2 phantom_files	177
13.10.4.3 success	177
13.10.4.4 time	177
13.11 GeomInfo Class Reference	178
13.11.1 Detailed Description	179
13.11.2 Constructor & Destructor Documentation	179
13.11.2.1 GeomInfo()	179
13.11.2.2 ~GeomInfo()	179
13.11.3 Member Function Documentation	179
13.11.3.1 build_tree(string root, vector< Node > &children)	179
13.11.3.2 getChildren(string name, EGS_Input *inp)	179
13.11.3.3 getGeomRegs(Node, vector< GeomRegionInfo > &, int)	179
13.11.3.4 globalToLocal(int ir)	180
13.11.3.5 globalToLocalReg(int ir)	180
13.11.3.6 initializeFromInput(EGS_Input *input)	180
13.11.3.7 isPhantom(int ir)	180
13.11.3.8 isSource(int ir)	180
13.11.3.9 localToGlobal(GeomRegT)	180
13.11.3.10 phantomFromRegion(int ir)	180
13.11.3.11 printInfo()	180
13.11.3.12 setGeometryIndexes(EGS_BaseGeometry *sim_geom)	181
13.11.3.13 setGeomMap()	181

13.11.4 Member Data Documentation	181
13.11.4.1 geom_to_regioninfo	181
13.11.4.2 geom_tree	181
13.11.4.3 global_ir_to_geom	181
13.11.4.4 global_ir_to_local_ir	181
13.11.4.5 global_ir_to_phant	181
13.11.4.6 global_ir_to_source	182
13.11.4.7 gmap	182
13.11.4.8 ngeom	182
13.11.4.9 nreg_total	182
13.11.4.10 ordered_geom_data	182
13.11.4.11 phantom_geoms	182
13.11.4.12 phantom_names	182
13.11.4.13 sim_geom_name	183
13.11.4.14 source_envelope_name	183
13.11.4.15 source_names	183
13.12 GeomRegionInfo Struct Reference	183
13.12.1 Detailed Description	183
13.12.2 Member Data Documentation	184
13.12.2.1 children	184
13.12.2.2 end	184
13.12.2.3 name	184
13.12.2.4 nreg	184
13.12.2.5 start	184
13.12.2.6 type	184
13.13 gzstreambase Class Reference	185
13.13.1 Detailed Description	185
13.13.2 Constructor & Destructor Documentation	185
13.13.2.1 gzstreambase()	185
13.13.2.2 gzstreambase(const char *name, int open_mode)	185

13.13.2.3 ~gzstreambase()	185
13.13.3 Member Function Documentation	185
13.13.3.1 close()	185
13.13.3.2 open(const char *name, int open_mode)	186
13.13.3.3 rdbuf()	186
13.13.4 Member Data Documentation	186
13.13.4.1 buf	186
13.14 gzstreambuf Class Reference	186
13.14.1 Detailed Description	187
13.14.2 Constructor & Destructor Documentation	187
13.14.2.1 gzstreambuf()	187
13.14.2.2 ~gzstreambuf()	187
13.14.3 Member Function Documentation	187
13.14.3.1 close()	187
13.14.3.2 flush_buffer()	187
13.14.3.3 is_open()	187
13.14.3.4 open(const char *name, int open_mode)	187
13.14.3.5 overflow(int c=EOF)	188
13.14.3.6 sync()	188
13.14.3.7 underflow()	188
13.14.4 Member Data Documentation	188
13.14.4.1 buffer	188
13.14.4.2 bufferSize	188
13.14.4.3 file	188
13.14.4.4 mode	188
13.14.4.5 opened	188
13.15 eb_tests.iae.IAEAPhaseSpace Class Reference	189
13.15.1 Detailed Description	189
13.15.2 Constructor & Destructor Documentation	189
13.15.2.1 __init__(self, path, mode='r')	189

13.15.3 Member Function Documentation	190
13.15.3.1 <code>_create_source(self)</code>	190
13.15.3.2 <code>_set_path(self, path)</code>	190
13.15.3.3 <code>maximum_energy(self)</code>	190
13.15.3.4 <code>num_orig_particles(self)</code>	190
13.15.3.5 <code>num_particles(self, particle_type='all')</code>	190
13.15.3.6 <code>source_id(self)</code>	190
13.15.4 Member Data Documentation	190
13.15.4.1 <code>_source_id</code>	190
13.15.4.2 <code>access</code>	191
13.15.4.3 <code>header_ext</code>	191
13.15.4.4 <code>path</code>	191
13.15.4.5 <code>phsp_ext</code>	191
13.16eb_tests.iaea_errors.IAEAPhaseSpaceError Class Reference	191
13.16.1 Detailed Description	191
13.16.2 Constructor & Destructor Documentation	191
13.16.2.1 <code>__init__(self, err_id=None, message="")</code>	191
13.16.3 Member Data Documentation	192
13.16.3.1 <code>message</code>	192
13.17eb_tests.iaea_errors.IAEAPhaseSpaceSetupError Class Reference	192
13.17.1 Detailed Description	192
13.18igzstream Class Reference	192
13.18.1 Detailed Description	192
13.18.2 Constructor & Destructor Documentation	193
13.18.2.1 <code>igzstream()</code>	193
13.18.2.2 <code>igzstream(const char *name, int open_mode=std::ios::in)</code>	193
13.18.3 Member Function Documentation	193
13.18.3.1 <code>open(const char *name, int open_mode=std::ios::in)</code>	193
13.18.3.2 <code>rdbuf()</code>	193
13.19Latch Class Reference	193

13.19.1 Detailed Description	194
13.19.2 Member Enumeration Documentation	194
13.19.2.1 Flag	194
13.19.3 Member Function Documentation	195
13.19.3.1 addScatter(EGS_Particle *p)	195
13.19.3.2 addScatter(int &latch)	195
13.19.3.3 checkFlag(Flag flag, EGS_Particle *p)	195
13.19.3.4 checkFlag(Flag flag, int latch)	195
13.19.3.5 hasEscaped(EGS_Particle *p)	195
13.19.3.6 isMultScat(int latch)	195
13.19.3.7 isMultScat(EGS_Particle *p)	195
13.19.3.8 isPrimary(int latch)	195
13.19.3.9 isPrimary(EGS_Particle *p)	196
13.19.3.10sSingleScat(int latch)	196
13.19.3.11sSingleScat(EGS_Particle *p)	196
13.19.3.12setFlag(Flag flag, EGS_Particle *p)	196
13.19.3.13setFlag(Flag flag, int &latch)	196
13.19.3.14setPrimary(int &latch)	196
13.19.3.15setPrimary(EGS_Particle *p)	196
13.19.3.16unsetFlag(Flag flag, EGS_Particle *p)	196
13.19.3.17unsetFlag(Flag flag, int &latch)	196
13.19.3.18update(EB_Message message, void *particle)	197
13.20muen::MuenDataParser Class Reference	197
13.20.1 Detailed Description	198
13.20.2 Constructor & Destructor Documentation	198
13.20.2.1 MuenDataParser()	198
13.20.3 Member Function Documentation	198
13.20.3.1 getMuenInterpolator(string med_name)	198
13.20.3.2 setMuenFile(string filename)	199
13.20.3.3 splitFileByMed(ifstream &in)	199

13.20.4 Member Data Documentation	199
13.20.4.1 med_data	199
13.20.4.2 MUEN_START	199
13.20.4.3 NSKIP	199
13.21 Node Class Reference	199
13.21.1 Detailed Description	200
13.21.2 Constructor & Destructor Documentation	200
13.21.2.1 Node(string n, vector< Node > children)	200
13.21.3 Member Function Documentation	200
13.21.3.1 addNode(Node node)	200
13.21.4 Member Data Documentation	200
13.21.4.1 children	200
13.21.4.2 name	200
13.22 ogzstream Class Reference	200
13.22.1 Detailed Description	201
13.22.2 Constructor & Destructor Documentation	201
13.22.2.1 ogzstream()	201
13.22.2.2 ogzstream(const char *name, int mode=std::ios::out)	201
13.22.3 Member Function Documentation	201
13.22.3.1 open(const char *name, int open_mode=std::ios::out)	201
13.22.3.2 rdbuf()	201
13.23 ebvolcor::Options Class Reference	201
13.23.1 Detailed Description	202
13.23.2 Constructor & Destructor Documentation	203
13.23.2.1 Options(EGS_Input *inp)	203
13.23.2.2 ~Options()	203
13.23.3 Member Function Documentation	203
13.23.3.1 getRandomPoint()	203
13.23.3.2 setBoundsShape()	204
13.23.3.3 setDensity()	204

13.23.3.4 setMode()	204
13.23.3.5 setRNG()	204
13.23.4 Member Data Documentation	204
13.23.4.1 bounds	204
13.23.4.2 bounds_volume	204
13.23.4.3 DEFAULT_RAND_POINT_DENSITY	204
13.23.4.4 density	204
13.23.4.5 input	205
13.23.4.6 mode	205
13.23.4.7 npoints	205
13.23.4.8 rng	205
13.23.4.9 sobolAllowed	205
13.23.4.10 valid	205
13.24PHSPControl Class Reference	205
13.24.1 Detailed Description	206
13.24.2 Member Enumeration Documentation	207
13.24.2.1 ACCESS	207
13.24.2.2 PARTICLE_TYPE	207
13.24.3 Constructor & Destructor Documentation	207
13.24.3.1 PHSPControl(EGS_Input *inp, EGS_AffineTransform *trans, EGS_AdvancedApplication *app, Publisher *pub)	207
13.24.4 Member Function Documentation	207
13.24.4.1 destroySource()	207
13.24.4.2 finish(EGS_I64 n_orig_particles)	207
13.24.4.3 getIAEAParticleType(const EGS_Particle *p)	208
13.24.4.4 initSource()	208
13.24.4.5 outputResults()	208
13.24.4.6 update(EB_Message message, void *particle)	208
13.24.4.7 writeParticle(EGS_Particle *p)	208
13.24.5 Member Data Documentation	208
13.24.5.1 boundary_step	208

13.24.5.2 fname	208
13.24.5.3 id	209
13.24.5.4 kill_after_scoring	209
13.24.5.5 mode	209
13.24.5.6 num_written	209
13.24.5.7 print_header	209
13.24.5.8 transform	209
13.25 Publisher Class Reference	209
13.25.1 Detailed Description	210
13.25.2 Constructor & Destructor Documentation	210
13.25.2.1 Publisher()	210
13.25.2.2 ~Publisher()	210
13.25.3 Member Function Documentation	210
13.25.3.1 getNotifyEnabled() const	210
13.25.3.2 notify(EB_Message message, void *what=0, Subscriber *s=0)	210
13.25.3.3 setNotifyEnabled(bool flag)	210
13.25.3.4 subscribe(Subscriber *s, EB_Message message)	211
13.25.3.5 unsubscribe(Subscriber *s, EB_Message message)	211
13.25.4 Member Data Documentation	211
13.25.4.1 notifyEnabled	211
13.25.4.2 subscribers	211
13.26 RecycleOpts Class Reference	211
13.26.1 Detailed Description	211
13.26.2 Constructor & Destructor Documentation	212
13.26.2.1 RecycleOpts(EGS_Input *inp)	212
13.26.3 Member Function Documentation	212
13.26.3.1 printInfo()	212
13.26.4 Member Data Documentation	212
13.26.4.1 nrecycle	212
13.26.4.2 rotate	212

13.27RegionResult Struct Reference	212
13.27.1 Detailed Description	212
13.27.2 Member Data Documentation	213
13.27.2.1 edep	213
13.27.2.2 edep_err	213
13.27.2.3 reg	213
13.27.2.4 tlen	213
13.27.2.5 tlen_err	213
13.27.2.6 volume	213
13.28ebvolcor::Results Struct Reference	213
13.28.1 Detailed Description	214
13.28.2 Constructor & Destructor Documentation	214
13.28.2.1 Results()	214
13.28.2.2 Results(Options *opts)	214
13.28.3 Member Function Documentation	214
13.28.3.1 outputResults(string extra="")	214
13.28.4 Member Data Documentation	214
13.28.4.1 bounds_volume	214
13.28.4.2 density	214
13.28.4.3 npoints	215
13.28.4.4 other_volume	215
13.28.4.5 regions_corrected	215
13.28.4.6 success	215
13.28.4.7 time	215
13.29Subscriber Class Reference	215
13.29.1 Detailed Description	216
13.29.2 Constructor & Destructor Documentation	216
13.29.2.1 ~Subscriber()	216
13.29.3 Member Function Documentation	216
13.29.3.1 update(EB_Message message, void *what=0)=0	216

13.30SurfaceCountSpectrum Class Reference	216
13.30.1 Detailed Description	217
13.30.2 Constructor & Destructor Documentation	217
13.30.2.1 SurfaceCountSpectrum(EGS_Input *input, EGS_BaseSource *src, GeomInfo *ginfo, Publisher *publisher)	
13.30.3 Member Function Documentation	217
13.30.3.1 getFileExtension() const	217
13.30.3.2 getResult(int bin, EGS_Float &r, EGS_Float &dr)	217
13.30.3.3 getSubTitle() const	217
13.30.3.4 getTitle() const	218
13.30.3.5 getYAxisLabel() const	218
13.30.3.6 outputTotal()	218
13.30.3.7 score(EB_Message message, void *data=0)	218
13.31ebvolcor::VolumeCorrector Class Reference	218
13.31.1 Detailed Description	219
13.31.2 Constructor & Destructor Documentation	219
13.31.2.1 VolumeCorrector(EGS_Input *volcor_input, vector< EB_Phantom * > phantoms, EGS_BaseGeometry)	
13.31.2.2 ~VolumeCorrector()	219
13.31.3 Member Function Documentation	219
13.31.3.1 applyVolumeCorrections(Options *options, HitCounterT hit_counter)	219
13.31.3.2 correctGeneralVolumes()	220
13.31.3.3 correctPhantomVolumesForSources()	220
13.31.3.4 loadFileVolumeCorrections()	220
13.31.3.5 runFileCorrection(EB_TimingTree &timer)	220
13.31.3.6 runGeneralCorrection(EB_TimingTree &timer)	220
13.31.3.7 runSourceCorrection(EB_TimingTree &timer)	220
13.31.3.8 setupOptions()	220
13.31.4 Member Data Documentation	220
13.31.4.1 base_geom	220
13.31.4.2 base_transform	220
13.31.4.3 base_transform_inv	220
13.31.4.4 gen_opts	221
13.31.4.5 ginfo	221
13.31.4.6 input	221
13.31.4.7 phantom_files	221
13.31.4.8 phantoms	221
13.31.4.9 source_opts	221
13.31.4.10 transforms	221

14 File Documentation	223
14.1 doc_utils.py File Reference	223
14.2 egs_brachy.dox File Reference	223
14.3 egs_brachy.md File Reference	223
14.4 gen_docs.py File Reference	223
14.5 gen_geom.py File Reference	224
14.6 gen_media.py File Reference	224
14.7 gen_specs.py File Reference	224
14.8 gen_tests.py File Reference	225
14.9 gen_transport.py File Reference	225
14.10geom.md File Reference	226
14.11media.md File Reference	226
14.12spectra.md File Reference	226
14.13tests.md File Reference	226
14.14transport.md File Reference	226
14.15/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/array_sizes.h File Reference	226
14.15.1 Macro Definition Documentation	226
14.15.1.1 MXMED	226
14.15.1.2 MXSTACK	226
14.16/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_iaeaphsp_source/docs/eb_iaeaphsp_source.dox File Reference	226
14.17/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_iaeaphsp_source/docs/output/html/dynsections.js File Reference	226
14.17.1 Function Documentation	227
14.17.1.1 toggleFolder(id)	227
14.17.1.2 toggleInherit(id)	227
14.17.1.3 toggleLevel(level)	227
14.17.1.4 toggleVisibility(linkObj)	227
14.17.1.5 updateStripes()	227
14.18/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_iaeaphsp_source/docs/output/html/jquery.js File Reference	227
14.18.1 Function Documentation	229
14.18.1.1 a0(bv, e)	229

14.18.1.2 aK(e)	229
14.18.1.3 at()	229
14.18.1.4 b(function(){if(!b.support.reliableMarginRight){b.cssHooks.marginRight={get:function(bw,bv){var e;b.swa	
14.18.1.5 bh()	229
14.18.1.6 each(["height","","width"], function(bv, e){b.cssHooks[e]={get:function(by, bx, bw){var bz;if(bx){if(by.offset	
14.18.1.7 each({slideDown:a0("show", 1), slideUp:a0("hide", 1), slideToggle:a0("toggle", 1), fadeIn:{opacity:"" s	
14.18.1.8 extend({cssHooks:{opacity:{get:function(bw, bv){if(bv){var e=Z(bw,""opacity""),"opacity");return e==="""?b	
14.18.1.9 extend(b.fx,{tick:function(){var bw, bv=b.timers, e=0;for(;e< bv.length;e++){bw=bv[e];if("!bw()&&bv[e]===""	
14.18.1.10f("!b.support.opacity")	230
14.18.1.11f(av.defaultView &&av.defaultView.getComputedStyle)	230
14.18.1.12f(av.documentElement.currentStyle)	230
14.18.1.13f(b.expr &&b.expr.filters)	230
14.18.1.14f(typeof define==="function"">&&define.amd &&define.amd.jQuery)	230
14.18.1.15f("getBoundingClientRect"in av.documentElement)	231
14.18.1.16f(by, bw, bv)	231
14.18.1.17f(bx)	231
14.18.2 Variable Documentation	231
14.18.2.1 aD	231
14.18.2.2 ad	231
14.18.2.3 aM	231
14.18.2.4 ap	231
14.18.2.5 aQ	231
14.18.2.6 au	231
14.18.2.7 aZ	232
14.18.2.8 b	232
14.18.2.9 bb	240
14.18.2.10bq	240
14.18.2.11bs	240
14.18.2.12c	240
14.18.2.13css	241

14.18.2.14curCSS	241
14.18.2.15else	241
14.18.2.16Query	241
14.18.2.17k	241
14.18.2.18_	241
14.18.2.19prototype	242
14.18.2.20V	242
14.18.2.21window	242
14.18.2.22Z	242
 14.19/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_ieaphsp_source/docs/output/html/search/all_0.js File Reference	
14.19.1 Variable Documentation	243
14.19.1.1 searchData	243
 14.20/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_ieaphsp_source/docs/output/html/search/all_1.js File Reference	
14.20.1 Variable Documentation	243
14.20.1.1 searchData	243
 14.21/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/egs_brachy/eb_ieaphsp_source/docs/output/html/search/all_2.js File Reference	
14.21.1 Variable Documentation	244
14.21.1.1 searchData	244
 14.22/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/egs_brachy/eb_ieaphsp_source/docs/output/html/search/all_3.js File Reference	
14.22.1 Variable Documentation	244
14.22.1.1 searchData	244
 14.23/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/egs_brachy/eb_ieaphsp_source/docs/output/html/search/classes_0.js File Reference	
14.23.1 Variable Documentation	245
14.23.1.1 searchData	245
 14.24/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/egs_brachy/eb_ieaphsp_source/docs/output/html/search/files_0.js File Reference	
14.24.1 Variable Documentation	245
14.24.1.1 searchData	245
 14.25/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/egs_brachy/eb_ieaphsp_source/docs/output/html/search/functions_0.js File Reference	
14.25.1 Variable Documentation	246
14.25.1.1 searchData	246

14.26/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_ieaphsp_source/docs/output/html/search/search.js File Reference	
14.26.1 Function Documentation	246
14.26.1.1 convertTold(search)	246
14.26.1.2 createResults()	246
14.26.1.3 getXPos(item)	246
14.26.1.4 getYPos(item)	247
14.26.1.5 SearchBox(name, resultsPath, inFrame, label)	247
14.26.1.6 SearchResults(name)	247
14.26.1.7 setClassAttr(elem, attr)	247
14.26.1.8 setKeyActions(elem, action)	247
14.26.2 Variable Documentation	247
14.26.2.1 indexSectionNames	247
14.26.2.2 indexSectionsWithContent	247
14.27/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_ieaphsp_source/docs/output/html/search/variables_0.js File Reference	
14.27.1 Variable Documentation	248
14.27.1.1 searchData	248
14.28/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_ieaphsp_source/docs/output/html/search/variables_1.js File Reference	
14.28.1 Variable Documentation	248
14.28.1.1 searchData	248
14.29/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/egs_brachy/eb_ieaphsp_source/docs/output/html/search/variables_2.js File Reference	
14.29.1 Variable Documentation	249
14.29.1.1 searchData	249
14.30/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/egs_brachy/eb_ieaphsp_source/docs/output/html/search/variables_3.js File Reference	
14.30.1 Variable Documentation	249
14.30.1.1 searchData	249
14.31/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/egs_brachy/eb_ieaphsp_source/eb_ieaphsp_source.cpp File Reference	249
14.32/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/egs_brachy/eb_ieaphsp_source/eb_ieaphsp_source.h File Reference	250
14.32.1 Detailed Description	250
14.32.2 Macro Definition Documentation	250
14.32.2.1 EB_IAEA_SOURCE_EXPORT	250

14.32.2.2 EB_IAEA_SOURCE_LOCAL	250
14.33/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/__init__.py File Reference . . .	251
14.34/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/brem_cyl/__init__.py File Reference	251
14.35/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/flu_cutoff/__init__.py File Reference	251
14.36/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/phsp_run/__init__.py File Reference	251
14.37/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/phsp_scoring/__init__.py File Reference	251
14.38/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/recycling/__init__.py File Reference	251
14.39/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/scatter/__init__.py File Reference	252
14.40/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/seeds_in_xyz/__init__.py File Reference	252
14.41/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/seeds_in_xyz_genvelope/__init__.py File Reference	252
14.42/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/simple_dose_sph/__init__.py File Reference	252
14.43/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/single_generator/__init__.py File Reference	252
14.44/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/source_energies/__init__.py File Reference	252
14.45/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/spec_absolute/__init__.py File Reference	253
14.46/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/spec_eflu/__init__.py File Reference	253
14.47/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/spec_vox/__init__.py File Reference	253
14.48/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/stepped_source/__init__.py File Reference	253
14.49/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/tg43mode/__init__.py File Reference	253
14.50/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/tg43mode_recycle/__init__.py File Reference	253
14.51/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/tg43mode_zeroweight/__init__.py File Reference	254
14.52/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/variable_activity/__init__.py File Reference	254
14.53/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/variable_w_recycling/__init__.py File Reference	254
14.54/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/volume_correction/__init__.py File Reference	254
14.55/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/brem_cyl/test.py File Reference	254
14.56/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/flu_cutoff/test.py File Reference	255
14.57/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/phsp_run/test.py File Reference	255
14.58/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/phsp_scoring/test.py File Reference	255
14.59/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/recycling/test.py File Reference	256
14.60/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/scatter/test.py File Reference .	256
14.61/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/seeds_in_xyz/test.py File Reference	257

14.62/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/seeds_in_xyz_genvelope/test.py File Reference	257
14.63/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/simple_dose_sph/test.py File Reference	257
14.64/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/single_generator/test.py File Reference	258
14.65/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/source_energies/test.py File Reference	258
14.66/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/spec_absolute/test.py File Reference	259
14.67/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/spec_eflu/test.py File Reference	259
14.68/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/spec_vox/test.py File Reference	260
14.69/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/stepped_source/test.py File Reference	260
14.70/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/tg43mode/test.py File Reference	261
14.71/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/tg43mode_recycle/test.py File Reference	261
14.72/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/tg43mode_zeroweight/test.py File Reference	261
14.73/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/variable_activity/test.py File Reference	262
14.74/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/variable_w_recycling/test.py File Reference	262
14.75/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/volume_correction/test.py File Reference	263
14.76/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/iaea.py File Reference	263
14.77/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/iaea_errors.py File Reference .	263
14.78/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/iaea_types.py File Reference .	264
14.79/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/utils.py File Reference	264
14.80/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_volcor.cpp File Reference	265
14.80.1 Detailed Description	265
14.81/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_volcor.h File Reference	266
14.81.1 Detailed Description	267
14.82/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/egs_brachy.cpp File Reference	267
14.82.1 Detailed Description	268
14.82.2 Macro Definition Documentation	268
14.82.2.1 egsGetElectronData	268
14.82.2.2 egsGetPhotonData	268
14.82.2.3 egsGetRNGArray	268
14.82.2.4 egsGetRNGPointers	268
14.82.2.5 egsGetSteps	269

14.82.2.6 egsOpenUnits	269
14.82.2.7 egsSetRNGState	269
14.82.2.8 egsSetSteps	269
14.82.3 Function Documentation	269
14.82.3.1 APP_MAIN(EB_Application)	269
14.82.3.2 containsInclude(string str)	269
14.82.3.3 egsGetElectronData(void(*func)(EGS_I32 *, EGS_Float *, EGS_Float *, EGS_Float *, EGS_Float *), const char *)	269
14.82.3.4 egsGetPhotonData(void(*func)(EGS_I32 *, EGS_Float *, EGS_Float *, EGS_Float *, EGS_Float *), const char *)	269
14.82.3.5 egsGetRNGArray(EGS_Float *)	269
14.82.3.6 egsGetRNGPointers(EGS_I32 *, EGS_I32 *)	269
14.82.3.7 egsGetSteps(double *, double *)	269
14.82.3.8 egsOpenUnits(const EGS_I32 *)	269
14.82.3.9 egsSetRNGState(const EGS_I32 *, const EGS_Float *)	269
14.82.3.10 egsSetSteps(const double *, const double *)	269
14.82.3.11 F77_OBJ_(egs_scale_xcc, EGS_SCALE_XCC)(const int *	269
14.82.3.12 F77_OBJ_(egs_scale_bc, EGS_SCALE_BC)(const int *	269
14.82.3.13 F77_OBJ_(egs_bcse, EGS_BCSE)(const int *	269
14.82.3.14 F77_OBJ_(egs_uniform_photons, EGS_UNIFORM_PHOTONS)(const int *	269
14.82.3.15 getMuenForMedia(EGS_Input *scoring_options)	269
14.82.3.16 printParticleWithSpherical(EGS_Particle p)	270
14.83/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy.h File Reference	270
14.83.1 Detailed Description	271
14.83.2 Macro Definition Documentation	271
14.83.2.1 EB_EPSILON	271
14.83.2.2 NUM_STUCK_STEPS	271
14.83.2.3 PRINT_PARTICLE	271
14.83.2.4 PRINT_PARTICLE_WITH_DIR	271
14.83.2.5 SAME_POSITION_TOLERANCE	271
14.84/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/ginfo.cpp File Reference	271
14.84.1 Detailed Description	272

14.84.2 Typedef Documentation	272
14.84.2.1 CDGeomRegType	272
14.84.3 Function Documentation	272
14.84.3.1 countAutoEnvelopeInscribed(EGS_Input *input)	272
14.84.3.2 findGeomInVec(EGS_BaseGeometry *geom, vector< string > geoms)	272
14.84.3.3 getAutoEnvelopeChildren(EGS_Input *input)	272
14.84.3.4 getCDChildren(EGS_Input *input)	273
14.84.3.5 getGEnvelopeChildren(EGS_Input *input)	273
14.84.3.6 getGeomBaseName(EGS_Input *input)	273
14.84.3.7 getGStackChildren(EGS_Input *input)	273
14.84.3.8 getNDChildren(EGS_Input *input)	273
14.84.3.9 getUnionChildren(EGS_Input *input)	273
14.84.3.10 join(const vector< string > &v, string delim)	273
14.84.3.11 maxNRegOfGeoms(vector< string > gnames, int start)	273
14.84.3.12 hregForSubDiv(GeomRegionInfo gri, int idx)	273
14.84.3.13 pairCompare(const CDGeomRegType &firstElem, const CDGeomRegType &secondElem)	273
14.85/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/ginfo.h File Reference	274
14.85.1 Detailed Description	274
14.85.2 Typedef Documentation	274
14.85.2.1 GeomRegionInfoMapT	274
14.85.2.2 GeomRegT	274
14.86/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/gzstream/gzstream.C File Reference	275
14.87/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/gzstream/gzstream.h File Reference	275
14.88/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/gzstream/LICENSE.txt File Reference	275
14.88.1 Function Documentation	297
14.88.1.1 and(2) we offer you this license	297
14.88.1.2 Copyright(C) 1991	297
14.88.1.3 distributed(in either source or binary form) with the major components(compiler	297
14.88.1.4 employer(if you work as a programmer) or your school	297
14.88.1.5 Frob(a library for tweaking knobs) written by James Random Hacker.< signature of Ty Coon >	297

14.88.1.6 functions(ten lines or less in length)	298
14.88.1.7 Library(or with a work based on the Library) on a volume of a storage or distribution medium does not bri	
14.88.1.8 Library(or a portion or derivative of it, under Section 2) in object code or executable form under the terms	
14.88.1.9 Library(because it contains portions of the Library)	298
14.88.1.10Library(It is understood that the user who changes the contents of definitions files in the Library will not n	
14.88.1.11Library(or any work based on the Library)	299
14.88.1.12LIBRARY(INCLUDING BUT NOT LIMITED TO LOSS OF DATA OR DATA BEING RENDERED INACCURATE)	
14.88.1.13License(If a newer version than version 2 of the ordinary GNU General Public License has appeared, then the	
14.88.1.14meaningful(For example, a function in a library to compute square roots has a purpose that is entirely we	
14.88.1.15or(at your option) any later version.This library is distributed in the hope that it will be useful	300
14.88.1.16reason(not limited to patent issues)	300
14.88.1.17software(and charge for this service if you wish)	300
14.88.1.18terms(or, alternatively, under the terms of the ordinary General Public License).To apply these terms	301
14.88.1.19work(Executables containing this object code plus portions of the Library will still fall under Section 6.) O	
14.88.1.20you(whether by court order, agreement or otherwise) that contradict the conditions of this License	302
14.88.2 Variable Documentation	302
14.88.2.1 above	302
14.88.2.2 ABOVE	302
14.88.2.3 accessors	303
14.88.2.4 addition	303
14.88.2.5 Also	303
14.88.2.6 and	303
14.88.2.7 any	303
14.88.2.8 apply	304
14.88.2.9 Boston	304
14.88.2.10case	304
14.88.2.11CHARGE	305
14.88.2.12circumstance	305
14.88.2.13claims	306
14.88.2.14code	306

14.88.2.15conditions	306
14.88.2.16contrast	307
14.88.2.17Coon	307
14.88.2.18copies	307
14.88.2.19copy	308
14.88.2.20copying	309
14.88.2.21countries	309
14.88.2.22DAMAGES	309
14.88.2.23DEFECTIVE	310
14.88.2.24distribute	310
14.88.2.25distributor	310
14.88.2.26document	311
14.88.2.27example	311
14.88.2.28exception	311
14.88.2.29executable	312
14.88.2.30fee	312
14.88.2.31Finally	312
14.88.2.32Foundation	312
14.88.2.33GENERAL	312
14.88.2.34HOLDER	313
14.88.2.35However	313
14.88.2.36f	314
14.88.2.37IMPLIED	314
14.88.2.38inc	314
14.88.2.39INCLUDING	314
14.88.2.40interfaces	315
14.88.2.41invoked	315
14.88.2.42isolation	315
14.88.2.43t	315
14.88.2.44kernel	315

14.88.2.45KIND	316
14.88.2.46libraries	316
14.88.2.47library	316
14.88.2.48Library	317
14.88.2.49LIBRARY	317
14.88.2.50license	317
14.88.2.51License	318
14.88.2.52method	318
14.88.2.53modify	318
14.88.2.54names	318
14.88.2.55not	318
14.88.2.56number	319
14.88.2.57obligations	319
14.88.2.58offer	320
14.88.2.59on	320
14.88.2.60one	320
14.88.2.61operates	320
14.88.2.62parameters	320
14.88.2.63permitted	321
14.88.2.64Place	321
14.88.2.65place	321
14.88.2.66programs	321
14.88.2.67public	321
14.88.2.68rather	322
14.88.2.69recipients	322
14.88.2.70rights	322
14.88.2.71runs	322
14.88.2.72sample	323
14.88.2.73Section	323
14.88.2.74SERVICING	323

14.88.2.75	so	324
14.88.2.76	software	324
14.88.2.77	SPECIAL	325
14.88.2.78	sublicense	325
14.88.2.79	Subsection	325
14.88.2.80	Suite	325
14.88.2.81	system	326
14.88.2.82	able	326
14.88.2.83	terms	326
14.88.2.84	that	326
14.88.2.85	themselves	326
14.88.2.86	Therefore	327
14.88.2.87	these	327
14.88.2.88	hey	327
14.88.2.89	things	328
14.88.2.90	Thus	328
14.88.2.91	TO	328
14.88.2.92	oo	328
14.88.2.93	unrestricted	329
14.88.2.94	use	329
14.88.2.95	Version	329
14.88.2.96	version	329
14.88.2.97	void	330
14.88.2.98	warranty	330
14.88.2.99	WARRANTY	330
14.88.2.100	hole	331
14.88.2.101	with	331
14.88.2.102	work	331
14.88.2.103	years	332
14.88.2.104	bu	332

14.89/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/latch.cpp File Reference	332
14.89.1 Detailed Description	333
14.90/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/latch.h File Reference	333
14.90.1 Detailed Description	333
14.91/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/lib/geometry/sources/README.md File Reference	333
14.92/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/muen.h File Reference	333
14.92.1 Detailed Description	334
14.93/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/phantom.cpp File Reference	334
14.93.1 Detailed Description	335
14.93.2 Function Documentation	335
14.93.2.1 edepRegTopResultCompare(const RegionResult &firstElem, const RegionResult &secondElem)	335
14.93.2.2 space2underscore(std::string text)	335
14.93.2.3 tlenRegTopResultCompare(const RegionResult &firstElem, const RegionResult &secondElem)	335
14.94/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/phantom.h File Reference	335
14.94.1 Detailed Description	336
14.95/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/phsp.cpp File Reference	336
14.95.1 Detailed Description	336
14.95.2 Function Documentation	336
14.95.2.1 dirExists(string path)	336
14.96/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/phsp.h File Reference	336
14.96.1 Detailed Description	337
14.97/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/pubsub.cpp File Reference	337
14.98/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/pubsub.h File Reference	337
14.98.1 Detailed Description	337
14.98.2 Typedef Documentation	338
14.98.2.1 SendMessage	338
14.98.3 Enumeration Type Documentation	338
14.98.3.1 EB_Message	338
14.99/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/recycle.cpp File Reference	338
14.99.1 Detailed Description	338
14.10/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/recycle.h File Reference	339
14.100.Detailed Description	339
14.101/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/run_tests.py File Reference	339
14.102/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/spec_scoring.cpp File Reference	340
14.102.Detailed Description	340
14.102.Function Documentation	340
14.102.1getFileNameFromPath(const string &s)	340
14.102.2string_format(const std::string fmt,...)	341
14.103/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/spec_scoring.h File Reference	341
14.103.Detailed Description	341
14.104/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/timing.h File Reference	341

Chapter 1

Main Page

1.1 General Information

egs_brachy is an egs++ application for rapid brachytherapy calculations for both photon and electron sources. The current documentation serves as a Technical Reference Manual to complement the egs_brachy user manual (https://clrp-code.github.io/egs_brachy/pdf/egs_brachy_user_manual.pdf) and our initial egs_brachy paper (https://clrp-code.github.io/egs_brachy/pdf/egs_brachy_paper2016.pdf) : MJP Chamberland, REP Taylor, DWO Rogers, and RM Thomson, egs_brachy: a versatile and fast Monte Carlo code for brachytherapy, Phys. Med. Biol. 61, 8214-8231 (2016). Please cite this paper when egs_brachy is used in publications.

egs_brachy was written by Randle Taylor in collaboration with Marc Chamberland, Dave Rogers, and Rowan Thomson of the Carleton Laboratory for Radiotherapy Physics.

For more information please contact:

- Rowan Thomson (rthomson@physics.carleton.ca) -or-
- Dave Rogers (drogers@physics.carleton.ca) -or-
- Randle Taylor (randle.taylor@gmail.com)

1.2 License

The egs_brachy code (all pieces of code associated with the egs_brachy code system) is copyrighted Rowan Thomson, Dave Rogers, Randle Taylor, and Marc Chamberland. egs_brachy is distributed in the hope that it will be useful, but without any warranty; without even the implied warranty of merchantability or fitness for a particular purpose. egs_brachy is distributed as free software according to the terms of the GNU Affero General Public License as published by the Free Software Foundation, either version 3 of the License, or (at your option), any later version (<https://www.gnu.org/licenses/>). (See also section 2 of the User Manual for egs_brachy : https://clrp-code.github.io/egs_brachy/pdf/egs_brachy_user_manual.pdf)

1.3 Installation instructions (including EGSnrc installation)

```
git clone https://github.com/clrp-code/EGSnrc_with_egs_brachy.git
cd EGSnrc_with_egs_brachy
```

Checkout the most-up-to-date 'egs_brachy' branch and download the egs_brachy user code:

```
git checkout egs_brachy
git submodule update --init --recursive
```

Finally, configure EGSnrc by following the instructions for your OS (skip Step 2, which is already completed if you've been following these instructions):

- Linux: <https://github.com/nrc-cnrc/EGSnrc/wiki/Install-EGSnrc-on-Linux>
- Mac: <https://github.com/nrc-cnrc/EGSnrc/wiki/Install-EGSnrc-on-OS-X-El-Capitan>
- Windows: <https://github.com/nrc-cnrc/EGSnrc/wiki/Install-EGSnrc-on-Windows>

At this point you should have everything required to run egs_brachy. If you did not choose to compile it when configuring EGSnrc, you should do so now:

```
cd $EGS_HOME/egs_brachy
make
```

1.4 Usage

1.4.1 Run Control

egs_brachy uses the same run control block as other egs++ user codes with the addition of one extra input egsdat file format which you can use to tell egs_brachy to output its egsdat file in gzip format. Using gzip format can result in significantly smaller egsdat file sizes for simulations with a large number of regions defined.

```
:start run control:
  ncase = 10000
  nbatch=1
  geometry error limit = 10
  egsdat file format = gzip # gzip or text
:stop run control:
```

1.4.2 Run Modes

There are currently three different run modes available in egs_brachy:

1. 'normal' (default): a regular simulation. For an example see `tests/seeds_in_xyz/seeds_in_xyz.egsinp`.
2. 'superposition' : This type of simulation requires the used of an EGS_ASwitchedEnvelope as the simulation geometry. At the start of every history only a single inscribed geometry will be activated. This allows you to explore the effects of intersource attenuation by performing TG-43 dose superposition type calculations. For an example see `tests/tg43mode/tg43mode.egsinp`.
3. 'volume correction only': Just run the volume correction routines, print the results and then quit. No actual dose calculations will be done. For an example see `tests/volume_correction/vc.egsinp`.

The run mode is set using a 'run mode' input block:

```
:start run mode:  
    run mode = normal # 'normal', 'superposition', or 'volume correction only'  
:stop run mode:
```

In simulations with more than a single source, egs_brachy uses the first source as a particle generator. That is, all particles are initiated at the location of the first source and transported until they escape the source geometry. From there, the particle is moved to the location of the next source before transport continues (more accurately, a new particle is added to the top of the stack at the location of the chosen source and the original particle is killed).

This behaviour can be disabled by setting `single generator = no` in the run mode block (see `tests/single_generator/single_generator.egsinp`).

```
:start run mode:  
    run mode = normal  
    single generator = no  
:stop run mode:
```

Disabling the single generator (see `tests/single_generator/multiple_generator.egsinp`) mode may be slightly faster for some simulations (there is an extra call to `howfar` for every particle escaping the source geometry in single generator mode). Note that in some situations (particle recycling for example) single generator will always be enabled by egs_brachy.

1.4.3 Geometry Specification

In general, arbitrary egs++ geometries can be included in a simulation although, for the sake of efficiency, it is expected that EGS_AEnvelope geometries will be used for most simulations.

There are three egs_brachy specific input keys that are required for the 'geometry definition' input block (in addition to the standard egs++ 'simulation geometry' key):

1. 'source geometries' : this key specifies which geometries define the actual brachytherapy source object. This may be a single geometry name (e.g. when using the `egs_glib` shim to load an externally defined geometry) or a list of all the sub-geometries used to compose a single source geometry when defining geometries inline.

2. 'phantom geometries': this tells egs_brachy which geometries to score dose in (1 or more phantom geometries are required). Currently 3 geometry types are allowed to be used as phantoms:
 - (a) EGS_XYZGeometry (library egs_ndgeometry, see [tests/seeds_in_xyz/seeds_in_xyz.egsinp](#))
 - (b) EGS_RZGeometry (library egs_rz, see [tests/stepped_source/stepped.egsinp](#))
 - (c) EGS_cSpheres (library egs_spheres, see [tests/scatter/scatter.egsinp](#))
3. 'source envelope geometry': this input is only required for superposition run mode and must name the EG←S_ASwitchedEnvelope geometry that contains the sources.

Other phantom geometry types could be added in future provided they implement the getBound, getNRegDir, and getMass methods of the EGS_BaseGeometry class.

An (abbreviated) example geometry specification might look like:

```
:start geometry definition:

# all geometries that are a part of the source
source geometries = planes, end_cap_1, seed_middle, end_cap_2, seed

phantom geometries = phantom

simulation geometry = phantom_w_seeds

# only required for superposition run mode
source envelope geometry = phantom_w_seeds

:start geometry:

  name = phantom
  library = egs_ndgeometry
  type    = EGS_XYZGeometry

  # rest of geom definition

:stop geometry:

:start geometry:
  library = egs_planes
  name = planes
  # ...
:stop geometry:

:start geometry:
  name = end_cap_1
  #...
:stop geometry:

:start geometry:
  name = seed_middle
  #...
:stop geometry:

:start geometry:
  name = end_cap_2
  #...
:stop geometry:

:start geometry:

  library = egs_cdgeometry
  name = seed
  base geometry = planes
  set geometry = 0 end_cap_1
  set geometry = 1 seed_middle
  set geometry = 2 end_cap_2

:stop geometry:
```

```
:start geometry:
library = egs_autoenvelope
name = phantom_w_seeds
base geometry = phantom

:start inscribed geometry:
inscribed geometry name = seed
# rest of auto envelope inscribed geom definition

:stop inscribed geometry:

:stop geometry:
:stop geometry definition:
```

1.4.3.1 Using CT data to create phantoms

Using the `egs_glib` geometry library you can construct an `EGS_XYZGeometry` using a `.egsphant` file like so:

```
:start geometry:
library = egs_glib
type = egsphant
name = my_egsphant_geom
egsphant file = /path/to/some/egsphant/file
density file = /path/to/density/file
:stop geometry:
```

The `egsphant` file may either be a typical `.egsphant` text file or gzipped `.egsphant.gz` file, and the latter compressed format is often advantageous in terms of memory) The density file indicates to `egs_brachy` the nominal density of each medium in the `egsphant` (voxel-by-voxel densities are defined in the `egsphant` file), and currently `egs_brachy` can read these data from a (a) material.dat file, (b) pgs4 data file, or (c) a simple text file of the format:

```
MEDIUM=WATER
RHO=1.000
MEDIUM=AIR
RHO=1.2E-3
```

Note the `egs_glib` geometry library in the main EGSnrc repository does not currently contain support for `egsphant` files. The `egs_glib` contained in the `egs_brachy` git branch is customized to include support for `egsphant` files.

It is also possible to use the `egs_ndgeometry` library to construct an `EGS_XYZGeometry` using a `.egsphant` file like so:

```
:start geometry:
library = egs_ndgeometry
type = EGS_XYZGeometry
name = my_egsphant_geom
egsphant file = /path/to/some/egsphant/file
ct ramp = /path/to/ramp/file.ramp

:stop geometry:
```

See the `egs_ndgeometry` documentation for details about the format of the `ct ramp` file. Note, however, that the `egs_ndgeometry` approach assumes that there is no overlap in voxel mass densities for different media in the `egsphant`, i.e., each medium has a distinct and non-overlapping range of mass densities. This is often *not* the case for brachytherapy phantoms, and so using the `egs_glib` geometry with `.egsphant` files (gzip format) is recommended.

1.4.3.2 The geometry library

The geometry library (see [The Geometry Library](#) below) consists of useful phantom geometries ([lib/geometry/phantoms](#)), source geometries and radioactivity distributions [lib/geometry/sources](#), eye plaques [lib/geometry/eye_plaques](#) and sets of transformations [lib/geometry/transformations/](#).

1.4.4 Scoring options

The 'scoring options' input block currently has the following keys:

- 'muen file': path to the file containing the muen data required for the simulation. See the MuenDataParser class for more information about the format of this file.
- 'muen for media': (Optional) a list of the materials that muen data is required for. Dose will be set to 0 for any phantom media that don't have muen data available. (Can be used instead of or in conjunction with `muen for medium`).
- 'muen for medium': (Optional) one or more input blocks which specify the muen dataset to be used for a given transport medium. (Can be used instead of or in conjunction with `muen for media`) This allows you to, for example, transport particles in tissue but score in water with notation $D_{w,m}$ according to the conventions of TG-186.

```
:start muen for medium:
    transport medium = WATER
    scoring medium = TISSUE
:stop muen for medium:
```

- 'score tracklength dose' : (Optional) Controls whether dose using a tracklength estimator is scored in the phantom geometries. The choices are 'yes' (default) or 'no'.
- 'score energy deposition' : (Optional) Controls whether dose from particle interactions is scored in the phantom geometries. The choices are 'yes' or 'no' (default). See [tests/brem_cyl/brem_cyl.egsinp](#) for an example
- 'score scatter dose' : (Optional) Controls whether scatter dose (normalized to total radiant energy) is scored in the phantom geometries. The choices are 'yes' or 'no' (default). See [tests/scatter/scatter.egsinp](#) for an example.
- 'spectrum scoring': (Optional) zero or more input blocks specifying spectra to score (described below). See [tests/spec_absolute/spec_absolute.egsinp](#), [tests/spec_eflu/spec_eflu.egsinp](#), and [tests/spec_vox/spec_vox.egsinp](#) for examples.
- 'phsp scoring': (Optional) zero or one input block specifying whether to score a phase space on the surface of the source (described below). See [tests/phsp_scoring/phsp_score.egsinp](#) for an example.
- 'dose file format': (Optional) Controls whether 3ddose files are written as text or gzipped text files. Options are 'text' (default) and 'gzip'.
- 'output egsphant files': (Optional) Controls whether egsphant files are created for scoring phantoms. Options are 'no' (default) and 'yes'.
- 'egsphant file format': (Optional) Controls whether egsphant files are written as text or gzipped text files. Options are 'text' (default) and 'gzip'.
- 'output voxel info files': (Optional) Controls whether voxel info files are created for scoring phantoms. Options are 'no' (default) and 'yes'. See below for a description of these files. See [tests/volume_correction/vc.egsinp](#) for an example.

- 'voxel info file format': (Optional) Controls whether voxel info files are written in text (default) or gzip format
- 'output volume correction files for phantoms': (Optional) Controls which phantoms will have volume correction files created.
- 'volume correction file format': (Optional) Controls whether volume correction files are written in text (default) or gzip format
- 'record initial particle positions': (Optional) If this is set to a number N, where N > 0, then the first N initial particle positions will be written to a .pinit file. You can use this file to visualize the initial particle positions using gnuplot for example.
- 'current result phantom region': (Optional) Controls which phantom region is used for displaying results at the end of each batch and/or terminating the calculation if the required statistical uncertainty is reached. Defaults to region 0 of the first phantom object. Currently the result of the tracklength dose scoring is always used. See [tests/brem_cyl/brem_cyl.egsinp](#) for an example.
- 'dose scaling factor': (Optional) Allows you to scale all dose files output by egs_brachy by a constant factor.

A sample 'scoring options' block looks like this:

```
:start scoring options:

score tracklength dose = yes # 'yes' (default) or 'no'
score energy deposition = no # 'no' (default) or 'yes'
score scatter dose = yes # 'no' (default) or 'yes'
muen file = /home/randlet/egs/HEN_HOUSE/muen_data/brachy_xcom_1.5MeV.muendat
muen for media = WATER_0.998, AIR_TG43

dose file format = gzip # text or gzip

output egsphant files = yes
egsphant file format = gzip

output voxel info files = no
voxel info file format = text # text or gzip

output volume correction files for phantoms = phantom1, phantom2
volume correction file format = gzip # text or gzip

current result phantom region = phantom 123 # phant name and reg number

dose scaling factor = 1

:start spectrum scoring:
    type = surface count
    particle type = photon
    minimum energy = 0.001
    maximum energy = 0.040
    number of bins = 100
    output format = xmgr
:stop spectrum scoring:

:start phsp scoring:
    phsp output directory = /home/randlet/egs/egsnrc/egs_brachy/
    access mode = write
    print header = no
    kill after scoring = yes
:stop phsp scoring:

:stop scoring options:
```

1.4.4.1 Volume correction files

If one or more phantoms are specified in 'output volume correction files for phantoms' then egs_brachy will output a file containing region numbers and the corrected volumes for any regions which has had its volume corrected.

File mode is specified with the 'volume correction file format' input and can either be 'text' or 'gzip'.

These volume correction files allow you to precompute volume corrections for a given geometry arrangement and can then be used in conjunction with the 'volume correction from file' volume correction option. This can be particularly useful when running a simulation in parallel. A single job in "volume correction only" mode can be run to initially calculate the volume corrections and then the parallel jobs can use the precomputed volume corrections values eliminating the redundant calculation of volume corrections by every job in your parallel run.

The input file `tests/volume_correction/vc.egsinp` demonstrates this feature.

1.4.4.2 Spectrum Scoring Options

`egs_brachy` can currently score three different type of spectra:

1. Absolute counts of particles escaping the surface of the source (See `tests/spec_absolute/spec_absolute.egsinp`)
2. Energy weighted spectra of particles on the surface of the source (See `tests/spec_eflu/spec_eflu.egsinp`)
3. Photon energy fluence in a single geometry region (See `tests/spec_vox/spec_vox.egsinp`)

To score a spectrum, add one or more 'spectrum scoring' input blocks to the 'scoring options' block (you may add an arbitrary number of 'spectrum scoring' blocks.)

Note that for the 'energy fluence in region' spectrum type, it is essential that the scoring region has no other overlapping geometries.

Spectrum scoring input options are explained below.

```
:start scoring options:
...
:start spectrum scoring:
    type = surface count # surface count, energy weighted surface, energy fluence in region
    particle type = photon # photon, electron, positron
    minimum energy = 0.001 # defaults to 0.001MeV
    maximum energy = 1.00 # defaults to max energy of source
    number of bins = 1000 # defaults to 100
    output format = xmgr # xmgr (default), csv, egsnrc

    file extension = my_spectrum # (optional)

    # egsnrc 'output format' only
    egsnrc format mode = 0 # 0, 1, 2

    # 'energy fluence in region' mode only
    geometry = your_geom_name
    scoring region = 10 # region of specified geometry to score fluence in (defaults to 0 )

:stop spectrum scoring:
:stop scoring options:
```

1.4.4.3 Phase Space Scoring Options

`egs_brachy` has the ability to score an IAEA format phase space file of all particles escaping the source geometry. This phase space can then be used as a particle source in future simulations with the `eb_iaeaphsp_source` source type (see Phase Space Source section below).

To enable this option you need to add a `phsp scoring` block to the `scoring options` input section. The `phsp scoring` block has the following inputs:

1. 'phsp output directory': (Optional) Controls where the `.IAEAheader` & `.IAEAphsp` files are written too. Defaults to the current working directory.
2. 'access mode': (Optional) Controls whether `egs_brachy` should write to a new file or append to an existing `phsp` file. Options are `write` and `append` (default).
3. 'kill after scoring': (Optional) Controls whether the weight of scored particles should be set to 0 which will increase the speed of phase space file generation. Options are `yes` and `no` (default).
4. 'boundary step': (Optional) Since `egs_brachy` scores `phsp` particles on the surface of a source, you may find that when you use a `phsp` source, particles get stuck at the geometry boundary when they are initialized. To combat this, before scoring a `phsp` particle `egs_brachy` propagates the particle a small distance forward along its current direction of travel before writing it to the phase space file. By default this value is `1E-4 cm` but you can make it smaller or larger if necessary.
5. 'print header': (Optional) Controls whether the `iaea_print_header` function is called during the `outputResults`. Options are `yes` and `no` (default).

A complete `phsp scoring` block looks like:

```
:start phsp scoring:
    phsp output directory = /home/randlet/egs/egsnrc/egs_brachy/
    access mode = write
    print header = no
    kill after scoring = yes
    boundary step = 1E-6
:stop phsp scoring:
```

See [tests/phsp_scoring/phsp_score.egsinp](#) for an example of scoring a phase space and [tests/phsp_run/phsp_run.egsinp](#) for an example of running a phase space source.

Limitations

Currently phase space generation using parallel runs is not supported.

1.4.5 Source definition

The `source definition` block for `egs_brachy` consists of 3 parts:

1. a standard `egs++ source` block which defines what the base particle source and spectrum will be (typically for brachy calculations this will be an isotropic source).
2. a `transformations` input block which contains one or more `EGS_AffineTransform` input blocks to tell `egs_brachy` the location of all particle sources (this will usually be identical to the `inscribed geometry -> transformations` block for an `egs_autoenvelope` geometry and hence an external file and an `include` file directive should probably be used.)

3. a simulation source input item which is set to the name of the source defined in 1.
4. an optional source weights input item which is a list of relative statistical weights for each source. This input is described below in the Variable source weights section.

An example source definition block is shown below for a 6702 seed:

```
:start source definition:

:start source:

library = egs_isotropic_source
name = 6702_spheres
charge = 0

# three spherical shell sources for 6702 Source
:start shape:

library = egs_shape_collection

:start shape:
library = egs_spherical_shell
inner radius = 0.0299
outer radius = 0.03
midpoint = 0, 0, -0.11
:stop shape:

:start shape:
library = egs_spherical_shell
inner radius = 0.0299
outer radius = 0.03
midpoint = 0, 0, 0
:stop shape:

:start shape:
library = egs_spherical_shell
inner radius = 0.0299
outer radius = 0.03
midpoint = 0, 0, 0.11
:stop shape:

probabilities = 1 1 1

:stop shape:

:start spectrum:
type = tabulated spectrum
spectrum file = /home/randlet/egs/HEN_HOUSE/spectra/I125_TG43.spectrum
:stop spectrum:

:stop source:

:start transformations :
:start transformation:
translation = -2,-2,-2
:stop transformation:
:start transformation:
translation = -2,-2,-1
:stop transformation:

# more transformations...

:stop transformations:

simulation source = 6702_spheres

:stop source definition:
```

1.4.5.1 Variable source weighting

In order to simulate sources with different activity levels you can add a `source weights` input to the `source definition` section. For example, if you have a simulation with two sources, the first of which has three times the activity of the second, you would set the following source input:

```
:start source definition:

:start source:

library = egs_point_source
name = pt_source
charge = 0
position = 0 0 0

:start spectrum:
type = tabulated spectrum
spectrum file = /home/randlet/egs/HEN_HOUSE/spectra/I125_TG43.spectrum
:stop spectrum:

:stop source:

:start transformations :
:start transformation:
translation = 0 0 -1
:stop transformation:
:start transformation:
translation = 0 0 1
:stop transformation:
:stop transformations:

simulation source = pt_source

source weights = 3 1 # give source at (0, 0, -1) three times the weight of source 2

:stop source definition:
```

`egs_brachy` uses these weights to assign the initial statistical weight of the particles originating in a source. If the `source weights` input is missing all sources are given equal weighting. If the number of inputs for `source weights` is less than the number of sources, the missing inputs will be assumed to be 1. See [tests/variable_activity/variable.egsinp](#) for an example.

When the superposition run mode is used, the `source weights` input represents relative dwell times (e.g. for a stepped Ir192 HDR source) rather than different activity levels. See [tests/stepped_source/stepped.egsinp](#) for an example of this feature.

1.4.5.2 Phase Space Sources

Using an IAEA phase space source in `egs_brachy` is just a matter of setting the `source` input block to use the `eb_ieaphsp_source` type like so:

```
:start source definition:

:start source:
library = eb_ieaphsp_source
name = 6702
header file = /home/randlet/egs/egsnrc/egs_brachy/iaea.phsp.IAEAheader
:stop source:

:start transformations :
include file = lib/geometry/transformations/125seeds_1cm_grid
:stop transformations:

simulation source = 6702

:stop source definition:
```

See the eb_iaeaphsp_source documentation for more information on the inputs and [tests/phsp_run/phsp_run.egsinp](#) input file for an example of this feature.

It should be noted that phase space sources are treated slightly differently than other source types when particle recycling is enabled. This is discussed below in the particle recycling section.

1.4.6 Transport Parameters

egs_brachy has a couple of extra optional transport parameters.

1. Fluorescent Photon Cutoff which will kill all fluorescent photons with energy less than or equal to the cutoff energy.

```
:start MC transport parameter:  
  
Global ECUT          = 1.512  
Global PCUT          = 0.001  
# ...  
Fluorescent Photon Cutoff = 0.005 # kill all flu. photons with E <= 5keV  
  
:stop MC transport parameter:
```

2. Source ECUT & Source PCUT these two transport parameters allow you to set ECUT and PCUT to different values within the source compared to elsewhere. This is required for x-ray source simulations (see e.g. [tests/brem_cyl/brem_cyl.egsinp](#)).

```
:start MC transport parameter:  
  
Global ECUT          = 1.512  
Global PCUT          = 0.001  
Source ECUT          = 0.512  
Source PCUT          = 0.001  
  
:stop MC transport parameter:
```

1.4.7 Variance Reduction

1.4.7.1 Particle Recycling

egs_brachy has the ability to reuse particles which escape from the source geometry an arbitrary number of times. With particle recycling enabled, egs_brachy detects (in ausgab) when a particle is escaping the source, and then adds Nrecycle new particles to the top of the stack at the location of each source in the simulation.

This can increase the efficiency of a simulation where only a fraction of particles are escaping the source geometry (since particles which don't escape the source geometry are 'wasted' because they don't contribute to dose in the phantom).

In order to enable source particle recycling you must include a `particle recycling` block in the variance reduction block.

```
:start variance reduction:  
:start particle recycling:  
  times to reuse recycled particles = 10  
  rotate recycled particles = yes  
:stop particle recycling:  
:stop variance reduction:
```

If `rotate recycled particles` is set to yes, each particle will be rotated by an arbitrary angle about the z-axis prior to being reused. (If `times to reuse recycled particles` is greater than 1, particle rotation is enforced).

Examples of particle recycling may be seen in the following test files: [tests/phsp_run/phsp_run.egsinp](#), [tests/recycling/recycling.egsinp](#), [tests/tg43mode_recycle/tg43mode_recycling.egsinp](#), [tests/variable_w_recycling/variable_w_recycling.egsinp](#).

Particle Recycling with PHSP Sources

Phase space particles are scored once they've already escaped the source and therefore particles from a phsp source will be initiated outside of sources. Because of this phsp particles never escape the source and trigger the recycling routines in ausgab. Instead, at the beginning of each history a single particle is retrieved from the phase space file and then NRecycle copies of the particle are made and placed at the location of all the sources (so the history starts with NRecycle*NSource particles on the stack rather than just a single particle).

Particle Recycling and Superposition Mode

Currently when running in superposition mode recycled particles are only generated for the currently active source rather than all source locations (i.e. when a particle escapes a source only Nrecycle particles are created rather than Nrecycle*Nsource).

1.4.7.2 Range Rejection

Range rejection is enabled outside of sources and disabled within sources by default in egs_brachy. The default maximum range rejection energy is set to 2.511 MeV (including rest mass). In other words, by default range rejection is applied to electrons in the phantom with kinetic energy lower than 2 MeV. To enable or disable range rejection within sources, or outside of sources, use the source range rejection and global range rejection inputs, respectively.

The source range rejection max energy and global range rejection max energy inputs are used to set the maximum energy of electrons (in MeV, including rest mass) to use range rejection with.

```
:start variance reduction:  
    global range rejection = yes  
    global range rejection max energy = 0.611  
    source range rejection = yes  
    source range rejection max energy = 0.516  
:stop variance reduction:
```

1.4.7.3 Bremsstrahlung Splitting

To enable brem splitting in egs_brachy set the split brems photons input to something greater than 1 in the variance reduction block.

```
:start variance reduction:  
    split brem photons = 100  
:stop variance reduction:
```

See [tests/brem_cyl/brem_cyl.egsinp](#) for an input file that uses brem splitting.

1.4.7.4 Bremsstrahlung Cross Section Enhancement

To enable bremsstrahlung cross section enhancement in egs_brachy add a bcse medium input item in the variance reduction block. The format of the input is medium_name enhancement_factor.

```
:start variance reduction:  
    split brem photons = 100  
    bcse medium = Ti10W90 100  
:stop variance reduction:
```

1.4.8 Voxel volume correction details

egs_brachy has three methods available for doing voxel volume correction calculations in rectilinear, cylindrical and spherical geometries. There is a 'fast' method that uses the same technique described in the egs_autoenvelope documentation and a more general purpose routine which can be used for larger volumes with multiple overlapping phantom geometries. In addition to those two methods, corrected voxel volumes can be precomputed (either manually or by egs_brachy) and read from a file. Finally, there is a fourth method, phantom region volumes that can be used to specify manually calculated voxel volumes in the input file for other geometry types (e.g. conical geometries).

See [tests/volume_correction/vc.egsinp](#) for examples of the fast & general volume correction methods.

1.4.8.1 Fast voxel volume corrections for sources

The input block for this type of volume correction looks like:

```
:start volume correction:

:start source volume correction:

    correction type = correct # optional: none(default), correct, zero dose
    density of random points (cm^-3) = 1E7 # optional random point sampling density defaults to 1E8

    # shape which encompasses source
    :start shape:
        type = cylinder
        radius = 0.04
        height = 0.45
    :stop shape:

    # optional rng definition
    :start rng definition:
        type = sobol
        initial seed = 1234
    :stop rng definition:

    # -or-
    :start rng definition:
        type = ranmar
        initial seeds = two integers
    :stop rng definition:

:stop source volume correction:

:stop volume correction:
```

1.4.8.2 General purpose volume corrections

The general purpose algorithm is similar, except any geometry region within the bounding shape will have its region volume corrected. Currently the shape must be cylinder, sphere, or box type.

The input block for the general purpose volume corrections is shown below:

```
:start volume correction:

:start extra volume correction:

    correction type = correct # correct, none, zero dose
    density of random points (cm^-3) = 1E5
```

```

# correct volume of region for all geometries within
# x,y,z = +/- 2cm around origin
:start shape:

    type = box
    box size = 4

    :start transformation:
        translation = 0 0 0
    :stop transformation:

:stop shape:

:stop extra volume correction:

:stop volume correction:

```

1.4.8.3 Volume calculations from file

You can also use precomputed volume corrections by using a 'volume correction from file' input.

The input block specifies one or more 'phantom file' inputs with two strings. The first string is the name of the phantom to set the volumes for and the second string is the file to read the volumes from. egs_brachy will automatically determine whether the file is in text or gzip mode.

```

:start volume correction:

    :start volume correction from file:

        phantom file = phantom1 your_precomputed_phantom1_volumes.volcor
        phantom file = phantom2 your_precomputed_phantom2_volumes.volcor

    :stop volume correction from file:

:stop volume correction:

```

To create your own volcor text files, create a text file in the format:

```

NRECORDS
REG_NUM_1 REG_1_VOLUME
REG_NUM_2 REG_2_VOLUME
...
REG_NUM_3 REG_3_VOLUME

```

for example the following file:

```

3
5 0.5
13 1.0
1000 2.5

```

would set regions 5, 13 and 1000 to volumes 0.5 cm^3 , 1 cm^3 , 2.5 cm^3 of whichever phantom it was assigned to.

1.4.8.4 Random Number Generator for volume corrections

If a `box` shape is used as the volume correction shape, volume corrections will use a Sobol Quasi Random Number Generator by default. For all other shapes the regular Ranmar RNG will be used (the Sobol generator only works for Cartesian coordinate systems). The RNG can be overridden as show in the example above.

1.4.8.5 Manually specifying voxel volumes

For calculating dose in phantoms which are not rectilinear, cylindrical, or spherical you may use phantom region volumes blocks to specify the the volume of one or more regions in a phantom (note, it will also work in e.g. rectilinear phantoms, it's just not generally needed). The format of these blocks is:

```
:start volume correction:  
  
:start phantom region volumes:  
phantom name = <phantom_name>  
region numbers = r_1 r_2 ... r_i ... r_N  
region volumes = V_1 V_2 ... V_i ... V_N  
:stop phantom region volumes:  
  
:stop volume correction:
```

for example to specify volumes of 0.5cm^3 and 1cm^3 for regions 1 and 3 respectively in a phantom called my_phantom you would do:

```
:start volume correction:  
  
:start phantom region volumes:  
phantom name = my_phantom  
region numbers = 1 3  
region volumes = 0.5 1  
:stop phantom region volumes:  
  
:stop volume correction:
```

if you try to calculate dose in a geometry type that doesn't support automatic volume calculations without including a phantom region volumes block, egs_brachy will print a warning and terminate.

1.4.9 Output files

1.4.9.1 3ddose files

A 3ddose file will be output for every phantom geometry named in the geometry definition -> phantom geometries input item. The filename format of these 3ddose files is {input_file}_{phantom_name}.3ddose where {input_file} is replaced with the name of the simulations input file and {phantom_name} is replaced with the name of the phantom.

If score energy deposition = yes is set, a second 3ddose file with dose from interaction scoring will be output to {input_file}_{phantom_name}.edep.3ddose as well.

If score scatter dose is enabled, egs_brachy will score primary, single scattered and multiple scattered dose (normalized to total radiant energy) and output them to 3ddose files with the format {input_file}_{phantom_name}.{pr,ss,ms,to}.3ddose

1.4.9.2 egsphant file

If the user sets output egsphant files to yes in the scoring options input block, an egsphant file will be output for each scoring phantom in the simulation.

```
:start scoring options:  
  
#...  
output egsphant files = yes  
  
:stop scoring options:
```

1.4.9.3 Voxel info files

If the user sets `output voxel info files` to yes in the scoring options input block, a file with a `.voxels` extension (`{input_file}_{phantom_name}.voxels`) will be output that contains region by region information about every voxel in a phantom. The information currently includes, region #, corrected volume, uncorrected volume, mass, density, medium, dose and uncertainty.

```
:start scoring options:  
  
#...  
output voxel info files = yes  
  
:stop scoring options:
```

1.4.10 Running a simulation

`egs_brachy` uses the standard `egs++ run control` input block to control the number of histories, batches, geometry error limits etc.. Likewise the standard methods of running EGSnrc user codes from the command line all apply to `egs_brachy` (i.e. use `ex`, `exb` or `egs_brachy -i input_file [-p pegs_file] [-o output_file] [-s] [-P n -j i]`)

1.5 Test Suite

`egs_brachy` comes with a test suite that will allow you to confirm the code is still performing as expected after making modifications or updating the `egsnrc` version.

Geometries required for the tests are either defined within the `.egsinp` files or within `eb_tests/test_geoms`.

1.5.1 Setup

In order to make accurate CPU time comparisons the test suite needs to know how fast your CPU is. If you are on a linux system that makes processor speed available in `/proc/cpuinfo/` then the test suite can likely determine this information on its own. Otherwise you will need to set a `CPU_MHZ` environment variable with the value of your CPU speed in MHz (e.g. `CPU_MHZ=2400`).

1.5.2 Running the test suite

To run the test suite you need to be in the root `egs_brachy` directory. To run the whole test suite type (tested with Python 2.7 & 3.4):

```
python run_tests.py
```

after which you should see output like:

```
~/egs/egsnrc/egs_brachy$ python run_tests.py
CPU speed read from /proc/cpuinfo as 3498.557000 MHz
Running test 'tests.volume_correction'...
PASS - tests.volume_correction - ran in 5.72E-05 s/MHz (0.2 s)
Running test 'tests.scatter'...
PASS - tests.scatter - ran in 0.0056 s/MHz (19.6 s)
Running test 'tests.seeds_in_xyz'...
...
Running test 'tests.spec_vox'...
PASS - tests.spec_vox - ran in 0.000829 s/MHz (2.9 s)
=====
Tests finished 17/17 passed
~/egs/egsnrc/egs_brachy$
```

You can also run a subset of the tests in the following way:

```
~/egs/egsnrc/egs_brachy$ python run_tests.py eb_tests/seeds_in_xyz/
CPU speed read from /proc/cpuinfo as 3498.557000 MHz
Running test 'tests.seeds_in_xyz'...
PASS - tests.seeds_in_xyz - ran in 0.00269 s/MHz (9.4 s)
=====
Tests finished 1/1 passed
~/egs/egsnrc/egs_brachy$
```

or

```
~/egs/egsnrc/egs_brachy$ python run_tests.py "eb_tests/spec*"
CPU speed read from /proc/cpuinfo as 3498.557000 MHz
Running test 'tests.spec_eflu'...
PASS - tests.spec_eflu - ran in 0.000629 s/MHz (2.2 s)
Running test 'tests.spec_absolute'...
PASS - tests.spec_absolute - ran in 0.000629 s/MHz (2.2 s)
Running test 'tests.spec_vox'...
PASS - tests.spec_vox - ran in 0.000743 s/MHz (2.6 s)
=====
Tests finished 3/3 passed
~/egs/egsnrc/egs_brachy$
```

1.5.3 A list of the current tests

A list of all the tests currently implemented can be found in the [egs_brachy tests page](#).

1.6 The egs_brachy Library

1.6.1 The Geometry Library

For a list of the current geometry objects available in the egs_brachy library, please see [the geometry library page](#).

1.6.2 Transport Parameters

For a list of the current default transport parameter files available in the egs_brachy library, please see [the transport parameters page](#).

1.6.3 Spectra

For a list of the current spectra available in the egs_brachy library, please see the [spectra page](#).

1.6.4 Media & Muen Data

egs_brachy includes material files for peggless runs and muen data for scoring dose in different media using the tracklength estimator. For a list of the current media available see [here](#).

1.6.5 Example egsinp files

A suite of input files is distributed with egs_brachy (found in lib/examples). These provide a good starting point for users new to egs_brachy.

1.7 Documentation

This egs_brachy Technical Reference Manual uses doxygen and Python to build its documentation. Documentation for the egs_brachy library and test suite are generated by a number of Python scripts located in the `_docs` directory. The Python scripts generate markdown documents based on the contents of the `lib` and `eb_tests` directory. These markdown documents are then compiled to html by doxygen. A pdf of all the documentation will also be created and placed at `docs/pdf/egs_brachy_technical_manual.pdf`.

This document ([egs_brachy.md](#)) and the scripts for generating the library and test documents are located in `_docs/` and the generated html is placed in `docs/` (the documents in the `docs/` directory should not be modified manually).

To update the documentation simply run `make docs` and then commit the changes:

```
1 make docs
2 git add _docs/
3 git commit -am 'your commit message'
```


Chapter 2

geom

The egs_brachy Geometry Library

2.1 Source Library

The current list of sources available in the egs_brachy geometry library.

2.1.1 I125 LDR Sources

2.1.1.1 OncoSeed_6711

Description *No description available*

Geometry Files [OncoSeed_6711.geom](#)

Shape Files [OncoSeed_6711.shape](#), [boundary.shape](#)

Images

2.1.2 Ir192 HDR Sources

2.1.2.1 MBDCA-WG

Description *No description available*

Geometry Files [MBDCA-WG.geom](#)

Shape Files [MBDCA-WG.shape](#), [boundary.shape](#)

Images

2.1.2.2 microSelectron-v2

Description *No description available*

Geometry Files `microSelectron-v2.geom`

Shape Files `boundary.shape`, `microSelectron-v2.shape`

Images

2.1.3 Pd103 LDR Sources

2.1.3.1 TheraSeed_200

Description *No description available*

Geometry Files `TheraSeed_200_AIR_TG43_LD.geom`, `TheraSeed_200.geom`

Shape Files `TheraSeed_200.shape`, `boundary.shape`

Images

2.1.4 point source Sources

2.1.4.1 sphere

Description *No description available*

Geometry Files `sphere.geom`

Shape Files `sphere.shape`, `boundary.shape`

Images

2.1.5 xray Sources

2.1.5.1 eshell

Description *No description available*

Geometry Files `eshell.geom`

Shape Files `eshell.shape`, `boundary.shape`

Images

2.2 Phantom Library

The current list of phantoms available in the egs_brachy geometry library.

10.0cmx10.0cmx10.0cm_2mm_xyz_water.geom**File Location:** lib/geometry/phantoms/10.0cmx10.0cmx10.0cm_2mm_xyz_water.geom

-5.0cm <= X, Y, Z <= 5.0cm with 0.2cm voxels

10.1cmx10.1cmx10.1cm_1mm_xyz_water.geom**File Location:** lib/geometry/phantoms/10.1cmx10.1cmx10.1cm_1mm_xyz_water.geom

-5.05cm <= X, Y, Z <= 5.05cm with 1mm voxels

10cmx10cmx10cm_box_xyz_water.geom**File Location:** lib/geometry/phantoms/10cmx10cmx10cm_box_xyz_water.geom

A 10cm³ water phantom with a single region

15.0cmx19.1cmx13.5cm_xyz_breast.geom**File Location:** lib/geometry/phantoms/15.0cmx19.1cmx13.5cm_xyz_breast.geom

No description available

2.0cmx2.0cmx2.0cm_1mm_xyz_water.geom**File Location:** lib/geometry/phantoms/2.0cmx2.0cmx2.0cm_1mm_xyz_water.geom

-1cm <= X, Y, Z <= 1cm with 1mm voxels

2.0cmx2.0cmx2.0cm_2mm_xyz_water.geom**File Location:** lib/geometry/phantoms/2.0cmx2.0cmx2.0cm_2mm_xyz_water.geom

-1cm <= X, Y, Z <= 1cm with 0.2mm voxels

20.1cmx20.1cmx20.1cm_1mm_xyz_water.geom**File Location:** lib/geometry/phantoms/20.1cmx20.1cmx20.1cm_1mm_xyz_water.geom

-10.05cm <= X, Y, Z <= 10.05cm with 1mm voxels

20.1cmx20.1cmx20.1cm_box_xyz_water.geom**File Location:** lib/geometry/phantoms/20.1cmx20.1cmx20.1cm_box_xyz_water.geom*No description available***3.0cmx3.0cmx3.0cm_0.5mm_xyz_water.geom****File Location:** lib/geometry/phantoms/3.0cmx3.0cmx3.0cm_0.5mm_xyz_water.geom

-1.5cm <= X, Y, Z <= 1.5cm with 0.5cm voxels

3.0cmx3.0cmx3.0cm_1mm_xyz_water.geom**File Location:** lib/geometry/phantoms/3.0cmx3.0cmx3.0cm_1mm_xyz_water.geom

-1.5cm <= X, Y, Z <= 1.5cm with 0.1cm voxels

3.0cmx3.0cmx3.0cm_2mm_xyz_water.geom**File Location:** lib/geometry/phantoms/3.0cmx3.0cmx3.0cm_2mm_xyz_water.geom

-1.5cm <= X, Y, Z <= 1.5cm with 0.2cm voxels

30.2cmx30.2cmx30.2cm_2mm_xyz_water.geom**File Location:** lib/geometry/phantoms/30.2cmx30.2cmx30.2cm_2mm_xyz_water.geom

-15.1cm <= X, Y, Z <= 15.1cm with 0.2mm voxels

30cm_0.1mm_sph_water.geom**File Location:** lib/geometry/phantoms/30cm_0.1mm_sph_water.geom

0cm <= r <= 15cm with 0.1mm voxels for r <= 1.015cm

30cm_0.5mm_sph_water.geom**File Location:** lib/geometry/phantoms/30cm_0.5mm_sph_water.geom

0cm <= r <= 15cm with 0.5mm voxels for r <= 5.075cm

30cm_1mm_sph_water.geom**File Location:** lib/geometry/phantoms/30cm_1mm_sph_water.geom

0cm $\leq r \leq$ 15cm with 1mm voxels for $r \leq 10\text{cm}$

30cmx30cm_r101xz203_0.1mm_rz_water.geom**File Location:** lib/geometry/phantoms/30cmx30cm_r101xz203_0.1mm_rz_water.geom

$0 \leq r \leq 30\text{cm}$, $-15.1\text{cm} \leq Z \leq 15.1\text{cm}$ 0.01 cm voxels for $0 \leq r \leq 1.015\text{cm}$ and $-1.015\text{cm} \leq z \leq 1.015\text{cm}$

30cmx30cm_r101xz203_0.5mm_rz_water.geom**File Location:** lib/geometry/phantoms/30cmx30cm_r101xz203_0.5mm_rz_water.geom

$0 \leq r \leq 30\text{cm}$, $-15.1\text{cm} \leq Z \leq 15.1\text{cm}$ 0.05 cm voxels for $0 \leq r \leq 5.075\text{cm}$ and $-5.075\text{cm} \leq z \leq 5.075\text{cm}$

30cmx30cm_r101xz203_1.0mm_rz_water.geom**File Location:** lib/geometry/phantoms/30cmx30cm_r101xz203_1.0mm_rz_water.geom

$0 \leq r \leq 30\text{cm}$, $-15.1\text{cm} \leq Z \leq 15.1\text{cm}$ 1cm voxels for $0 \leq r \leq 10.15\text{cm}$ and $-10.15\text{cm} \leq z \leq 10.15\text{cm}$

30cmx30cmx30cm_0.1mm_xyz_water.geom**File Location:** lib/geometry/phantoms/30cmx30cmx30cm_0.1mm_xyz_water.geom

$-15\text{cm} \leq X, Y, Z \leq 15\text{cm}$ 0.01cm voxels for $-1.015 \leq X, Z \leq 1.015\text{cm}$, and a 0.01cm voxel from $-0.005\text{cm} \leq Y \leq 0.005\text{cm}$

30cmx30cmx30cm_0.5mm_xyz_water.geom**File Location:** lib/geometry/phantoms/30cmx30cmx30cm_0.5mm_xyz_water.geom

$-15\text{cm} \leq X, Y, Z \leq 15\text{cm}$ 0.05cm voxels for $-5.075\text{cm} \leq X, Z \leq 5.075\text{cm}$, and a 0.05cm voxel from $-0.025\text{cm} \leq Y \leq 0.025\text{cm}$

30cmx30cmx30cm_1.0mm_xyz_water.geom**File Location:** lib/geometry/phantoms/30cmx30cmx30cm_1.0mm_xyz_water.geom

$-15\text{cm} \leq X, Y, Z \leq 15\text{cm}$ 0.1cm voxels for $-10.15 \leq X, Z \leq 10.15\text{cm}$, and a 0.1cm voxel from $-0.05\text{cm} \leq Y \leq 0.05\text{cm}$

30cmx30cmx30cm_box_xyz_prostate.geom**File Location:** lib/geometry/phantoms/30cmx30cmx30cm_box_xyz_prostate.geom*No description available***30cmx30cmx30cm_box_xyz_water.geom****File Location:** lib/geometry/phantoms/30cmx30cmx30cm_box_xyz_water.geom

single 30cm voxel filled with water

5.0cmx5.0cmx5.0cm_2mm_xyz_breast.geom**File Location:** lib/geometry/phantoms/5.0cmx5.0cmx5.0cm_2mm_xyz_breast.geom*No description available***5.0cmx5.0cmx5.0cm_2mm_xyz_water.geom****File Location:** lib/geometry/phantoms/5.0cmx5.0cmx5.0cm_2mm_xyz_water.geom

-2.5cm <= X, Y, Z <= 2.5Cm with 0.2cm voxels

50cmx50cmx50cm_box_xyz_air.geom**File Location:** lib/geometry/phantoms/50cmx50cmx50cm_box_xyz_air.geom*No description available***50cmx50cmx50cm_box_xyz_water.geom****File Location:** lib/geometry/phantoms/50cmx50cmx50cm_box_xyz_water.geom*No description available***80cmx80cm_r101x0.1mm_z203x0.1mm_rz_water.geom****File Location:** lib/geometry/phantoms/80cmx80cm_r101x0.1mm_z203x0.1mm_rz_water.geom

0 <= r <= 40cm, -40cm <= Z <= 40cm 0.01 cm voxels for 0 <= r <= 1.015cm and -1.015cm <= z <= 1.015cm

80cmx80cm_r101x0.5mm_z203x0.5mm_rz_water.geom**File Location:** lib/geometry/phantoms/80cmx80cm_r101x0.5mm_z203x0.5mm_rz_water.geom

$0 \leq r \leq 40\text{cm}$, $-40\text{cm} \leq Z \leq 40\text{cm}$ 0.05 cm voxels for $0 \leq r \leq 5.075\text{cm}$ and $-5.075\text{cm} \leq z \leq 5.075\text{cm}$

80cmx80cm_r101x1.0mm_z203x1.0mm_rz_water.geom**File Location:** lib/geometry/phantoms/80cmx80cm_r101x1.0mm_z203x1.0mm_rz_water.geom

$0 \leq r \leq 40\text{cm}$, $-40\text{cm} \leq Z \leq 40\text{cm}$ 0.1 cm voxels for $0 \leq r \leq 10.15\text{cm}$ and $-10.15\text{cm} \leq z \leq 10.15\text{cm}$

80cmx80cm_r101x2.0mm_z203x2.0mm_rz_water.geom**File Location:** lib/geometry/phantoms/80cmx80cm_r101x2.0mm_z203x2.0mm_rz_water.geom

$0 \leq r \leq 40\text{cm}$, $-40\text{cm} \leq Z \leq 40\text{cm}$ 0.2 cm voxels for $0 \leq r \leq 20.3\text{cm}$ and $-20.3\text{cm} \leq z \leq 20.3\text{cm}$

80cmx80cmx80cm_203x0.1mm_xyz_water.geom**File Location:** lib/geometry/phantoms/80cmx80cmx80cm_203x0.1mm_xyz_water.geom

$-40\text{cm} \leq X, Y, Z \leq 40\text{cm}$ 0.01cm voxels for $-1.015 \leq X, Z \leq 1.015\text{cm}$, and a 0.01cm voxel from $-0.005\text{cm} \leq Y \leq 0.005\text{cm}$

80cmx80cmx80cm_203x0.5mm_xyz_water.geom**File Location:** lib/geometry/phantoms/80cmx80cmx80cm_203x0.5mm_xyz_water.geom

$-40\text{cm} \leq X, Y, Z \leq 40\text{cm}$ 0.05cm voxels for $-5.075 \leq X, Z \leq 5.075\text{cm}$, and a 0.05cm voxel from $-0.025\text{cm} \leq Y \leq 0.025\text{cm}$

80cmx80cmx80cm_203x1.0mm_xyz_water.geom**File Location:** lib/geometry/phantoms/80cmx80cmx80cm_203x1.0mm_xyz_water.geom

$-40\text{cm} \leq X, Y, Z \leq 40\text{cm}$ 0.1cm voxels for $-10.15\text{cm} \leq X, Z \leq 10.15\text{cm}$, and a 0.1cm voxel from $-0.05\text{cm} \leq Y \leq 0.05\text{cm}$

80cmx80cmx80cm_203x2.0mm_xyz_water.geom**File Location:** lib/geometry/phantoms/80cmx80cmx80cm_203x2.0mm_xyz_water.geom

$-40\text{cm} \leq X, Y, Z \leq 40\text{cm}$ 0.2cm voxels for $-20.3\text{cm} \leq X, Z \leq 20.3\text{cm}$, and a 0.2cm voxel from $-0.1\text{cm} \leq Y \leq 0.1\text{cm}$

ptv_3.4cmx2.8cmx3.8cm_2mm_xyz_prostate.geom

File Location: lib/geometry/phantoms/ptv_3.4cmx2.8cmx3.8cm_2mm_xyz_prostate.geom

No description available

ptv_3.4cmx2.8cmx3.8cm_2mm_xyz_water.geom

File Location: lib/geometry/phantoms/ptv_3.4cmx2.8cmx3.8cm_2mm_xyz_water.geom

No description available

sk_10cm_0.1cm.geom

File Location: lib/geometry/phantoms/sk_10cm_0.1cm.geom

0.05x0.1x0.1 cm voxel at 10cm away along transverse axis for scoring air kerma strength

sk_10cm_2.66cm.geom

File Location: lib/geometry/phantoms/sk_10cm_2.66cm.geom

0.05x2.66x2.66 cm voxel at 10cm away along transverse axis for scoring air kerma strength

2.3 Applicator Library

The current list of applicators available in the egs_brachy geometry library.

TG186_applicator.geom

File Location: lib/geometry/applicators/TG186/TG186_applicator.geom

Generic shielded applicator from the AAPM Working Group on Model-Based Dose Calculation Algorithms (MBDCA)
This is commonly referred to as the TG-186 applicator.

2.4 Eye Plaques Library

The current list of eye plaques available in the egs_brachy geometry library.

2.5 Transformation Sets

The current list of predefined transformation sets available in the egs_brachy geometry library.

100seeds_grid_5x7mmx4x7mmx5x8mm_0.5mm_perturb_in_z**File Location:** lib/geometry/transformations/100seeds_grid_5x7mmx4x7mmx5x8mm_0.5mm_perturb_in_z*No description available***125seeds_0.5cm_grid****File Location:** lib/geometry/transformations/125seeds_0.5cm_grid

Seed locations at -1, -0.5, 0, 0.5, 1 in X, Y, Z

125seeds_1cm_grid**File Location:** lib/geometry/transformations/125seeds_1cm_grid

125 seed locations at -2, -1, 0, 1, 2 in X, Y, Z

5_seeds_along_z**File Location:** lib/geometry/transformations/5_seeds_along_z

Seeds located along the z axis at: (0, 0, -2), (0, 0, -1), (0, 0, 0), (0, 0, 1), (0, 0, 2)

64seeds_grid_4x4x4_1.55cm_0.55cm**File Location:** lib/geometry/transformations/64seeds_grid_4x4x4_1.55cm_0.55cm*No description available***PeppaBreastHDR192lr_MBDCA-WG_srcPosnRotn****File Location:** lib/geometry/transformations/PeppaBreastHDR192lr_MBDCA-WG_srcPosnRotn*No description available***single_seed_at_origin****File Location:** lib/geometry/transformations/single_seed_at_origin

A null transformation

single_seed_at_x7cm**File Location:** lib/geometry/transformations/single_seed_at_x7cm*No description available*

Chapter 3

media

egs_brachy Media & Muen Data

3.1 Pegsless run materials

The current list of media available for pegsless runs is as follows:

25GLAND-75ADIPOSE rho = 0.9675

elements = H, C, N, O, NA, P, S, CL

mass fractions = 0.112, 0.5215, 0.01275, 0.34025, 0.001, 0.00025, 0.00125, 0.001

bremssstrahlung correction = NRC

50GLAND-50ADIPOSE rho = 0.985

elements = H, C, N, O, NA, P, S, CL

mass fractions = 0.11, 0.465, 0.0185, 0.4025, 0.001, 0.0005, 0.0015, 0.001

bremssstrahlung correction = NRC

75GLAND-25ADIPOSE rho = 1.0025

elements = H, C, N, O, NA, P, S, CL

mass fractions = 0.108, 0.3985, 0.02425, 0.46475, 0.001, 0.00075, 0.00175, 0.001

bremssstrahlung correction = NRC

ADIPOSE2_WW86 bremssstrahlung correction = NRC

density correction file = adiposetissue_icru_1986

ADIPOSE_PHANT rho = 0.95

elements = H, C, N, O, NA, S, CL

mass fractions = 11.4, 58.9, 0.7, 28.7, 0.1, 0.1, 0.1

bremssstrahlung correction = NRC

ADV_PD_POLY rho = 1.2

elements = H, C, N, CL, PD

mass fractions = 0.08, 0.9, 0.003, 0.007, 0.01

bremssstrahlung correction = NRC

AIR_0.0012 rho = 1.2000E-03

elements = N, O, AR

mass fractions = 7.55000E-01, 2.32000E-01, 1.30000E-02

bremssstrahlung correction = NRC

gas pressure = 1.0

AIR_PHANT rho = 0.0012
elements = H, C, N, O, AR
mass fractions = 0.0732, 0.0123, 75.0325, 23.6077, 1.2743
gas pressure = 1.0
bremsstrahlung correction = NRC

AIR_TG43 rho = 0.0012
elements = H, C, N, O, AR
mass fractions = 0.0732, 0.0123, 75.0325, 23.6077, 1.2743
gas pressure = 1.0
bremsstrahlung correction = NRC

AIR_TG43_LD rho = 1.20e-13
elements = H, C, N, O, AR
mass fractions = 0.0732, 0.0123, 75.0325, 23.6077, 1.2743
gas pressure = 1.0
bremsstrahlung correction = NRC

AQUEOUS_MAR rho = 1.0035
elements = H, C, O, NA, CL
mass fractions = 0.111, 0.001, 0.881, 0.003, 0.004
bremsstrahlung correction = NRC

Ag bremsstrahlung correction = NRC
density correction file = silver

AgBrAgI_6.20 rho = 6.20
elements = AG, BR, I
mass fractions = 0.536, 0.284, 0.180
bremsstrahlung correction = NRC

AgI bremsstrahlung correction = NRC
density correction file = silveriodide

AgI_6.003 rho = 6.003
elements = AG, I
mass fractions = 0.459458, 0.540542
bremsstrahlung correction = NRC

Al2O3 rho = 3.97
elements = O, AL
mass fractions = 0.470749, 0.529251
bremsstrahlung correction = NRC

Al bremsstrahlung correction = NRC
density correction file = aluminum

AlN_Y2O3_0.05_3.26 rho = 3.26
elements = AL, N, O, Y
mass fractions = 0.642, 0.333, 0.0053, 0.0197
bremsstrahlung correction = NRC

AlSilicate rho = 2.81
elements = O, SI, AL, NA, AG
mass fractions = 0.407, 0.214, 0.166, 0.113, 0.1
bremsstrahlung correction = NRC

AlSilicate rho = 2.81
elements = O, SI, AL, NA, AG
mass fractions = 0.407, 0.214, 0.166, 0.113, 0.1
bremsstrahlung correction = NRC

Alumina_2.88 rho = 2.88
elements = O, AL
number of atoms = 3, 2
bremsstrahlung correction = NRC

Ar bremsstrahlung correction = NRC
density correction file = argon

Ar bremsstrahlung correction = NRC
density correction file = argon

Au80Cu20 rho = 15.5
elements = AU, CU
mass fractions = 80, 20
bremsstrahlung correction = NRC

Au bremsstrahlung correction = NRC
density correction file = gold

BRAIN_PHANT rho = 1.05
elements = H, C, N, O, NA, MG, P, S, CL, K
mass fractions = 10.7, 14.4, 2.2, 71.3, 0.2, 0, 0.4, 0.2, 0.3, 0.3
bremsstrahlung correction = NRC

BRAIN_WMATTER_WW1986 rho = 1.04
elements = H, C, N, O, NA, P, S, CL, K
mass fractions = 0.106, 0.194, 0.025, 0.661, 0.002, 0.004, 0.002, 0.003, 0.003
bremsstrahlung correction = NRC

C12H18NCl rho = 1.2
elements = H, C, N, CL
number of atoms = 18, 12, 1, 1
bremsstrahlung correction = NRC

C85.7H14.3 rho = 1.0
elements = C, H
mass fractions = 85.7, 14.3
bremsstrahlung correction = NRC

CALCIFICATION_ICRU46 rho = 3.06
elements = H, C, N, O, P, CA
mass fractions = 0.003, 0.016, 0.005, 0.407, 0.187, 0.382
bremsstrahlung correction = NRC

CARTILAGE_PHANT rho = 1.1
elements = H, C, N, O, NA, P, S, CL
mass fractions = 9.6, 9.9, 2.2, 74.4, 0.5, 2.2, 0.9, 0.3
bremsstrahlung correction = NRC

CORNEA_COLLSTRUCMECH_ZIE rho = 1.05
elements = H, C, N, O, S
mass fractions = 0.1016, 0.1199, 0.0364, 0.7411, 0.0009
bremsstrahlung correction = NRC

CORTICAL_BONE_WW86 bremsstrahlung correction = NRC
density correction file = bone_cortical_icru_1986

CRANIUM_PHANT rho = 1.245
elements = H, C, N, O, NA, MG, P, S, CL, K
mass fractions = 8.1, 31.7, 2.8, 45.1, 0.2, 0.1, 3.7, 0.3, 0.1, 0.1
bremsstrahlung correction = NRC

CS10_polymer rho = 1.15
elements = H, C, N, O
mass fractions = 0.085, 0.648, 0.05, 0.217
bremsstrahlung correction = NRC

Co bremsstrahlung correction = NRC
density correction file = cobalt

Cu bremsstrahlung correction = NRC
density correction file = copper

DENSIMET_D176 rho = 17.6
elements = FE, NI, W
mass fractions = 0.025, 0.05, 0.925
bremsstrahlung correction = NRC

EXTERNAL_1.00 rho = 1.00
elements = H, C, N, O, P, S, CL
mass fractions = 1.08000E-01, 3.56000E-01, 2.20000E-02, 5.09000E-01, 1.00000E-03, 2.00000E-03, 2.00000E-03
bremsstrahlung correction = NRC

EYES_PHANT rho = 1.05
elements = H, C, N, O, NA, MG, P, S, CL
mass fractions = 9.7, 18.3, 5.4, 66, 0.1, 0, 0.1, 0.3, 0.1
bremsstrahlung correction = NRC

F_SOFT_TISSUE_ICRU46 rho = 1.02
elements = H, C, N, O, NA, P, S, CL, K
mass fractions = 0.106, 0.315, 0.024, 0.547, 0.001, 0.002, 0.002, 0.001, 0.002
bremsstrahlung correction = NRC

GLAND2_WW86 bremsstrahlung correction = NRC
density correction file = breasttissue_icru_1986

GLAND_PHANT rho = 1.03
elements = H, C, N, O, NA, P, S, CL, K
mass fractions = 10.5, 23.5, 2.8, 62.2, 0.1, 0.2, 0.3, 0.2, 0.2
bremsstrahlung correction = NRC

Graphite2.26 bremsstrahlung correction = NRC
density correction file = carbon_graphite_2.265g_cm3

HEART_1.05 rho = 1.05
elements = H, C, N, O, NA, P, S, CL, K
mass fractions = 9.85000E-02, 1.70500E-01, 4.60000E-02, 6.72500E-01, 4.00000E-03, 1.00000E-03, 4.00000E-03, 2.50000E-03, 1.00000E-03
bremsstrahlung correction = NRC

HEART_BLOODFILLED_WW86 bremsstrahlung correction = NRC
density correction file = heart_blood-filled_icru_1986

I bremsstrahlung correction = NRC
density correction file = iodine

IPPlant_active rho = 2.58
elements = SI, XE, I, TE
mass fractions = 0.976174, 0.023804, 1.6e-05, 6e-06
bremsstrahlung correction = NRC

Ir70Pt30 rho = 21.76
elements = IR, PT
mass fractions = 70, 30
bremsstrahlung correction = NRC

Ir bremsstrahlung correction = NRC
density correction file = iridium

Ir bremsstrahlung correction = NRC
density correction file = iridium

KOVAR rho = 8.36
elements = C, SI, MN, FE, CO, NI
mass fractions = 0.0002, 0.002, 0.003, 0.5348, 0.17, 0.29
bremsstrahlung correction = NRC

LENS_ICRU rho = 1.07
elements = H, C, N, O, NA, P, S, CL
mass fractions = 0.096, 0.195, 0.057, 0.646, 0.001, 0.001, 0.003, 0.001
bremsstrahlung correction = NRC

LUNGS_0.26 rho = 0.26
elements = H, C, N, O, NA, P, S, CL, K
mass fractions = 1.03000E-01, 1.05000E-01, 3.10000E-02, 7.49000E-01, 2.00000E-03, 2.00000E-03, 3.00000E-03, 3.00000E-03, 2.00000E-03
bremsstrahlung correction = NRC

LUNG_BLOODFILLED_WW86 bremsstrahlung correction = NRC
density correction file = lung_inflated_icru_1986

MANDIBLE_PHANT rho = 1.189
elements = H, C, N, O, NA, MG, P, S, CL, K
mass fractions = 8.7, 35.7, 2.6, 42.9, 0.2, 0.1, 3, 0.3, 0.1, 0.1
bremsstrahlung correction = NRC

MINERALBONE_PHANT rho = 1.92
elements = H, C, N, O, NA, MG, P, S
mass fractions = 3.6, 15.9, 4.2, 44.8, 0.3, 0.2, 9.4, 0.3
bremsstrahlung correction = NRC

MODULAY rho = 15.8
elements = AU, AG, CU, PD
mass fractions = 0.77, 0.14, 0.08, 0.01
bremsstrahlung correction = NRC

MUSCLE2_WW86 bremsstrahlung correction = NRC
density correction file = muscle_skeletal_icru_1986

MUSCLE_PHANT rho = 1.05
elements = H, C, N, O, NA, P, S, CL, K
mass fractions = 10.2, 14.2, 3.4, 71.1, 0.1, 0.2, 0.3, 0.1, 0.4
bremsstrahlung correction = NRC

M_SOFT_TISSUE_ICRU46 rho = 1.03
elements = H, C, N, O, NA, P, S, CL, K
mass fractions = 0.105, 0.256, 0.027, 0.602, 0.001, 0.002, 0.003, 0.002, 0.002
bremsstrahlung correction = NRC

Mo bremsstrahlung correction = NRC
density correction file = molybdenum

Ni bremsstrahlung correction = NRC
density correction file = nickel

P50C50 rho = 1.5524
elements = H, C, N, O, NA, P, S, K, CA
mass fractions = 0.054, 0.0525, 0.015, 0.5905, 0.001, 0.094, 0.001, 0.001, 0.191
bremsstrahlung correction = NRC

PMMA bremsstrahlung correction = NRC
density correction file = polymethylmethacrylate_lucite_perspex_plexiglas

PROSTATE_WW86 rho = 1.04
elements = H, C, N, O, NA, P, S, CL
mass fractions = 0.105, 0.089, 0.025, 0.774, 0.002, 0.001, 0.002, 0.002
bremsstrahlung correction = NRC

PTV_1.02 rho = 1.02
elements = H, C, N, O, P, S, CL
mass fractions = 1.08000E-01, 3.56000E-01, 2.20000E-02, 5.09000E-01, 1.00000E-03, 2.00000E-03, 2.00000E-03
bremsstrahlung correction = NRC

Pb bremsstrahlung correction = NRC
density correction file = lead

Pd bremsstrahlung correction = NRC
density correction file = palladium

Pollucite rho = 2.9
elements = SI, TI, AL, B, MG, CA, NA, CS, O
mass fractions = 0.2618, 0.03, 0.0159, 0.0373, 0.0121, 0.0286, 0.1261, 0.0094, 0.4789
bremsstrahlung correction = NRC

PolySty rho = 1.06
elements = H, C
mass fractions = 0.077418, 0.922582
bremsstrahlung correction = NRC

PolySty rho = 1.06
elements = H, C
mass fractions = 0.077418, 0.922582
bremsstrahlung correction = NRC

Poly_Best2335_0.5gpcm rho = 0.5
elements = H, C, O, N
mass fractions = 7.85, 89.73, 1.68, 0.74
bremsstrahlung correction = NRC

Poly_for_BestPd103_1gpcm rho = 1.0
elements = H, C, O, N
mass fractions = 7.85, 89.73, 1.68, 0.74
bremsstrahlung correction = NRC

Poly_for_BestPd103_1gpcm rho = 1.0
elements = H, C, O, N
mass fractions = 7.85, 89.73, 1.68, 0.74
bremsstrahlung correction = NRC

Pt70Ir30 rho = 21.68
elements = PT, IR
mass fractions = 70, 30
bremsstrahlung correction = NRC

Pt75Ir25 rho = 21.68
elements = PT, IR
mass fractions = 70, 30
bremsstrahlung correction = NRC

Pt90Ir10 rho = 21.45
elements = PT, IR
mass fractions = 90, 10
bremsstrahlung correction = NRC

Pt90Ir10 rho = 21.45
elements = PT, IR
mass fractions = 90, 10
bremsstrahlung correction = NRC

Pt bremsstrahlung correction = NRC
density correction file = platinum

Pyrex_2.4 rho = 2.4
elements = B, O, NA, AL, SI, K
mass fractions = 0.040064, 0.539562, 0.028191, 0.011644, 0.37722, 0.003321
bremsstrahlung correction = NRC

Pyrex_2.4 rho = 2.4
elements = B, O, NA, AL, SI, K
mass fractions = 0.040064, 0.539562, 0.028191, 0.011644, 0.37722, 0.003321
bremsstrahlung correction = NRC

Pyrex_2.4_Cs rho = 2.4
elements = B, O, NA, AL, SI, K, CS
mass fractions = 0.0400632, 0.539551, 0.0281904, 0.0116438, 0.377213, 0.00332093, 2e-05
bremsstrahlung correction = NRC

Pyrex_2.4_Cs rho = 2.4
elements = B, O, NA, AL, SI, K, CS
mass fractions = 0.0400632, 0.539551, 0.0281904, 0.0116438, 0.377213, 0.00332093, 2e-05
bremsstrahlung correction = NRC

RECTUM_ICRP23 rho = 0.75
elements = H, C, N, O, NA, P, CL, K
mass fractions = 0.063, 0.121, 0.022, 0.788, 0.0001, 0.001, 0.001, 0.001
bremsstrahlung correction = NRC

RIBS_1.92 rho = 1.92
elements = H, C, N, O, NA, MG, P, S, CA
mass fractions = 3.40000E-02, 1.55000E-01, 4.20000E-02, 4.35000E-01, 1.00000E-03, 2.00000E-03, 1.03000E-01, 3.00000E-03, 2.25000E-01
bremsstrahlung correction = NRC

SCLERA_COLLSTRUCMECH_ZIE rho = 1.05
elements = H, C, N, O, S
mass fractions = 0.097, 0.1696, 0.0499, 0.6831, 0.0003
bremsstrahlung correction = NRC

SILASTIC rho = 1.12
elements = H, C, O, SI, PT
mass fractions = 0.063, 0.249, 0.289, 0.399, 5e-05
bremsstrahlung correction = NRC

SKIN2_WW86 bremsstrahlung correction = NRC
density correction file = skin_icru_1986

SKIN_1.09 rho = 1.09
elements = H, C, N, O, NA, P, S, CL, K, CA
mass fractions = 9.50000E-02, 4.55000E-01, 2.50000E-02, 3.55000E-01, 1.00000E-03, 2.10000E-02, 1.00000E-03, 1.00000E-03, 1.00000E-03, 4.50000E-02
bremsstrahlung correction = NRC

SKIN_PHANT rho = 1.09
elements = H, C, N, O, NA, MG, P, S, CL, K
mass fractions = 10, 19.9, 4.2, 65, 0.2, 0, 0.1, 0.2, 0.3, 0.1
bremsstrahlung correction = NRC

SS_AISI301 rho = 8.0
elements = C, SI, CR, P, MN, FE, S, NI
mass fractions = 0.15, 1, 17, 0.045, 2, 71.77, 0.03, 7
bremsstrahlung correction = NRC

SS_AISI301 rho = 8.0
elements = C, SI, CR, P, MN, FE, S, NI
mass fractions = 0.15, 1, 17, 0.045, 2, 71.77, 0.03, 7
bremsstrahlung correction = NRC

SS_AISI304 rho = 8.02
elements = NI, SI, CR, MN, FE
mass fractions = 0.1, 0.01, 0.19, 0.02, 0.68
bremsstrahlung correction = NRC

SS_AISI304_p5.6 rho = 5.6
elements = NI, SI, CR, MN, FE
mass fractions = 0.1, 0.01, 0.19, 0.02, 0.68
bremsstrahlung correction = NRC

SS_AISI316L rho = 8.06
elements = SI, CR, MN, FE, NI, MO
mass fractions = 0.007, 0.17, 0.01, 0.668, 0.12, 0.025
bremsstrahlung correction = NRC

SS_AISI316L rho = 8.06
elements = SI, CR, MN, FE, NI, MO
mass fractions = 0.007, 0.17, 0.01, 0.668, 0.12, 0.025
bremsstrahlung correction = NRC

SS_AISI316L_p5.0 rho = 5.0
elements = NI, FE, MN, CR, SI
mass fractions = 0.12, 0.68, 0.02, 0.17, 0.01
bremsstrahlung correction = NRC

SS_AISI316L_p6.9 rho = 6.9
elements = SI, CR, MN, FE, NI, MO
mass fractions = 0.007, 0.17, 0.01, 0.668, 0.12, 0.025
bremsstrahlung correction = NRC

SS_AISI316L_p7.8 rho = 7.8
elements = SI, CR, MN, FE, NI, MO
mass fractions = 0.007, 0.17, 0.01, 0.668, 0.12, 0.025
bremsstrahlung correction = NRC

SS_AISI316L_p8.02 rho = 8.02
elements = NI, FE, MN, CR, SI
mass fractions = 0.12, 0.68, 0.02, 0.17, 0.01
bremsstrahlung correction = NRC

SS_AISI316L_rho4.81 rho = 4.81
elements = SI, CR, MN, FE, NI, MO
mass fractions = 0.007, 0.17, 0.01, 0.668, 0.12, 0.025
bremsstrahlung correction = NRC

SS_AISI321 rho = 8.027
elements = C, SI, CR, TI, FE, NI, W
mass fractions = 0.11, 0.2, 18.2, 0.6, 72.04, 8.2, 0.6
bremsstrahlung correction = NRC

SS_AISI321 rho = 8.027
elements = C, SI, CR, TI, FE, NI, W
mass fractions = 0.11, 0.2, 18.2, 0.6, 72.04, 8.2, 0.6
bremsstrahlung correction = NRC

SS_PROBE_RHO8.0 rho = 8.0
elements = NI, FE, MN, CR, SI, C, P
mass fractions = 0.095, 0.68375, 0.02, 0.19, 0.01, 0.0008, 0.00045
bremsstrahlung correction = NRC

SdVBC24H24 rho = 1.26
elements = C, H
mass fractions = 0.9167, 0.0833
bremsstrahlung correction = NRC

SiO2 rho = 2.32
elements = O, SI
mass fractions = 0.532565, 0.467435
bremsstrahlung correction = NRC

TEETH_PHANT rho = 2.75
elements = H, C, N, O, MG, P
mass fractions = 2.2, 9.5, 2.9, 42.1, 0.7, 13.7
bremsstrahlung correction = NRC

Ti10W90 rho = 17.824
elements = W, TI
mass fractions = 0.9, 0.1
bremsstrahlung correction = NRC

Ti10W90 rho = 17.824
elements = W, TI
mass fractions = 0.9, 0.1
bremsstrahlung correction = NRC

Ti44.4Ni55.6 rho = 6.5
elements = NI, TI
mass fractions = 55.6, 44.4
bremsstrahlung correction = NRC

Ti bremsstrahlung correction = NRC
density correction file = titanium

Ti_grade2 rho = 4.512
elements = H, C, N, O, FE, TI
mass fractions = 0.00015, 0.001, 0.0003, 0.0025, 0.002, 0.99405
bremsstrahlung correction = NRC

URETHRA_WW86 rho = 1.04
elements = H, C, N, O, NA, P, S, CL
mass fractions = 0.105, 0.089, 0.025, 0.774, 0.002, 0.001, 0.002, 0.002
bremsstrahlung correction = NRC

URINARY_BLADDER_EMPTY rho = 1.04
elements = H, C, N, O, NA, P, S, CL, K
mass fractions = 0.105, 0.096, 0.026, 0.761, 0.002, 0.002, 0.003, 0.003
bremsstrahlung correction = NRC

URINARY_BLADDER_FULL rho = 1.03
elements = H, C, N, O, NA, P, S, CL, K
mass fractions = 0.108, 0.035, 0.015, 0.83, 0.003, 0.001, 0.001, 0.005, 0.002
bremsstrahlung correction = NRC

VITREOUS_TUMRAM_MAR rho = 1.0071
elements = H, O, NA, CL, K
mass fractions = 0.1109, 0.8804, 0.0038, 0.0045, 0.0003
bremsstrahlung correction = NRC

W bremsstrahlung correction = NRC
 density correction file = tungsten

W bremsstrahlung correction = NRC
 density correction file = tungsten

WATER_0.998 rho = 0.998
 elements = H, O
 number of atoms = 2, 1
 bremsstrahlung correction = NRC

Yb169 bremsstrahlung correction = NRC
 density correction file = ytterbium

melanoma1_maughan rho = 1.05
 elements = H, C, N, O, NA, P, S, CL, K
 mass fractions = 0.094, 0.212, 0.056, 0.615, 0.00253, 0.00506, 0.00644, 0.00391, 0.00506
 bremsstrahlung correction = NRC

quartz_2.21 rho = 2.21
 elements = Si, O
 number of atoms = 1, 2
 bremsstrahlung correction = NRC

3.2 Materials with Muen data

The current list of media with muen data available for scoring dose with the tracklength estimator is as follows:

3.2.1 PeppaBreastHDR192Ir_MBDCA-WG_muen.muendat

File Location: ..//lib/muen/PeppaBreastHDR192Ir_MBDCA-WG_muen.muendat

AIR_0.0012 Medium used is mediaName found in PeppaCompareCase3_WGMBDCA.pegs4dat
 Number of energy intervals is 2000

EXTERNAL_1.00 Medium used is mediaName found in PeppaCompareCase3_WGMBDCA.pegs4dat
 Number of energy intervals is 2000

HEART_1.05 Medium used is mediaName found in PeppaCompareCase3_WGMBDCA.pegs4dat
 Number of energy intervals is 2000

LUNGS_0.26 Medium used is mediaName found in PeppaCompareCase3_WGMBDCA.pegs4dat
 Number of energy intervals is 2000

PTV_1.02 Medium used is mediaName found in PeppaCompareCase3_WGMBDCA.pegs4dat
 Number of energy intervals is 2000

RIBS_1.92 Medium used is mediaName found in PeppaCompareCase3_WGMBDCA.pegs4dat
 Number of energy intervals is 2000

SKIN_1.09 Medium used is mediaName found in PeppaCompareCase3_WGMBDCA.pegs4dat
 Number of energy intervals is 2000

3.2.2 brachy_xcom_1.5MeV.muendat

File Location: ..//lib/muen/brachy_xcom_1.5MeV.muendat

10GLAND-90ADIPOSE Medium used is 10GLAND-90ADIPOSE found in brachy_xcom_1500keV
Number of energy intervals is 2000

25GLAND-75ADIPOSE Medium used is 25GLAND-75ADIPOSE found in brachy_xcom_1500keV
Number of energy intervals is 2000

50GLAND-50ADIPOSE Medium used is 50GLAND-50ADIPOSE found in brachy_xcom_1500keV
Number of energy intervals is 2000

75GLAND-25ADIPOSE Medium used is 75GLAND-25ADIPOSE found in brachy_xcom_1500keV
Number of energy intervals is 2000

90GLAND-10ADIPOSE Medium used is 90GLAND-10ADIPOSE found in brachy_xcom_1500keV
Number of energy intervals is 2000

ADIPOSE1_WW86 Medium used is ADIPOSE1_WW86 found in brachy_xcom_1500keV
Number of energy intervals is 2000

ADIPOSE2_WW86 Medium used is ADIPOSE2_WW86 found in brachy_xcom_1500keV
Number of energy intervals is 2000

ADIPOSE3_WW86 Medium used is ADIPOSE3_WW86 found in brachy_xcom_1500keV
Number of energy intervals is 2000

AIR_TG43 Medium used is AIR_TG43 found in brachy_xcom_1500keV
Number of energy intervals is 2000

AIR_TG43_LD Medium used is AIR_TG43_LD found in brachy_xcom_1500keV
Number of energy intervals is 2000

CALCIFICATION Medium used is CALCIFICATION found in brachy_xcom_1500keV
Number of energy intervals is 2000

CARTILAGE_WW86 Medium used is CARTILAGE_WW86 found in brachy_xcom_1500keV
Number of energy intervals is 2000

CORTICAL_BONE_WW86 Medium used is CORTICAL_BONE_WW86 found in brachy_xcom_1500keV
Number of energy intervals is 2000

EYELENS_ICRU46 Medium used is EYELENS_ICRU46 found in brachy_xcom_1500keV
Number of energy intervals is 2000

F_SOFT_TISSUE_ICRU46 Medium used is F_SOFT_TISSUE_ICRU46 found in brachy_xcom_1500keV
Number of energy intervals is 2000

GLAND2_WW86 Medium used is GLAND2_WW86 found in brachy_xcom_1500keV
Number of energy intervals is 2000

HEART1_WW86 Medium used is HEART1_WW86 found in brachy_xcom_1500keV
Number of energy intervals is 2000

HEART2_WW86 Medium used is HEART2_WW86 found in brachy_xcom_1500keV
Number of energy intervals is 2000

HEART3_WW86 Medium used is HEART3_WW86 found in brachy_xcom_1500keV
Number of energy intervals is 2000

HEART_BLOODFILLED_WW86 Medium used is HEART_BLOODFILLED_WW86 found in brachy_xcom_1500keV
Number of energy intervals is 2000

LUNG_BLOODFILLED_WW86 Medium used is LUNG_BLOODFILLED_WW86 found in brachy_xcom_1500keV
Number of energy intervals is 2000

LUNG_UNITRHO Medium used is LUNG_UNITRHO found in brachy_xcom_1500keV
Number of energy intervals is 2000

MUSCLE1_WW86 Medium used is MUSCLE1_WW86 found in brachy_xcom_1500keV
Number of energy intervals is 2000

MUSCLE2_WW86 Medium used is MUSCLE2_WW86 found in brachy_xcom_1500keV
Number of energy intervals is 2000

MUSCLE3_WW86 Medium used is MUSCLE3_WW86 found in brachy_xcom_1500keV
Number of energy intervals is 2000

M_SOFT_TISSUE_ICRU46 Medium used is M_SOFT_TISSUE_ICRU46 found in brachy_xcom_1500keV
Number of energy intervals is 2000

PROSTATE_WW86 Medium used is PROSTATE_WW86 found in brachy_xcom_1500keV
Number of energy intervals is 2000

RED_MARROW_WW86 Medium used is RED_MARROW_WW86 found in brachy_xcom_1500keV
Number of energy intervals is 2000

RIBS_10_WH87 Medium used is RIBS_10_WH87 found in brachy_xcom_1500keV
Number of energy intervals is 2000

RIBS_2_6_WH87 Medium used is RIBS_2_6_WH87 found in brachy_xcom_1500keV
Number of energy intervals is 2000

SKIN1_WW86 Medium used is SKIN1_WW86 found in brachy_xcom_1500keV
Number of energy intervals is 2000

SKIN2_WW86 Medium used is SKIN2_WW86 found in brachy_xcom_1500keV
Number of energy intervals is 2000

SKIN3_WW86 Medium used is SKIN3_WW86 found in brachy_xcom_1500keV
Number of energy intervals is 2000

SOFT_BONE_ICRU44 Medium used is SOFT_BONE_ICRU44 found in brachy_xcom_1500keV
Number of energy intervals is 2000

SPONGIOSA_WW86 Medium used is SPONGIOSA_WW86 found in brachy_xcom_1500keV
Number of energy intervals is 2000

TISSUE_ICRU33 Medium used is TISSUE_ICRU33 found in brachy_xcom_1500keV
Number of energy intervals is 2000

WATER_0.998 Medium used is WATER_0.998 found in brachy_xcom_1500keV
Number of energy intervals is 2000

WATER_1.000 Medium used is WATER_1.000 found in brachy_xcom_1500keV
Number of energy intervals is 2000

YELLOW_MARROW_WW86 Medium used is YELLOW_MARROW_WW86 found in brachy_xcom_1500keV
Number of energy intervals is 2000

3.2.3 brachy_xcom_1.5MeV_egsphant.muendat

File Location: ..lib/muen/brachy_xcom_1.5MeV_egsphant.muendat

10GLAND-90ADIPOSE Medium used is 10GLAND-90ADIPOSE found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

25GLAND-75ADIPOSE Medium used is 25GLAND-75ADIPOSE found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

50GLAND-50ADIPOSE Medium used is 50GLAND-50ADIPOSE found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

75GLAND-25ADIPOSE Medium used is 75GLAND-25ADIPOSE found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

80ADIPOSE-20GLAND Medium used is 80ADIPOSE-20GLAND found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

80ADIPOSE-20GLAND_M Medium used is 80ADIPOSE-20GLAND_M found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

90GLAND-10ADIPOSE Medium used is 90GLAND-10ADIPOSE found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

A10C90 Medium used is A10C90 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

A15C85 Medium used is A15C85 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

A20C80 Medium used is A20C80 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

A25C75 Medium used is A25C75 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

A30C70 Medium used is A30C70 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

A35C65 Medium used is A35C65 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

A40C60 Medium used is A40C60 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

A45C55 Medium used is A45C55 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

A50C50 Medium used is A50C50 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

A55C45 Medium used is A55C45 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

A5C95 Medium used is A5C95 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

A60C40 Medium used is A60C40 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

A65C35 Medium used is A65C35 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

A70C30 Medium used is A70C30 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

A75C25 Medium used is A75C25 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

A80C20 Medium used is A80C20 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

A85C15 Medium used is A85C15 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

A90C10 Medium used is A90C10 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

A95C5 Medium used is A95C5 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

ADIPOSE1_WW86 Medium used is ADIPOSE1_WW86 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

ADIPOSE2_WW86 Medium used is ADIPOSE2_WW86 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

ADIPOSE3_WW86 Medium used is ADIPOSE3_WW86 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

ADIPOSE_H79 Medium used is ADIPOSE_H79 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

AGAR Medium used is AGAR found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

AIR_TG43 Medium used is AIR_TG43 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

AIR_TG43_LD Medium used is AIR_TG43_LD found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

CALCIFICATION_AUS1_HCO Medium used is CALCIFICATION_AUS1_HCO found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

CALCIFICATION_AUS1_O Medium used is CALCIFICATION_AUS1_O found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

CALCIFICATION_AUS2_HCO Medium used is CALCIFICATION_AUS2_HCO found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

CALCIFICATION_AUS2_O Medium used is CALCIFICATION_AUS2_O found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

CALCIFICATION_AUS3_HCO Medium used is CALCIFICATION_AUS3_HCO found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

CALCIFICATION_AUS3_O Medium used is CALCIFICATION_AUS3_O found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

CALCIFICATION_AUS4_HCO Medium used is CALCIFICATION_AUS4_HCO found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

CALCIFICATION_AUS4_O Medium used is CALCIFICATION_AUS4_O found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

CALCIFICATION_ICRU46 Medium used is CALCIFICATION_ICRU46 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

CARTILAGE_WW86 Medium used is CARTILAGE_WW86 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

CORTICAL_BONE_WW86 Medium used is CORTICAL_BONE_WW86 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

EYELENS_ICRU46 Medium used is EYELENS_ICRU46 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

F_SOFT_TISSUE_ICRU46 Medium used is F_SOFT_TISSUE_ICRU46 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

GITRACT_ICRU46 Medium used is GITRACT_ICRU46 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

GLAND1_WW86 Medium used is GLAND1_WW86 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

GLAND2_WW86 Medium used is GLAND2_WW86 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

GLAND2_WW98 Medium used is GLAND2_WW98 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

GLAND3_WW86 Medium used is GLAND3_WW86 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

GLAND_H79 Medium used is GLAND_H79 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

HEART1_WW86 Medium used is HEART1_WW86 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

HEART2_WW86 Medium used is HEART2_WW86 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

HEART3_WW86 Medium used is HEART3_WW86 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

HEART_BLOODFILLED_WW86 Medium used is HEART_BLOODFILLED_WW86 found in brachy_xcom_1.5←
MeV_nelson
Number of energy intervals is 2000

LUNG_BLOODFILLED_WW86 Medium used is LUNG_BLOODFILLED_WW86 found in brachy_xcom_1.5MeV←
_nelson
Number of energy intervals is 2000

LUNG_UNITRHO Medium used is LUNG_UNITRHO found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

MUSCLE1_WW86 Medium used is MUSCLE1_WW86 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

MUSCLE2_WW86 Medium used is MUSCLE2_WW86 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

MUSCLE3_WW86 Medium used is MUSCLE3_WW86 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

M_SOFT_TISSUE_ICRU46 Medium used is M_SOFT_TISSUE_ICRU46 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

P10C90 Medium used is P10C90 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

P15C85 Medium used is P15C85 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

P20C80 Medium used is P20C80 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

P25C75 Medium used is P25C75 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

P30C70 Medium used is P30C70 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

P35C65 Medium used is P35C65 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

P40C60 Medium used is P40C60 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

P45C55 Medium used is P45C55 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

P50C50 Medium used is P50C50 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

P55C45 Medium used is P55C45 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

P5C95 Medium used is P5C95 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

P60C40 Medium used is P60C40 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

P65C35 Medium used is P65C35 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

P70C30 Medium used is P70C30 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

P75C25 Medium used is P75C25 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

P80C20 Medium used is P80C20 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

P85C15 Medium used is P85C15 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

P90C10 Medium used is P90C10 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

P95C5 Medium used is P95C5 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

PROSTATE_01PCALC Medium used is PROSTATE_01PCALC found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

PROSTATE_05PCALC Medium used is PROSTATE_05PCALC found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

PROSTATE_1PCALC Medium used is PROSTATE_1PCALC found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

PROSTATE_1p5PCALC Medium used is PROSTATE_1p5PCALC found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

PROSTATE_3PCALC Medium used is PROSTATE_3PCALC found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

PROSTATE_4PCALC Medium used is PROSTATE_4PCALC found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

PROSTATE_5PCALC Medium used is PROSTATE_5PCALC found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

PROSTATE_ICRP23 Medium used is PROSTATE_ICRP23 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

PROSTATE_WW86 Medium used is PROSTATE_WW86 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

RECTUM_ICRP23 Medium used is RECTUM_ICRP23 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

RED_MARROW_WW86 Medium used is RED_MARROW_WW86 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

RIBS_10_WH87 Medium used is RIBS_10_WH87 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

RIBS_2_6_WH87 Medium used is RIBS_2_6_WH87 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

SKIN1_WW86 Medium used is SKIN1_WW86 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

SKIN2_WW86 Medium used is SKIN2_WW86 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

SKIN3_WW86 Medium used is SKIN3_WW86 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

SKIN_H79 Medium used is SKIN_H79 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

SOFT_BONE_ICRU44 Medium used is SOFT_BONE_ICRU44 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

SPONGIOSA_WW86 Medium used is SPONGIOSA_WW86 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

TISSUE_ICRU33 Medium used is TISSUE_ICRU33 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

URETHRA_WW86 Medium used is URETHRA_WW86 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

URINARY_BLADDER Medium used is URINARY_BLADDER found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

URINARY_BLADDER_EMPTY Medium used is URINARY_BLADDER_EMPTY found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

URINARY_BLADDER_FULL Medium used is URINARY_BLADDER_FULL found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

URINE Medium used is URINE found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

WATER_0.998 Medium used is WATER_0.998 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

WATER_1.000 Medium used is WATER_1.000 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

YELLOW_MARROW_WW86 Medium used is YELLOW_MARROW_WW86 found in brachy_xcom_1.5MeV_nelson
Number of energy intervals is 2000

Chapter 4

spectra

egs_brachy Spectra

The current list of spectra available in the egs_brachy geometry library.

Cs131_NNDC_2.6_line.spectrum

File Location: lib/spectra/Cs131_NNDC_2.6_line.spectrum

NuDat 2.6 NNDC Cs131 spectrum Khazov et al. (2006)

Cs137_NNDC_2.6_line.spectrum

File Location: lib/spectra/Cs137_NNDC_2.6_line.spectrum

NuDat 2.6 NNDC Cs137 spectrum Browne and Tuli, Nuclear Data Sheets 108,2173 (2007)

I125_NCRP_line.spectrum

File Location: lib/spectra/I125_NCRP_line.spectrum

NCRP No.58 spectrum

I125_TG43.spectrum

File Location: lib/spectra/I125_TG43.spectrum

TG43 I125 spectrum

Ir192_NNDC.spectrum

File Location: lib/spectra/Ir192_NNDC.spectrum

NuDat 2.6 NNDC Ir192 spectrum

Ir192_NNDC_2.6_line.spectrum

File Location: lib/spectra/Ir192_NNDC_2.6_line.spectrum

NuDat 2.6 NNDC Ir192 spectrum Baglin (2012) beta- and EC decays

Ir192_bare_1993.spectrum

File Location: lib/spectra/Ir192_bare_1993.spectrum

192-Ir spectrum; Duchemin and Coursol 1993

Pd103_NNDC_2.6_line.spectrum

File Location: lib/spectra/Pd103_NNDC_2.6_line.spectrum

NNDC 2.6 Pd 103 spectrum

Pd103_TG43.spectrum

File Location: lib/spectra/Pd103_TG43.spectrum

TG43 Pd 103 spectrum

Rh106_ICRU72_line.spectrum

File Location: lib/spectra/Rh106_ICRU72_line.spectrum

Rh-106 spectra extracted from ICRP72 containing beta emissions

Yb169_NNDC_2.6_line.spectrum

File Location: lib/spectra/Yb169_NNDC_2.6_line.spectrum

NuDat 2.6 NNDC Yb169 full spectrum Baglin (2008)

bareco60_line.spectrum

File Location: lib/spectra/bareco60_line.spectrum

Bare 60Co spectrum with 2 gamma ray lines of equal intensity

Chapter 5

tests

egs_brachy Test Suite

The current list of tests available in the egs_brachy test suite

Brem Cyl

Test Directory: eb_tests/brem_cyl

A test for ensuring x-ray sources mode is working. The test consists of a 1cm^2 beam of electrons incident on a thin cylindrical disc with dose being calculated in cylindrical slabs behind the target. The egs_brachy energy deposition doses are compared with values calculated by dosrznrc.

Flu Cutoff

Test Directory: eb_tests/flu_cutoff

A test for ensuring that the fluorescent photon cutoff works. A monoenergetic source of 0.015keV is placed within a thin Ti sphere and photon counts are scored on the outer surface of the sphere. Normally there would be a fluorescent peak at $\sim 4.5\text{keV}$ so when the `fluorescent photon cutoff` setting is set to 0.005 MeV that peak should not be present.

Two energy bins from 0-10keV and 10-20keV are used. If fluorescent photon cutoff feature is working correctly 100% of photons should be in the 10-20keV range.

Phsp Run

Test Directory: eb_tests/phsp_run

A test to compare a dose calculation using a phsp source with the equivalent ab-initio simulation.

Phsp Scoring

Test Directory: eb_tests/phsp_scoring

A test that generates an IAEAphsp source with egs_brachy and then checks the IAEA file to make sure it was created correctly.

Recycling

Test Directory: eb_tests/recycling

A test for ensuring doses calculated with recycling turned on are the same as doses without recycling.

Scatter

Test Directory: eb_tests/scatter

A test for comparing egs_brachy scatter dose calculations for an Ir192 sources with previously calculated values when egs_brachy was in a known good state.

Seeds In Xyz

Test Directory: eb_tests/seeds_in_xyz

A test for comparing dose calculated by egs_brachy in a simple rectilinear phantom containing multiple 6702 sources (some of which are rotated/translated). The calculated dose is compared with dose values calculated when egs_← brachy was in a known good state.

Seeds In Xyz Genvelope

Test Directory: eb_tests/seeds_in_xyz_genvelope

Same as tests/seeds_in_xyz except using a regular egs_genvelope instead of an autoenvelope.

Simple Dose Sph

Test Directory: eb_tests/simple_dose_sph

A very simple dose calculation in a spherical phantom with multiple media. The simple geometry allows a fast calculation with high precision for comparing against a previously calculated dose.

Single Generator

Test Directory: eb_tests/single_generator

This test ensures the 'single generator=no' and 'single_generator=yes' options give the same results.

Gold standard dose distribution was generated with egs_brachy and multiple_generator.egsinp

Source Energies

Test Directory: eb_tests/source_energies

A test to ensure initialized/escaping source/escaping geometry energy tallies are consistent with previously calculated values.

Spec Absolute

Test Directory: eb_tests/spec_absolute

A test for comparing the total absolute photon counts on the surface of a source with the expected value. A uniform spectrum between 15keV-25keV in a near-vaccum source is used so the expected spectrum can easily be calculated analytically.

Spec Eflu

Test Directory: eb_tests/spec_eflu

A test for comparing the calculated energy fluence spectrum on the surface of a source with the expected value. A uniform spectrum between 15keV-25keV in a near-vaccum source is used so the expected spectrum can easily be calculated analytically.

Spec Vox

Test Directory: eb_tests/spec_vox

A test for comparing the calculated energy fluence spectrum in a phantom region with the expected value. A uniform spectrum between 15keV-25keV in a near-vaccum geometry is used so the expected spectrum can easily be calculated analytically.

Stepped Source

Test Directory: eb_tests/stepped_source

A test for comparing the dose from a "stepped source" (i.e. superposition mode with variable activity) with previous calculations made when egs_brachy was in a known good state.

Tg43Mode

Test Directory: eb_tests/tg43mode

A test to ensure egs_brachy superposition mode calculations match previous calculations when egs_brachy was in a known good state.

Tg43Mode Recycle

Test Directory: eb_tests/tg43mode_recycle

A test to ensure superposition mode calculations with recycling turned on result in the same dose as superposition mode calculations without recycling.

Tg43Mode Zeroweight

Test Directory: eb_tests/tg43mode_zeroweight

A test to ensure superposition mode calculations work when a source has zero weighting.

Gold standard dose distribution was generated with egs_brachy and gold_standard.egsinp

Variable Activity

Test Directory: eb_tests/variable_activity

A test for comparing the dose from sources with different source weighting with calculations from when egs_brachy was in a known good state.

Variable W Recycling

Test Directory: eb_tests/variable_w_recycling

A test for comparing the dose from sources with different source weighting and recycling on with calculations from when egs_brachy was in a known good state.

Gold standard dose distribution was generated with egs_brachy and gold_standard.egsinp

Volume Correction

Test Directory: eb_tests/volume_correction

A test of the egs_brachy Monte Carlo volume correction routines. The volume of phantom voxels overlapped by sources and other phantoms are calculated by egs_brachy and compared with analytical values.

Chapter 6

transport

egs_brachy Sample Transport Parameters

Sample Monte Carlo transport parameters for various simulations.

electron_transport_10keV

File Location: lib/transport/electron_transport_10keV

Turns on electron transport in the source and in the phantom, with electron cutoff energy set to 10 keV; photon cutoff energy is 1 keV.

high_energy_default

File Location: lib/transport/high_energy_default

Default MC parameters for high energy sources; electron cutoff energy 1.5 MeV, photon cutoff energy 1 keV.

high_energy_sk_calc

File Location: lib/transport/high_energy_sk_calc

Recommended for air-kerma strength calculations of high energy sources; electron cutoff energy 1.5 MeV, photon cutoff energy 10 keV.

low_energy_default

File Location: lib/transport/low_energy_default

Default MC parameters for low energy sources; electron cutoff energy 1.5 MeV, photon cutoff energy 1 keV.

low_energy_sk_calc

File Location: lib/transport/low_energy_sk_calc

Recommended for air-kerma strength calculations of low energy sources; electron cutoff energy 1 MeV, photon cutoff energy 5 keV.

xray_source

File Location: lib/transport/xray_source

Recommended for x-ray source simulations; electron cutoff energy 1 keV in the source geometry only (1 MeV elsewhere), photon cutoff energy 1 keV.

Chapter 7

CLRP egs++ brachytherapy source models

Work in progress...

Chapter 8

Namespace Index

8.1 Namespace List

Here is a list of all namespaces with brief descriptions:

doc_utils	69
eb_tests	69
eb_tests.brem_cyl	70
eb_tests.brem_cyl.test	70
eb_tests.flu_cutoff	71
eb_tests.flu_cutoff.test	71
eb_tests.iaeа	72
eb_tests.iaeа_errors	73
eb_tests.iaeа_types	74
eb_tests.phsp_run	76
eb_tests.phsp_run.test	76
eb_tests.phsp_scoring	77
eb_tests.phsp_scoring.test	77
eb_tests.recycling	79
eb_tests.recycling.test	79
eb_tests.scatter	79
eb_tests.scatter.test	80
eb_tests.seeds_in_xyz	81
eb_tests.seeds_in_xyz.test	81
eb_tests.seeds_in_xyz_genvelope	81
eb_tests.seeds_in_xyz_genvelope.test	82
eb_tests.simple_dose_sph	82
eb_tests.simple_dose_sph.test	82
eb_tests.single_generator	84
eb_tests.single_generator.test	84
eb_tests.source_energies	84
eb_tests.source_energies.test	85
eb_tests.spec_absolute	86
eb_tests.spec_absolute.test	86
eb_tests.spec_eflu	87
eb_tests.spec_eflu.test	87
eb_tests.spec_vox	89
eb_tests.spec_vox.test	89
eb_tests.stepped_source	91
eb_tests.stepped_source.test	91

eb_tests.tg43mode	92
eb_tests.tg43mode.test	92
eb_tests.tg43mode_recycle	93
eb_tests.tg43mode_recycle.test	94
eb_tests.tg43mode_zeroweight	95
eb_tests.tg43mode_zeroweight.test	95
eb_tests.utils	96
eb_tests.variable_activity	97
eb_tests.variable_activity.test	97
eb_tests.variable_w_recycling	98
eb_tests.variable_w_recycling.test	98
eb_tests.volume_correction	99
eb_tests.volume_correction.test	99
ebvolcor	101
gen_docs	103
gen_geom	103
gen_media	105
gen_specs	106
gen_tests	107
gen_transport	108
muen	109
run_tests	110

Chapter 9

Hierarchical Index

9.1 Class Hierarchy

This inheritance list is sorted roughly, but not completely, alphabetically:

EB_Timer	163
EB_TimingTree	166
EGS_AdvancedApplication	
EB_Application	123
EGS_BaseSource	
EB_IAEASource	145
Exception	
eb_tests.iaea_errors.IAEAPhaseSpaceError	191
eb_tests.iaea_errors.IAEAPhaseSpaceSetupError	192
ebvolcor::FileResults	176
GeomInfo	178
GeomRegionInfo	183
ios	
gzstreambase	185
igzstream	192
ogzstream	200
istream	
igzstream	192
muen::MuenDataParser	197
Node	199
object	
eb_tests.iaea.IAEAPhaseSpace	189
ebvolcor::Options	201
ostream	
ogzstream	200
Publisher	209
RecycleOpts	211
RegionResult	212
ebvolcor::Results	213
streambuf	
gzstreambuf	186
Subscriber	215
BaseSpectrumScorer	115
EnergyFluenceSpectrumInVoxel	167
EnergyWeightedSurfaceSpectrum	174

SurfaceCountSpectrum	216
EB_Phantom	151
EnergyScoringStats	170
Latch	193
PHSPControl	205
ebvolcor::VolumeCorrector	218

Chapter 10

Class Index

10.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

BaseSpectrumScorer	Abstract base class for scoring spectrum information	115
EB_Application	The main egs_brachy application class. See the Main Page for full documentation	123
EB_IAEASource	A phase space file source for egs_brachy	145
EB_Phantom	A class to represent a single phantom for scoring dose in egs_brachy	151
EB_Timer	163
EB_TimingTree	166
EnergyFluenceSpectrumInVoxel	A class for scoring the energy weighted spectrum (normalized to total radiant energy) of particles on the surface of a source geometry	167
EnergyScoringStats	Class to use for scoring information about total energy initialized, escaping sources etc	170
EnergyWeightedSurfaceSpectrum	A class for scoring the energy weighted spectrum (normalized to total radiant energy) of particles on the surface of a source geometry	174
ebvolcor::FileResults	176
GeomInfo	Container for organizing meta data about the geometries	178
GeomRegionInfo	Struct to contain elementary information aboud a geometry	183
gzstreambase	185
gzstreambuf	186
eb_tests.iaeia.IAEAPhaseSpace	189
eb_tests.iaeia_errors.IAEAPhaseSpaceError	191
eb_tests.iaeia_errors.IAEAPhaseSpaceSetupError	192
igzstream	192
Latch	A class for handling latch bits relevant to egs_brachy. The Latch class listens for particle events and sets/unsets latch bits on the particle based on the event type	193
muen::MuenDataParser	Class for parsing muen data from a file	197
Node	199

ogzstream	200
ebvolcor::Options	
Volume correction initialization helper class	201
PHSPControl	205
Publisher	209
RecycleOpts	211
RegionResult	212
ebvolcor::Results	
Struct used to collect and output results about a volume correction run	213
Subscriber	215
SurfaceCountSpectrum	
A class for scoring a histogram of the number of particles escaping a source geometry	216
ebvolcor::VolumeCorrector	
An object for controlling the volume correction routine	218

Chapter 11

File Index

11.1 File List

Here is a list of all files with brief descriptions:

/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/array_sizes.h	226
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_volcor.cpp Main implementation of volume correction routines	265
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_volcor.h Volume correction routines for egs_brachy	266
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/egs_brachy.cpp Main egs_brachy application implementation file	267
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/egs_brachy.h Main egs_brachy application header file	270
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/ginfo.cpp Implementation of Geometry Info class	271
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/ginfo.h Ginfo contains classes for organizing information about the geometries present in an egs_brachy simulation	274
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/latch.cpp Methods for setting/checking latch bits for egs_brachy	332
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/latch.h Handle particles latch bits for egs_brachy	333
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/muen.h Functions for loading muen data from a file	333
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/phantom.cpp Implementation of phantom objects	334
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/phantom.h Header file for phantom objects	335
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/phsp.cpp Implementation of the PHSPControl object	336
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/phsp.h Definition of the PHSPControl object	336
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/publish.cpp A simple pub/sub module to allow various egs_brachy classes to subscribe to particle events . .	337
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/publish.h Class implementations for recycling	338
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/recycle.h Class definitions for recycling	339

/home/randlet/EGSnrc/egs_home/egs_brachy/run_tests.py	339
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/spec_scoring.cpp	
Implementation of spectrum scoring classes	340
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/spec_scoring.h	
Definition of spectrum scoring classes	341
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/timing.h	341
doc_utils.py	223
gen_docs.py	223
gen_geom.py	224
gen_media.py	224
gen_specs.py	224
gen_tests.py	225
gen_transport.py	225
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_iaeaphsp_source/eb_iaeaphsp_source.cpp	
249	
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_iaeaphsp_source/eb_iaeaphsp_source.h	
Minimal IAEA phase space source for egs_brachy	250
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_iaeaphsp_source/docs/output/html/dynsections.js	
226	
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_iaeaphsp_source/docs/output/html/jquery.js	
227	
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_iaeaphsp_source/docs/output/html/search/all_0.js	
242	
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_iaeaphsp_source/docs/output/html/search/all_1.js	
243	
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_iaeaphsp_source/docs/output/html/search/all_2.js	
243	
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_iaeaphsp_source/docs/output/html/search/all_3.js	
244	
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_iaeaphsp_source/docs/output/html/search/classes_0.js	
244	
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_iaeaphsp_source/docs/output/html/search/files_0.js	
245	
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_iaeaphsp_source/docs/output/html/search/functions_0.js	
245	
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_iaeaphsp_source/docs/output/html/search/search.js	
246	
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_iaeaphsp_source/docs/output/html/search/variables_0.js	
248	
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_iaeaphsp_source/docs/output/html/search/variables_1.js	
248	
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_iaeaphsp_source/docs/output/html/search/variables_2.js	
248	
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_iaeaphsp_source/docs/output/html/search/variables_3.js	
249	
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/_init_.py	251
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/iaeа.py	263
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/iaeа_errors.py	263
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/iaeа_types.py	264
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/utils.py	264
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/brem_cyl/_init_.py	251
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/brem_cyl/test.py	254
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/flu_cutoff/_init_.py	251
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/flu_cutoff/test.py	255
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/phsp_run/_init_.py	251
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/phsp_run/test.py	255
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/phsp_scoring/_init_.py	251
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/phsp_scoring/test.py	255

/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/recycling/ __init__.py	251
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/recycling/ test.py	256
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/scatter/ __init__.py	252
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/scatter/ test.py	256
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/seeds_in_xyz/ __init__.py	252
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/seeds_in_xyz/ test.py	257
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/seeds_in_xyz_genvelope/ __init__.py	252
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/seeds_in_xyz_genvelope/ test.py	257
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/simple_dose_sph/ __init__.py	252
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/simple_dose_sph/ test.py	257
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/single_generator/ __init__.py	252
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/single_generator/ test.py	258
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/source_energies/ __init__.py	252
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/source_energies/ test.py	258
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/spec_absolute/ __init__.py	253
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/spec_absolute/ test.py	259
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/spec_eflu/ __init__.py	253
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/spec_eflu/ test.py	259
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/spec_vox/ __init__.py	253
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/spec_vox/ test.py	260
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/stepped_source/ __init__.py	253
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/stepped_source/ test.py	260
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/tg43mode/ __init__.py	253
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/tg43mode/ test.py	261
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/tg43mode_recycle/ __init__.py	253
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/tg43mode_recycle/ test.py	261
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/tg43mode_zeroweight/ __init__.py	254
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/tg43mode_zeroweight/ test.py	261
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/variable_activity/ __init__.py	254
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/variable_activity/ test.py	262
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/variable_w_recycling/ __init__.py	254
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/variable_w_recycling/ test.py	262
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/volume_correction/ __init__.py	254
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/volume_correction/ test.py	263
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/gzstream.C	275
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/gzstream.h	275

Chapter 12

Namespace Documentation

12.1 doc_utils Namespace Reference

Functions

- def [find_file_descriptions](#) (dir_path, include_key=None)

12.1.1 Function Documentation

12.1.1.1 `def doc_utils.find_file_descriptions (dir_path, include_key = None)`

Definition at line 3 of file doc_utils.py.

12.2 eb_tests Namespace Reference

Namespaces

- [brem_cyl](#)
- [flu_cutoff](#)
- [iaea](#)
- [iaea_errors](#)
- [iaea_types](#)
- [phsp_run](#)
- [phsp_scoring](#)
- [recycling](#)
- [scatter](#)
- [seeds_in_xyz](#)
- [seeds_in_xyz_genvelope](#)
- [simple_dose_sph](#)
- [single_generator](#)
- [source_energies](#)
- [spec_absolute](#)
- [spec_eflu](#)
- [spec_vox](#)
- [stepped_source](#)
- [tg43mode](#)
- [tg43mode_recycle](#)
- [tg43mode_zeroweight](#)
- [utils](#)
- [variable_activity](#)
- [variable_w_recycling](#)
- [volume_correction](#)

12.3 eb_tests.brem_cyl Namespace Reference

Namespaces

- [test](#)

12.4 eb_tests.brem_cyl.test Namespace Reference

Functions

- def [compare_results](#) (egslist, inp_name)

Variables

- string [EGSINP](#) = "brem_cyl.egsinp"
- int [TIME_LIMIT_S_PER_MHZ](#) = 20
- list [DOSRZ_NRC_DOSES](#)
- dictionary [expected_doses](#)

12.4.1 Detailed Description

A test for ensuring x-ray sources mode is working. The test consists of a 1cm^2 beam of electrons incident on a thin cylindrical disc with dose being calculated in cylindrical slabs behind the target. The egs_brachy energy deposition doses are compared with values calculated by dosrznrc.

12.4.2 Function Documentation

12.4.2.1 def eb_tests.brem_cyl.test.compare_results (*egslist, inp_name*)

Definition at line 43 of file test.py.

12.4.3 Variable Documentation

12.4.3.1 list eb_tests.brem_cyl.test.DOSRZ_NRC_DOSES

Initial value:

```
1 = [
2     (3.0107E-013, 0.0002),
3     (1.0088E-016, 0.0040),
4     (5.6843E-017, 0.0042),
5     (3.8797E-017, 0.0041),
6 ]
```

Definition at line 18 of file test.py.

12.4.3.2 string eb_tests.brem_cyl.test.EGSINP = "brem_cyl.egsinp"

Definition at line 14 of file test.py.

12.4.3.3 dictionary eb_tests.brem_cyl.test.expected_doses

Initial value:

```

1 = {
2     "tlen": [
3         (3.702E-16, 2.84),
4         (1.042E-16, 2.90),
5         (5.933E-17, 3.04),
6         (4.064E-17, 3.14),
7     ],
8     "edep": [
9         (3.002E-13, 0.41),
10        (1.073E-16, 3.15),
11        (5.943E-17, 3.66),
12        (3.912E-17, 4.20),
13    ]
14 }
```

Definition at line 26 of file test.py.

12.4.3.4 int eb_tests.brem_cyl.test.TIME_LIMIT_S_PER_MHZ = 20

Definition at line 15 of file test.py.

12.5 eb_tests.flu_cutoff Namespace Reference

Namespaces

- [test](#)

12.6 eb_tests.flu_cutoff.test Namespace Reference

Functions

- def [compare_results](#) (egslst, inp_name)

Variables

- string [EGSINP](#) = "flu_cutoff.egsinp"
- int [TIME_LIMIT_S_PER_MHZ](#) = 2

12.6.1 Detailed Description

A test for ensuring that the fluorescent photon cutoff works. A monoenergetic source of 0.015keV is placed within a thin Ti sphere and photon counts are scored on the outer surface of the sphere. Normally there would be a fluorescent peak at ~4.5keV so when the 'fluorescent photon cutoff' setting is set to 0.005 MeV that peak should not be present.

Two energy bins from 0-10keV and 10-20keV are used. If fluorescent photon cutoff feature is working correctly 100% of photons should be in the 10-20keV range.

12.6.2 Function Documentation

12.6.2.1 def eb_tests.flu_cutoff.test.compare_results (*egslist*, *inp_name*)

Definition at line 23 of file test.py.

12.6.3 Variable Documentation

12.6.3.1 string eb_tests.flu_cutoff.test.EGSINP = "flu_cutoff.egsinp"

Definition at line 19 of file test.py.

12.6.3.2 int eb_tests.flu_cutoff.test.TIME_LIMIT_S_PER_MHZ = 2

Definition at line 20 of file test.py.

12.7 eb_tests.iaea Namespace Reference

Classes

- class [IAEAPhaseSpace](#)

Variables

- `HEN_HOUSE` = os.getenv("HEN_HOUSE")
- `IAEA_DLL` = glob.glob(os.path.join(HEN_HOUSE,"egs++/dso/*/", "libiaea_phsp.so"))[0]
- `iaeadll` = ctypes.CDLL(IAEA_DLL)

12.7.1 Variable Documentation

12.7.1.1 eb_tests.iaea.HEN_HOUSE = os.getenv("HEN_HOUSE")

Definition at line 6 of file iaea.py.

12.7.1.2 `eb_tests.iaeaspace.IAEA_DLL = glob.glob(os.path.join(HEN_HOUSE,"egs++/dso/*/", "libiaeaspace_phsp.so"))[0]`

Definition at line 8 of file iaea.py.

12.7.1.3 `eb_tests.iaeaspace.IAEADLL = ctypes.CDLL(IAEA_DLL)`

Definition at line 19 of file iaea.py.

12.8 eb_tests.iaeaspace Namespace Reference

Classes

- class [IAEAPhaseSpaceError](#)
- class [IAEAPhaseSpaceSetupError](#)

Variables

- dictionary `error_messages = {}`
- tuple `new_source_errors`

12.8.1 Variable Documentation

12.8.1.1 dictionary `eb_tests.iaeaspace.error_messages = {}`

Definition at line 1 of file iaea_errors.py.

12.8.1.2 tuple `eb_tests.iaeaspace.new_source_errors`

Initial value:

```
1 = (
2
3     #errors returned in iaea_new_source
4
5     (105,'Header file not set'),
6
7     (-1,'Unable to initialize phase space'),
8     (-91,'Failed to get record contents'),
9     (-93,'Failed to read header'),
10    (-94,'Null file pointer to phase space file'),
11    (-95,'Failed to set record for new phase space file'),
12    (-96,'Phase space file failed to open'),
13    (-98,'Maximum number of sources exceeded or invalid source id'),
14    (-99,'Invalid access mode'),
15    (-100,'Path to phase space file is too long'),
16    (-101,'Path to phase space file is too short')
17
18 )
```

Definition at line 4 of file iaea_errors.py.

12.9 eb_tests.iaeatypes Namespace Reference

Variables

- `IAEA_Float` = `ctypes.c_float`
- `PIAEA_Float` = `ctypes.POINTER(IAEA_Float)`
- `IAEA_I16` = `ctypes.c_short`
- `PIAEA_I16` = `ctypes.POINTER(IAEA_I16)`
- `IAEA_I32` = `ctypes.c_int`
- `PIAEA_I32` = `ctypes.POINTER(IAEA_I32)`
- `IAEA_I64` = `ctypes.c_longlong`
- `PIAEA_I64` = `ctypes.POINTER(IAEA_I64)`
- dictionary `iaeatypes.iaeatypes.iaeatypes_file_modes`
- int `all_particles` = -1
- int `photons` = 1
- int `electrons` = 2
- int `positrons` = 3
- int `neutrons` = 4
- int `protons` = 5
- dictionary `iaeatypes.iaeatypes.iaeatypes_particle_types`
- int `max_sources` = 30

12.9.1 Variable Documentation

12.9.1.1 int eb_tests.iaeatypes.all_particles = -1

Definition at line 20 of file `iaeatypes.py`.

12.9.1.2 int eb_tests.iaeatypes.electrons = 2

Definition at line 22 of file `iaeatypes.py`.

12.9.1.3 dictionary eb_tests.iaeatypes.iaeatypes_file_modes

Initial value:

```
1 = {
2     'r': IAEA_I32(1),
3     'w': IAEA_I32(2),
4     'a': IAEA_I32(3)
5 }
```

Definition at line 14 of file `iaeatypes.py`.

12.9.1.4 eb_tests.iaeatypes.IAEA_Float = ctypes.c_float

Definition at line 3 of file `iaeatypes.py`.

12.9.1.5 eb_tests.iaea_types.IAEA_I16 = ctypes.c_short

Definition at line 7 of file iaea_types.py.

12.9.1.6 eb_tests.iaea_types.IAEA_I32 = ctypes.c_int

Definition at line 9 of file iaea_types.py.

12.9.1.7 eb_tests.iaea_types.IAEA_I64 = ctypes.c_longlong

Definition at line 11 of file iaea_types.py.

12.9.1.8 int eb_tests.iaea_types.max_sources = 30

Definition at line 39 of file iaea_types.py.

12.9.1.9 int eb_tests.iaea_types.neutrons = 4

Definition at line 24 of file iaea_types.py.

12.9.1.10 dictionary eb_tests.iaea_types.particle_types

Initial value:

```
1 = {
2     'all'      : all_particles,
3     'photon'   : photons,
4     'electron' : electrons,
5     'positron' : positrons,
6     'neutron'  : neutrons,
7     'proton'   : protons,
8     'charged'  : (electrons,positrons,protons),
9     'neutral'  : (photons,neutrons)
10 }
```

Definition at line 27 of file iaea_types.py.

12.9.1.11 int eb_tests.iaea_types.photons = 1

Definition at line 21 of file iaea_types.py.

12.9.1.12 eb_tests.iaea_types.PIAEA_Float = ctypes.POINTER(IAEA_Float)

Definition at line 5 of file iaea_types.py.

12.9.1.13 `eb_tests.iaeatypes.PIAEA_I16 = ctypes.POINTER(IAEA_I16)`

Definition at line 8 of file iaea_types.py.

12.9.1.14 `eb_tests.iaeatypes.PIAEA_I32 = ctypes.POINTER(IAEA_I32)`

Definition at line 10 of file iaea_types.py.

12.9.1.15 `eb_tests.iaeatypes.PIAEA_I64 = ctypes.POINTER(IAEA_I64)`

Definition at line 12 of file iaea_types.py.

12.9.1.16 `int eb_tests.iaeatypes.positrons = 3`

Definition at line 23 of file iaea_types.py.

12.9.1.17 `int eb_tests.iaeatypes.protons = 5`

Definition at line 25 of file iaea_types.py.

12.10 eb_tests.phsp_run Namespace Reference

Namespaces

- `test`

12.11 eb_tests.phsp_run.test Namespace Reference

Functions

- def `compare_results` (egslist, inp_name)

Variables

- string `EGSINP` = "phsp_run.egsinp"
- int `TIME_LIMIT_S_PER_MHZ` = 80

12.11.1 Detailed Description

A test to compare a dose calculation using a phsp source with the equivalent ab-initio simulation.

12.11.2 Function Documentation

12.11.2.1 def eb_tests.phsp_run.test.compare_results (*egslist, inp_name*)

Definition at line 19 of file test.py.

12.11.3 Variable Documentation

12.11.3.1 string eb_tests.phsp_run.test.EGSINP = "phsp_run.egsinp"

Definition at line 15 of file test.py.

12.11.3.2 int eb_tests.phsp_run.test.TIME_LIMIT_S_PER_MHZ = 80

Definition at line 16 of file test.py.

12.12 eb_tests.phsp_scoring Namespace Reference

Namespaces

- [test](#)

12.13 eb_tests.phsp_scoring.test Namespace Reference

Functions

- def [compare_results](#) (egslist, inp_name)

Variables

- string [EGSINP](#) = "phsp_score.egsinp"
- int [TIME_LIMIT_S_PER_MHZ](#) = 10
- tuple [SOURCE_WEIGHTS](#) = (1., 9.)
- tuple [MAX_E](#) = (0.05, 0.025,)
- int [NHIST](#) = 1000
- float [RM](#) = 0.511
- dictionary [EXPECTED](#)

12.13.1 Detailed Description

A test that generates an IAEApsh source with egs_brachy and then checks the IAEA file to make sure it was created correctly.

12.13.2 Function Documentation

12.13.2.1 def eb_tests.phsp_scoring.test.compare_results (*egslist*, *inp_name*)

Definition at line 29 of file test.py.

12.13.3 Variable Documentation

12.13.3.1 string eb_tests.phsp_scoring.test.EGSINP = "phsp_score.egsinp"

Definition at line 13 of file test.py.

12.13.3.2 dictionary eb_tests.phsp_scoring.test.EXPECTED

Initial value:

```
1 = {
2     'num_e': NHIST*SOURCE_WEIGHTS[0]/sum(SOURCE_WEIGHTS),
3     'num_p': NHIST*SOURCE_WEIGHTS[1]/sum(SOURCE_WEIGHTS),
4     'max_energy': 0.05,
5     'num_orig': NHIST,
6 }
```

Definition at line 21 of file test.py.

12.13.3.3 tuple eb_tests.phsp_scoring.test.MAX_E = (0.05, 0.025,)

Definition at line 17 of file test.py.

12.13.3.4 int eb_tests.phsp_scoring.test.NHIST = 1000

Definition at line 18 of file test.py.

12.13.3.5 float eb_tests.phsp_scoring.test.RM = 0.511

Definition at line 19 of file test.py.

12.13.3.6 tuple eb_tests.phsp_scoring.test.SOURCE_WEIGHTS = (1., 9.)

Definition at line 16 of file test.py.

12.13.3.7 int eb_tests.phsp_scoring.test.TIME_LIMIT_S_PER_MHZ = 10

Definition at line 14 of file test.py.

12.14 eb_tests.recycling Namespace Reference

Namespaces

- [test](#)

12.15 eb_tests.recycling.test Namespace Reference

Functions

- def [compare_results](#) (egslist, inp_name)

Variables

- string [EGSINP](#) = "recycling.egsinp"
- int [TIME_LIMIT_S_PER_MHZ](#) = 16

12.15.1 Detailed Description

A test for ensuring doses calculated with recycling turned on are the same as doses without recycling.

12.15.2 Function Documentation

12.15.2.1 def eb_tests.recycling.test.compare_results (*egslist, inp_name*)

Definition at line 19 of file test.py.

12.15.3 Variable Documentation

12.15.3.1 string eb_tests.recycling.test.EGSINP = "recycling.egsinp"

Definition at line 15 of file test.py.

12.15.3.2 int eb_tests.recycling.test.TIME_LIMIT_S_PER_MHZ = 16

Definition at line 16 of file test.py.

12.16 eb_tests.scatter Namespace Reference

Namespaces

- [test](#)

12.17 eb_tests.scatter.test Namespace Reference

Functions

- def `get_n_highest_doses` (`doses, uncs, n=NCOMPARE`)
- def `compare_results` (`egslst, inp_name`)

Variables

- string `EGSINP` = "scatter.egsinp"
- int `TIME_LIMIT_S_PER_MHZ` = 65
- int `NCOMPARE` = 10

12.17.1 Detailed Description

A test for comparing egs_brachy scatter dose calculations for an Ir192 sources with previously calculated values when egs_brachy was in a known good state.

12.17.2 Function Documentation

12.17.2.1 def eb_tests.scatter.test.compare_results (`egslst, inp_name`)

Definition at line 24 of file test.py.

12.17.2.2 def eb_tests.scatter.test.get_n_highest_doses (`doses, uncs, n=NCOMPARE`)

Definition at line 20 of file test.py.

12.17.3 Variable Documentation

12.17.3.1 string eb_tests.scatter.test.EGSINP = "scatter.egsinp"

Definition at line 15 of file test.py.

12.17.3.2 int eb_tests.scatter.test.NCOMPARE = 10

Definition at line 17 of file test.py.

12.17.3.3 int eb_tests.scatter.test.TIME_LIMIT_S_PER_MHZ = 65

Definition at line 16 of file test.py.

12.18 eb_tests.seeds_in_xyz Namespace Reference

Namespaces

- test

12.19 eb_tests.seeds_in_xyz.test Namespace Reference

Functions

- def `compare_results` (`egslist, inp_name`)

Variables

- string `EGSINP` = "seeds_in_xyz.egsinp"
- int `TIME_LIMIT_S_PER_MHZ` = 25

12.19.1 Detailed Description

A test for comparing dose calculated by egs_brachy in a simple rectilinear phantom containing multiple 6702 sources (some of which are rotated/translated). The calculated dose is compared with dose values calculated when egs_brachy was in a known good state.

12.19.2 Function Documentation

12.19.2.1 def eb_tests.seeds_in_xyz.test.compare_results (`egslist, inp_name`)

Definition at line 23 of file test.py.

12.19.3 Variable Documentation

12.19.3.1 string eb_tests.seeds_in_xyz.test.EGSINP = "seeds_in_xyz.egsinp"

Definition at line 19 of file test.py.

12.19.3.2 int eb_tests.seeds_in_xyz.test.TIME_LIMIT_S_PER_MHZ = 25

Definition at line 20 of file test.py.

12.20 eb_tests.seeds_in_xyz_genvelope Namespace Reference

Namespaces

- test

12.21 eb_tests.seeds_in_xyz_genvelope.test Namespace Reference

Functions

- def [compare_results](#) (egslist, inp_name)

Variables

- string [EGSINP](#) = "seeds_in_xyz_genvelope.egsinp"
- int [TIME_LIMIT_S_PER_MHZ](#) = 25

12.21.1 Detailed Description

Same as tests/seeds_in_xyz except using a regular egs_genvelope instead of an autoenvelope.

12.21.2 Function Documentation

12.21.2.1 def eb_tests.seeds_in_xyz_genvelope.test.compare_results (*egslist, inp_name*)

Definition at line 19 of file test.py.

12.21.3 Variable Documentation

12.21.3.1 string eb_tests.seeds_in_xyz_genvelope.test.EGSINP = "seeds_in_xyz_genvelope.egsinp"

Definition at line 15 of file test.py.

12.21.3.2 int eb_tests.seeds_in_xyz_genvelope.test.TIME_LIMIT_S_PER_MHZ = 25

Definition at line 16 of file test.py.

12.22 eb_tests.simple_dose_sph Namespace Reference

Namespaces

- [test](#)

12.23 eb_tests.simple_dose_sph.test Namespace Reference

Functions

- def [compare_results](#) (egslist, inp_name)

Variables

- string `EGSINP` = "simple_dose_sph.egsinp"
- int `TIME_LIMIT_S_PER_MHZ` = 22
- dictionary `expected_doses`

12.23.1 Detailed Description

A very simple dose calculation in a spherical phantom with multiple media. The simple geometry allows a fast calculation with high precision for comparing against a previously calculated dose.

12.23.2 Function Documentation

12.23.2.1 def eb_tests.simple_dose_sph.test.compare_results (`egslist`, `inp_name`)

Definition at line 35 of file test.py.

12.23.3 Variable Documentation

12.23.3.1 string eb_tests.simple_dose_sph.test.EGSINP = "simple_dose_sph.egsinp"

Definition at line 14 of file test.py.

12.23.3.2 dictionary eb_tests.simple_dose_sph.test.expected_doses

Initial value:

```

1 = {
2     "tlen": [
3         (5.219E-12, 0.0004),
4         (1.117E-12, 0.0002),
5         (4.292E-13, 0.0002),
6         (2.126E-13, 0.0002),
7         (1.332E-13, 0.0001),
8     ],
9     "edep": [
10        (5.212E-12, 0.0073),
11    ]
12 }
```

Definition at line 20 of file test.py.

12.23.3.3 int eb_tests.simple_dose_sph.test.TIME_LIMIT_S_PER_MHZ = 22

Definition at line 15 of file test.py.

12.24 eb_tests.single_generator Namespace Reference

Namespaces

- [test](#)

12.25 eb_tests.single_generator.test Namespace Reference

Functions

- def [compare_results](#) (egslist, inp_name)

Variables

- string [EGSINP](#) = "single_generator.egsinp"
- int [TIME_LIMIT_S_PER_MHZ](#) = 25

12.25.1 Detailed Description

This test ensures the 'single generator=no' and 'single_generator=yes' options give the same results.

Gold standard dose distribution was generated with egs_brachy and multiple_generator.egsinp

12.25.2 Function Documentation

12.25.2.1 def eb_tests.single_generator.test.compare_results (*egslist, inp_name*)

Definition at line 21 of file test.py.

12.25.3 Variable Documentation

12.25.3.1 string eb_tests.single_generator.test.EGSINP = "single_generator.egsinp"

Definition at line 17 of file test.py.

12.25.3.2 int eb_tests.single_generator.test.TIME_LIMIT_S_PER_MHZ = 25

Definition at line 18 of file test.py.

12.26 eb_tests.source_energies Namespace Reference

Namespaces

- [test](#)

12.27 eb_tests.source_energies.test Namespace Reference

Functions

- def [compare_results](#) (egslist, inp_name)

Variables

- string [EGSINP](#) = "source_energies.egsinp"
- int [TIME_LIMIT_S_PER_MHZ](#) = 2
- dictionary [expected_results](#)

12.27.1 Detailed Description

A test to ensure initialized/escaping source/escaping geometry energy tallies are consistent with previously calculated values.

12.27.2 Function Documentation

12.27.2.1 def eb_tests.source_energies.test.compare_results (*egslist, inp_name*)

Definition at line 24 of file test.py.

12.27.3 Variable Documentation

12.27.3.1 string eb_tests.source_energies.test.EGSINP = "source_energies.egsinp"

Definition at line 14 of file test.py.

12.27.3.2 dictionary eb_tests.source_energies.test.expected_results

Initial value:

```
1 = {
2     'initialized': 1135.1,
3     'escaping_source': 898.8,
4     'escaping_geom': 702.01,
5 }
```

Definition at line 17 of file test.py.

12.27.3.3 int eb_tests.source_energies.test.TIME_LIMIT_S_PER_MHZ = 2

Definition at line 15 of file test.py.

12.28 eb_tests.spec_absolute Namespace Reference

Namespaces

- [test](#)

12.29 eb_tests.spec_absolute.test Namespace Reference

Functions

- def [expected](#) (e)
- def [compare_results](#) (egslst, inp_name)

Variables

- string [EGSINP](#) = "spec_absolute.egsinp"
- int [TIME_LIMIT_S_PER_MHZ](#) = 6
- [EMIN](#)
- [EMAX](#)

12.29.1 Detailed Description

A test for comparing the total absolute photon counts on the surface of a source with the expected value. A uniform spectrum between 15keV-25keV in a near-vaccum source is used so the expected spectrum can easily be calculated analytically.

12.29.2 Function Documentation

12.29.2.1 def eb_tests.spec_absolute.test.compare_results (egslst, inp_name)

Definition at line 25 of file test.py.

12.29.2.2 def eb_tests.spec_absolute.test.expected (e)

Definition at line 20 of file test.py.

12.29.3 Variable Documentation

12.29.3.1 string eb_tests.spec_absolute.test.EGSINP = "spec_absolute.egsinp"

Definition at line 15 of file test.py.

12.29.3.2 eb_tests.spec_absolute.test.EMAX

Definition at line 18 of file test.py.

12.29.3.3 eb_tests.spec_absolute.test.EMIN

Definition at line 18 of file test.py.

12.29.3.4 int eb_tests.spec_absolute.test.TIME_LIMIT_S_PER_MHZ = 6

Definition at line 16 of file test.py.

12.30 eb_tests.spec_eflu Namespace Reference

Namespaces

- [test](#)

12.31 eb_tests.spec_eflu.test Namespace Reference

Functions

- def [expected](#) (e)
- def [compare_results](#) (egslst, inp_name)

Variables

- string [EGSINP](#) = "spec_eflu.egsinp"
- int [TIME_LIMIT_S_PER_MHZ](#) = 6
- [EMIN](#)
- [EMAX](#)
- int [NHIST](#) = 1
- float [BIN_WIDTH](#) = 0.001
- int [AVG_E](#) = ([EMAX](#)+[EMIN](#))/2
- [TOTAL_E](#) = [AVG_E](#)*[NHIST](#)
- tuple [N_BINS_IN_RANGE](#) = ([EMAX](#)-[EMIN](#))/[BIN_WIDTH](#)
- [SCORED_IN_BIN](#) = [NHIST](#)/[N_BINS_IN_RANGE](#)
- [SCORED_IN_BIN_PER_MEV](#) = [SCORED_IN_BIN](#)/[BIN_WIDTH](#)

12.31.1 Detailed Description

A test for comparing the calculated energy fluence spectrum on the surface of a source with the expected value. A uniform spectrum between 15keV-25keV in a near-vaccum source is used so the expected spectrum can easily be calculated analytically.

12.31.2 Function Documentation

12.31.2.1 def eb_tests.spec_eflu.test.compare_results (*egslist, inp_name*)

Definition at line 35 of file test.py.

12.31.2.2 def eb_tests.spec_eflu.test.expected (*e*)

Definition at line 30 of file test.py.

12.31.3 Variable Documentation

12.31.3.1 int eb_tests.spec_eflu.test.AVG_E = (EMAX+EMIN)/2

Definition at line 23 of file test.py.

12.31.3.2 float eb_tests.spec_eflu.test.BIN_WIDTH = 0.001

Definition at line 22 of file test.py.

12.31.3.3 string eb_tests.spec_eflu.test.EGSINP = "spec_eflu.egsinp"

Definition at line 15 of file test.py.

12.31.3.4 eb_tests.spec_eflu.test.EMAX

Definition at line 18 of file test.py.

12.31.3.5 eb_tests.spec_eflu.test.EMIN

Definition at line 18 of file test.py.

12.31.3.6 tuple eb_tests.spec_eflu.test.N_BINS_IN_RANGE = (EMAX-EMIN)/BIN_WIDTH

Definition at line 25 of file test.py.

12.31.3.7 int eb_tests.spec_eflu.test.NHIST = 1

Definition at line 20 of file test.py.

12.31.3.8 `eb_tests.spec_eflu.test.SCORED_IN_BIN = NHIST/N_BINS_IN_RANGE`

Definition at line 27 of file test.py.

12.31.3.9 `eb_tests.spec_eflu.test.SCORED_IN_BIN_PER_MEV = SCORED_IN_BIN/BIN_WIDTH`

Definition at line 28 of file test.py.

12.31.3.10 `int eb_tests.spec_eflu.test.TIME_LIMIT_S_PER_MHZ = 6`

Definition at line 16 of file test.py.

12.31.3.11 `eb_tests.spec_eflu.test.TOTAL_E = AVG_E*NHIST`

Definition at line 24 of file test.py.

12.32 eb_tests.spec_vox Namespace Reference

Namespaces

- `test`

12.33 eb_tests.spec_vox.test Namespace Reference

Functions

- def `expected` (`e`)
- def `compare_results` (`egslist`, `inp_name`)

Variables

- string `EGSINP` = "spec_vox.egsinp"
- int `TIME_LIMIT_S_PER_MHZ` = 7
- float `BIN_WIDTH` = 0.001
- `EMIN`
- `EMAX`
- `R1`
- `R2`
- `TRACK_LENGTH = R2-R1`
- tuple `N_BINS_IN_RANGE` = (`EMAX-EMIN`)/`BIN_WIDTH`
- `SCORED_IN_BIN = TRACK_LENGTH/N_BINS_IN_RANGE`
- int `VOLUME` = 4

12.33.1 Detailed Description

A test for comparing the calculated energy fluence spectrum in a phantom region with the expected value. A uniform spectrum between 15keV-25keV in a near-vaccum geometry is used so the expected spectrum can easily be calculated analytically.

12.33.2 Function Documentation

12.33.2.1 `def eb_tests.spec_vox.test.compare_results (egslst, inp_name)`

Definition at line 35 of file test.py.

12.33.2.2 `def eb_tests.spec_vox.test.expected (e)`

Definition at line 30 of file test.py.

12.33.3 Variable Documentation

12.33.3.1 `float eb_tests.spec_vox.test.BIN_WIDTH = 0.001`

Definition at line 17 of file test.py.

12.33.3.2 `string eb_tests.spec_vox.test.EGSINP = "spec_vox.egsinp"`

Definition at line 14 of file test.py.

12.33.3.3 `eb_tests.spec_vox.test.EMAX`

Definition at line 18 of file test.py.

12.33.3.4 `eb_tests.spec_vox.test.EMIN`

Definition at line 18 of file test.py.

12.33.3.5 `tuple eb_tests.spec_vox.test.N_BINS_IN_RANGE = (EMAX-EMIN)/BIN_WIDTH`

Definition at line 24 of file test.py.

12.33.3.6 `eb_tests.spec_vox.test.R1`

Definition at line 19 of file test.py.

12.33.3.7 eb_tests.spec_vox.test.R2

Definition at line 19 of file test.py.

12.33.3.8 eb_tests.spec_vox.test.SCORED_IN_BIN = TRACK_LENGTH/N_BINS_IN_RANGE

Definition at line 26 of file test.py.

12.33.3.9 int eb_tests.spec_vox.test.TIME_LIMIT_S_PER_MHZ = 7

Definition at line 15 of file test.py.

12.33.3.10 eb_tests.spec_vox.test.TRACK_LENGTH = R2-R1

Definition at line 22 of file test.py.

12.33.3.11 int eb_tests.spec_vox.test.VOLUME = 4

Definition at line 28 of file test.py.

12.34 eb_tests.stepped_source Namespace Reference

Namespaces

- [test](#)

12.35 eb_tests.stepped_source.test Namespace Reference

Functions

- def [get_n_highest_dose_pairs](#)(dose1, dose2, n=NCOMPARE)
- def [compare_results](#)(egslist, inp_name)

Variables

- string [EGSINP](#) = "stepped.egsinp"
- int [TIME_LIMIT_S_PER_MHZ](#) = 1000
- int [NCOMPARE](#) = 20

12.35.1 Detailed Description

A test for comparing the dose from a "stepped source" (i.e. superposition mode with variable activity) with previous calculations made when egs_brachy was in a known good state.

12.35.2 Function Documentation

12.35.2.1 `def eb_tests.steped_source.test.compare_results (egslst, inp_name)`

Definition at line 22 of file test.py.

12.35.2.2 `def eb_tests.steped_source.test.get_n_highest_dose_pairs (dose1, dose2, n=NCOMPARE)`

Definition at line 19 of file test.py.

12.35.3 Variable Documentation

12.35.3.1 `string eb_tests.steped_source.test.EGSINP = "stepped.egsinp"`

Definition at line 15 of file test.py.

12.35.3.2 `int eb_tests.steped_source.test.NCOMPARE = 20`

Definition at line 17 of file test.py.

12.35.3.3 `int eb_tests.steped_source.test.TIME_LIMIT_S_PER_MHZ = 1000`

Definition at line 16 of file test.py.

12.36 eb_tests.tg43mode Namespace Reference

Namespaces

- [test](#)

12.37 eb_tests.tg43mode.test Namespace Reference

Functions

- def [get_n_highest_dose_pairs](#) (dose1, dose2, n=NCOMPARE)
- def [compare_results](#) (egslst, inp_name)

Variables

- string `EGSINP` = "tg43mode.egsinp"
- int `TIME_LIMIT_S_PER_MHZ` = 2000
- int `NCOMPARE` = 100

12.37.1 Detailed Description

A test to ensure egs_brachy superposition mode calculations match previous calculations when egs_brachy was in a known good state.

12.37.2 Function Documentation

12.37.2.1 def eb_tests.tg43mode.test.compare_results (`egslist`, `inp_name`)

Definition at line 21 of file test.py.

12.37.2.2 def eb_tests.tg43mode.test.get_n_highest_dose_pairs (`dose1`, `dose2`, `n=NCOMPARE`)

Definition at line 18 of file test.py.

12.37.3 Variable Documentation

12.37.3.1 string eb_tests.tg43mode.test.EGSINP = "tg43mode.egsinp"

Definition at line 14 of file test.py.

12.37.3.2 int eb_tests.tg43mode.test.NCOMPARE = 100

Definition at line 16 of file test.py.

12.37.3.3 int eb_tests.tg43mode.test.TIME_LIMIT_S_PER_MHZ = 2000

Definition at line 15 of file test.py.

12.38 eb_tests.tg43mode_recycle Namespace Reference

Namespaces

- `test`

12.39 eb_tests.tg43mode_recycle.test Namespace Reference

Functions

- def [get_n_highest_dose_pairs](#) (dose1, dose2, n=NCOMPARE)
- def [compare_results](#) (egslist, inp_name)

Variables

- string [EGSINP](#) = "tg43mode_recycling.egsinp"
- int [TIME_LIMIT_S_PER_MHZ](#) = 1000
- int [NCOMPARE](#) = 50

12.39.1 Detailed Description

A test to ensure superposition mode calculations with recycling turned on result in the same dose as superposition mode calculations without recycling.

12.39.2 Function Documentation

12.39.2.1 def eb_tests.tg43mode_recycle.test.compare_results (*egslist, inp_name*)

Definition at line 21 of file test.py.

12.39.2.2 def eb_tests.tg43mode_recycle.test.get_n_highest_dose_pairs (*dose1, dose2, n = NCOMPARE*)

Definition at line 18 of file test.py.

12.39.3 Variable Documentation

12.39.3.1 string eb_tests.tg43mode_recycle.test.EGSINP = "tg43mode_recycling.egsinp"

Definition at line 14 of file test.py.

12.39.3.2 int eb_tests.tg43mode_recycle.test.NCOMPARE = 50

Definition at line 16 of file test.py.

12.39.3.3 int eb_tests.tg43mode_recycle.test.TIME_LIMIT_S_PER_MHZ = 1000

Definition at line 15 of file test.py.

12.40 eb_tests.tg43mode_zeroweight Namespace Reference

Namespaces

- [test](#)

12.41 eb_tests.tg43mode_zeroweight.test Namespace Reference

Functions

- def [get_n_highest_dose_pairs](#) (dose1, dose2, n=NCOMPARE)
- def [compare_results](#) (egslist, inp_name)

Variables

- string [EGSINP](#) = "tg43mode_zeroweight.egsinp"
- int [TIME_LIMIT_S_PER_MHZ](#) = 2000
- int [NCOMPARE](#) = 10

12.41.1 Detailed Description

A test to ensure superposition mode calculations work when a source has zero weighting.

Gold standard dose distribution was generated with egs_brachy and gold_standard.egsinp

12.41.2 Function Documentation

12.41.2.1 def eb_tests.tg43mode_zeroweight.test.compare_results (*egslist, inp_name*)

Definition at line 24 of file test.py.

12.41.2.2 def eb_tests.tg43mode_zeroweight.test.get_n_highest_dose_pairs (*dose1, dose2, n = NCOMPARE*)

Definition at line 21 of file test.py.

12.41.3 Variable Documentation

12.41.3.1 string eb_tests.tg43mode_zeroweight.test.EGSINP = "tg43mode_zeroweight.egsinp"

Definition at line 17 of file test.py.

12.41.3.2 int eb_tests.tg43mode_zeroweight.test.NCOMPARE = 10

Definition at line 19 of file test.py.

12.41.3.3 int eb_tests.tg43mode_zeroweight.test.TIME_LIMIT_S_PER_MHZ = 2000

Definition at line 18 of file test.py.

12.42 eb_tests.utils Namespace Reference

Functions

- def [extract_all_doses](#) (egslst)
- def [values_close](#) (a, b, max_percent_diff=0.001)
- def [values_close_abs](#) (a, b, max_diff=0.001)
- def [read_csv_spectrum](#) (fname)
- def [doses_approx_equal](#) (d1, d1_unc, d2, d2_unc, max_percent_diff=None, compare_unc=True, max_unc_percent_diff=None)
- def [read3ddose](#) (fname)
- def [compare_3ddose_files](#) (f1, f2, max_percent_diff=None)

Variables

- string [REG_DOSE_UNC_RE](#) = "\s+(\d)+\s+\d+\s+\d+\.?*\?|\s+(.*?)\s+\+/-\s+(.*?)%\s+(.*?)\s+\+/-\s+(.*?)%"

12.42.1 Function Documentation

12.42.1.1 def eb_tests.utils.compare_3ddose_files (*f1*, *f2*, *max_percent_diff* = None)

Definition at line 77 of file utils.py.

12.42.1.2 def eb_tests.utils.doses_approx_equal (*d1*, *d1_unc*, *d2*, *d2_unc*, *max_percent_diff* = None, *compare_unc* = True, *max_unc_percent_diff* = None)

Definition at line 37 of file utils.py.

12.42.1.3 def eb_tests.utils.extract_all_doses (*egslst*)

```
return all regionss and doses from egslst file. This may
include doses from more than one phantom
```

Definition at line 7 of file utils.py.

12.42.1.4 def eb_tests.utils.read3ddose (*fname*)

Definition at line 53 of file utils.py.

12.42.1.5 def eb_tests.utils.read_csv_spectrum (*fname*)

Definition at line 21 of file utils.py.

12.42.1.6 def eb_tests.utils.values_close (*a*, *b*, *max_percent_diff* = 0.001)

Definition at line 12 of file utils.py.

12.42.1.7 def eb_tests.utils.values_close_abs (*a*, *b*, *max_diff* = 0.001)

Definition at line 18 of file utils.py.

12.42.2 Variable Documentation

12.42.2.1 string eb_tests.utils.REG_DOSE_UNC_RE = "\s+(\d)+\s+\d+\s+\d+..\.*?\s+(.*?)\s+\|+-\s+(.*?)%\s+\|+-\s+(.*?)%"

Definition at line 4 of file utils.py.

12.43 eb_tests.variable_activity Namespace Reference

Namespaces

- [test](#)

12.44 eb_tests.variable_activity.test Namespace Reference

Functions

- def [compare_results](#) (egslist, inp_name)

Variables

- string [EGSINP](#) = "variable.egsinp"
- int [TIME_LIMIT_S_PER_MHZ](#) = 100

12.44.1 Detailed Description

A test for comparing the dose from sources with different source weighting with calculations from when egs_brachy was in a known good state.

12.44.2 Function Documentation

12.44.2.1 def eb_tests.variable_activity.test.compare_results (*egslist, inp_name*)

Definition at line 19 of file test.py.

12.44.3 Variable Documentation

12.44.3.1 string eb_tests.variable_activity.test.EGSINP = "variable.egsinp"

Definition at line 15 of file test.py.

12.44.3.2 int eb_tests.variable_activity.test.TIME_LIMIT_S_PER_MHZ = 100

Definition at line 16 of file test.py.

12.45 eb_tests.variable_w_recycling Namespace Reference

Namespaces

- [test](#)

12.46 eb_tests.variable_w_recycling.test Namespace Reference

Functions

- def [compare_results](#) (*egslist, inp_name*)

Variables

- string [EGSINP](#) = "variable_w_recycling.egsinp"
- int [TIME_LIMIT_S_PER_MHZ](#) = 15
- list [BENCHMARK_DOSES](#) = [(1.061E-13, 0.0001), (1.644E-13, 0.0001)]

12.46.1 Detailed Description

A test for comparing the dose from sources with different source weighting and recycling on with calculations from when egs_brachy was in a known good state.

Gold standard dose distribution was generated with egs_brachy and gold_standard.egsinp

12.46.2 Function Documentation

12.46.2.1 def eb_tests.variable_w_recycling.test.compare_results (*egslist*, *inp_name*)

Definition at line 25 of file test.py.

12.46.3 Variable Documentation

12.46.3.1 list eb_tests.variable_w_recycling.test.BENCHMARK_DOSES = [(1.061E-13, 0.0001), (1.644E-13, 0.0001)]

Definition at line 22 of file test.py.

12.46.3.2 string eb_tests.variable_w_recycling.test.EGSINP = "variable_w_recycling.egsinp"

Definition at line 18 of file test.py.

12.46.3.3 int eb_tests.variable_w_recycling.test.TIME_LIMIT_S_PER_MHZ = 15

Definition at line 19 of file test.py.

12.47 eb_tests.volume_correction Namespace Reference

Namespaces

- [test](#)

12.48 eb_tests.volume_correction.test Namespace Reference

Functions

- def [approx_equal](#) (*a*, *b*, *eps*=0.001)
- def [read_vols](#) (*phant*, *inp_name*)
- def [compare_results](#) (*egslist*, *inp_name*)

Variables

- string [EGSINP](#) = "vc.egsinp"
- int [TIME_LIMIT_S_PER_MHZ](#) = 1
- dictionary [expected_volumes](#)

12.48.1 Detailed Description

A test of the egs_brachy Monte Carlo volume correction routines. The volume of phantom voxels overlapped by sources and other phantoms are calculated by egs_brachy and compared with analytical values.

12.48.2 Function Documentation

12.48.2.1 def eb_tests.volume_correction.test.approx_equal (*a, b, eps=0.001*)

Definition at line 28 of file test.py.

12.48.2.2 def eb_tests.volume_correction.test.compare_results (*egslist, inp_name*)

Definition at line 50 of file test.py.

12.48.2.3 def eb_tests.volume_correction.test.read_vols (*phant, inp_name*)

Read voxel values for the phantom named 'phant' and return the region volumes for that phantom

Definition at line 33 of file test.py.

12.48.3 Variable Documentation

12.48.3.1 string eb_tests.volume_correction.test.EGSINP = "vc.egsinp"

Definition at line 13 of file test.py.

12.48.3.2 dictionary eb_tests.volume_correction.test.expected_volumes

Initial value:

```

1 = {
2   "source_volume": 4/3.*math.pi*0.1**3,
3   "bounding_shape_volume": 4/3.*math.pi*0.11**3,
4   "extra_bounding_shape_vol": 8**3,
5   "box_reg_0": 10**3 - 6**3,
6   "phantom_reg_0": 6*6*3 - 0.5*(4./3*math.pi*1**3),
7   "phantom_reg_1": 6*6*3 - 0.5*(4./3*math.pi*1**3),
8   "sph_phantom_reg_0": 4/3.*math.pi*(0.3**3 - 0.1**3),
9   "sph_phantom_reg_1": 4./3*math.pi*(1**3 - 0.3**3)
10 }
```

Definition at line 16 of file test.py.

12.48.3.3 int eb_tests.volume_correction.test.TIME_LIMIT_S_PER_MHZ = 1

Definition at line 14 of file test.py.

12.49 ebvolcor Namespace Reference

Classes

- struct [FileResults](#)
- class [Options](#)
Volume correction initialization helper class.
- struct [Results](#)
Struct used to collect and output results about a volume correction run.
- class [VolumeCorrector](#)
An object for controlling the volume correction routine.

Typedefs

- typedef pair< int, int > [PhantRegT](#)
PhantRegT is a pair of the form (PhantomNumber, PhantomRegion) e.g. a pair of (2, 12) would represent region 12 (i.e. the 13th region) of phantom 2 (i.e. the 3rd phantom)
- typedef pair< int, EGS_Float > [RegVolume](#)
RegVolumeT is a pair of the form (RegionNumber, Volume)
- typedef std::map< [PhantRegT](#), EGS_I64 > [HitCounterT](#)
HitCounterT is used for counting how many random points land in a given phantoms region.

Enumerations

- enum [VolCorMode](#) { [NO_CORRECTION](#), [ZERO_DOSE](#), [CORRECT_VOLUME](#) }

Functions

- bool [isGZip](#) (istream &vfile)
- EGS_Float [getShapeVolume](#) (EGS_Input *shape_inp)
- void [readVolumes](#) (istream &vfile, vector< [RegVolume](#) > ®_volumes)
- int [loadVolumes](#) (string fname, vector< [RegVolume](#) > ®_volumes)

12.49.1 Typedef Documentation

12.49.1.1 [typedef std::map<PhantRegT, EGS_I64> ebvolcor::HitCounterT](#)

HitCounterT is used for counting how many random points land in a given phantoms region.

Definition at line 90 of file eb_volcor.h.

12.49.1.2 [typedef pair<int, int> ebvolcor::PhantRegT](#)

PhantRegT is a pair of the form (PhantomNumber, PhantomRegion) e.g. a pair of (2, 12) would represent region 12 (i.e. the 13th region) of phantom 2 (i.e. the 3rd phantom)

Definition at line 83 of file eb_volcor.h.

12.49.1.3 `typedef pair<int, EGS_Float> ebvolcor::RegVolume`

`RegVolumeT` is a pair of the form (`RegionNumber`, `Volume`)

Definition at line 86 of file `eb_volcor.h`.

12.49.2 Enumeration Type Documentation

12.49.2.1 `enum ebvolcor::VolCorMode`

Enumerator

`NO_CORRECTION`
`ZERO_DOSE`
`CORRECT_VOLUME`

Definition at line 78 of file `eb_volcor.h`.

12.49.3 Function Documentation

12.49.3.1 `EGS_Float ebvolcor::getShapeVolume (EGS_Input * shape_inp)`

`getShapeVolume` takes an `EGS_Input` for a shape and returns the volume of the shape. Currently the volume will be calculated automatically for cylinders, spheres and box shapes. Other shapes must specify a volume using the `shape volume` input key. For example:

```
:start shape:  

    type = my_new_shape  

    input key 1 = 1234  

    input key 2= 5678  

    shape volume = 123456  

:stop shape:
```

If `shape volume` is present for a cylinder, sphere or box shape that value will be used and the automatic calculation will be ignored

Definition at line 77 of file `eb_volcor.cpp`.

12.49.3.2 `bool ebvolcor::isGZip (istream & vfile)`

looks at first two bytes of a stream and checks if they match the file type specifiers for gzip files

Definition at line 54 of file `eb_volcor.cpp`.

12.49.3.3 `int ebvolcor::loadVolumes (string fname, vector<RegVolume> & reg_volumes)`

Definition at line 396 of file `eb_volcor.cpp`.

12.49.3.4 void ebvolcor::readVolumes (istream & *vfile*, vector< RegVolume > & *reg_volumes*)

Definition at line 385 of file eb_volcor.cpp.

12.50 gen_docs Namespace Reference

Functions

- def [gen_docs \(\)](#)

Variables

- list [modules](#)

12.50.1 Function Documentation

12.50.1.1 def [gen_docs.gen_docs \(\)](#)

Definition at line 17 of file gen_docs.py.

12.50.2 Variable Documentation

12.50.2.1 list [gen_docs.modules](#)

Initial value:

```
1 = [
2     (gen_geom, "geom.md"),
3     (gen_specs, "spectra.md"),
4     (gen_transport, "transport.md"),
5     (gen_media, "media.md"),
6     (gen_tests, "tests.md"),
7 ]
```

Definition at line 8 of file gen_docs.py.

12.51 gen_geom Namespace Reference

Functions

- def [get_readme \(dir_path\)](#)
- def [get_filetype_links \(dir_path, extension\)](#)
- def [get_images \(dir_path\)](#)
- def [gen_geom_docs \(droot, title, is_sources=False\)](#)
- def [gen_docs \(fname\)](#)

Variables

- `root = os.path.join("..", "lib")`
- `abs_root = os.path.abspath(root)`
- `geom = os.path.join(abs_root, "geometry")`
- string `outfile` = "geom.md"

12.51.1 Function Documentation

12.51.1.1 `def gen_geom.gen_docs (fname)`

Definition at line 76 of file gen_geom.py.

12.51.1.2 `def gen_geom.gen_geom_docs (droot, title, is_sources=False)`

Definition at line 36 of file gen_geom.py.

12.51.1.3 `def gen_geom.get_filetype_links (dir_path, extension)`

Definition at line 22 of file gen_geom.py.

12.51.1.4 `def gen_geom.get_images (dir_path)`

Definition at line 29 of file gen_geom.py.

12.51.1.5 `def gen_geom.get_readme (dir_path)`

Look in directory `dir_path` for a file called `README.md` and return
it's contents if available

Definition at line 10 of file gen_geom.py.

12.51.2 Variable Documentation

12.51.2.1 `gen_geom.abs_root = os.path.abspath(root)`

Definition at line 7 of file gen_geom.py.

12.51.2.2 `gen_geom.geom = os.path.join(abs_root, "geometry")`

Definition at line 8 of file gen_geom.py.

12.51.2.3 string `gen_geom.outfile = "geom.md"`

Definition at line 134 of file `gen_geom.py`.

12.51.2.4 `gen_geom.root = os.path.join(.., "lib")`

Definition at line 6 of file `gen_geom.py`.

12.52 gen_media Namespace Reference

Functions

- def `get_pegless_materials ()`
- def `get_muen ()`
- def `gen_docs (fname)`

Variables

- `root = os.path.join(.., "lib")`
- `abs_root = os.path.abspath(root)`
- `media_file = os.path.join(abs_root, "media", "material.dat")`
- `muen_dir = os.path.join(abs_root, "muen")`
- string `outfile = "media.md"`

12.52.1 Function Documentation

12.52.1.1 def `gen_media.gen_docs (fname)`

Definition at line 64 of file `gen_media.py`.

12.52.1.2 def `gen_media.get_muen ()`

Definition at line 33 of file `gen_media.py`.

12.52.1.3 def `gen_media.get_pegless_materials ()`

Definition at line 8 of file `gen_media.py`.

12.52.2 Variable Documentation

12.52.2.1 `gen_media.abs_root = os.path.abspath(root)`

Definition at line 4 of file `gen_media.py`.

12.52.2.2 `gen_media.media_file = os.path.join(abs_root, "media", "material.dat")`

Definition at line 5 of file gen_media.py.

12.52.2.3 `gen_media.muen_dir = os.path.join(abs_root, "muen")`

Definition at line 6 of file gen_media.py.

12.52.2.4 `string gen_media.outfile = "media.md"`

Definition at line 99 of file gen_media.py.

12.52.2.5 `gen_media.root = os.path.join(.., "lib")`

Definition at line 3 of file gen_media.py.

12.53 gen_specs Namespace Reference

Functions

- def `get_spectra ()`
- def `gen_docs (fname)`

Variables

- `root = os.path.join(.., "lib")`
- `abs_root = os.path.abspath(root)`
- `specs = os.path.join(abs_root, "spectra")`
- string `outfile = "spectra.md"`

12.53.1 Function Documentation

12.53.1.1 `def gen_specs.gen_docs (fname)`

Definition at line 26 of file gen_specs.py.

12.53.1.2 `def gen_specs.get_spectra ()`

Definition at line 8 of file gen_specs.py.

12.53.2 Variable Documentation

12.53.2.1 `gen_specs.abs_root = os.path.abspath(root)`

Definition at line 4 of file `gen_specs.py`.

12.53.2.2 `string gen_specs.outfile = "spectra.md"`

Definition at line 46 of file `gen_specs.py`.

12.53.2.3 `gen_specs.root = os.path.join(.., "lib")`

Definition at line 3 of file `gen_specs.py`.

12.53.2.4 `gen_specs.specs = os.path.join(abs_root, "spectra")`

Definition at line 5 of file `gen_specs.py`.

12.54 gen_tests Namespace Reference

Functions

- def `get_tests ()`
- def `gen_docs (fname)`

Variables

- `root_tests = os.path.join(.., "eb_tests")`
- `globber = os.path.join(root_tests, "*", "test.py")`
- string `outfile = "tests.md"`

12.54.1 Function Documentation

12.54.1.1 `def gen_tests.gen_docs (fname)`

Definition at line 30 of file `gen_tests.py`.

12.54.1.2 `def gen_tests.get_tests ()`

Definition at line 11 of file `gen_tests.py`.

12.54.2 Variable Documentation

12.54.2.1 `gen_tests.globber = os.path.join(root_tests, "*", "test.py")`

Definition at line 9 of file gen_tests.py.

12.54.2.2 `string gen_tests.outfile = "tests.md"`

Definition at line 47 of file gen_tests.py.

12.54.2.3 `gen_tests.root_tests = os.path.join("../", "eb_tests")`

Definition at line 6 of file gen_tests.py.

12.55 gen_transport Namespace Reference

Functions

- def `gen_docs (fname)`

Variables

- `root = os.path.join("../", "lib")`
- `abs_root = os.path.abspath(root)`
- `transport = os.path.join(abs_root, "transport")`
- string `outfile = "transport.md"`

12.55.1 Function Documentation

12.55.1.1 `def gen_transport.gen_docs (fname)`

Definition at line 9 of file gen_transport.py.

12.55.2 Variable Documentation

12.55.2.1 `gen_transport.abs_root = os.path.abspath(root)`

Definition at line 5 of file gen_transport.py.

12.55.2.2 `string gen_transport.outfile = "transport.md"`

Definition at line 26 of file gen_transport.py.

12.55.2.3 `gen_transport.root = os.path.join("..", "lib")`

Definition at line 4 of file `gen_transport.py`.

12.55.2.4 `gen_transport.transport = os.path.join(abs_root, "transport")`

Definition at line 6 of file `gen_transport.py`.

12.56 muen Namespace Reference

Classes

- class [MuenDataParser](#)
class for parsing muen data from a file.

TypeDefs

- `typedef pair< double, double > MuenAtET`
pair of form (energy, muen(energy))
- `typedef map< string, vector< MuenAtET > > MuenMapT`
Map from medium name to vector of (e, muen(e)) data for that medium.

Functions

- `std::vector< std::string > & split (const std::string &s, char delim, std::vector< std::string > &elems)`
Split a string on input delimiter.
- `std::vector< std::string > split (const std::string &s, char delim)`
Split a string on input delimiter.

12.56.1 Typedef Documentation

12.56.1.1 `typedef pair<double, double> muen::MuenAtET`

`pair of form (energy, muen(energy))`

Definition at line 104 of file `muen.h`.

12.56.1.2 `typedef map<string, vector<MuenAtET> > muen::MuenMapT`

`Map from medium name to vector of (e, muen(e)) data for that medium.`

Definition at line 107 of file `muen.h`.

12.56.2 Function Documentation

12.56.2.1 std::vector<std::string>& muen::split (const std::string & s, char *delim*, std::vector< std::string > & *elems*)

Split a string on input delimiter.

Definition at line 68 of file muen.h.

12.56.2.2 std::vector<std::string> muen::split (const std::string & s, char *delim*)

Split a string on input delimiter.

Definition at line 79 of file muen.h.

12.57 run_tests Namespace Reference

Functions

- def `dyn_import` (*name*)
- def `create_egsinp` (*test_module*)
- def `find_cpu_time` (*egslist*)
- def `run_simulation` ()
- def `cleanup` ()
- def `find_tests` ()
- def `run_all_tests` ()

Variables

- bool `VERBOSE` = False
- string `timing_hard_fail` = "--timing-hard-fail"
- `EGS_HOME` = os.environ["EGS_HOME"]
- `EGS_BRACHY` = os.path.join(`EGS_HOME`, "egs_brachy")
- string `USER_CODE` = "egs_brachy"
- string `TEST_EGSINP_FILE` = "eb_test_run"
- `TEST_EGSINP_PATH_ROOT` = os.path.join(`EGS_BRACHY`, `TEST_EGSINP_FILE`)
- string `TEST_EGSINP_PATH` = `TEST_EGSINP_PATH_ROOT` + ".egsinp"
- string `PASS_FMT` = "%(pass_fail)s - %(test)s - ran in %(actual_time).3G s/MHz (%(real_time).3G s)"
- string `TIMING_WARN_FMT`
- string `FAIL_FMT`
- string `cpu_speed_cmd` = """grep -i "cpu mhz" /proc/cpuinfo | tail -1 | awk -F ":" '{print \$2}'''
- `CPU_MHZ` = float(os.environ["CPU_MHZ"])
- string `source` = "CPU_MHZ env variable"
- `p`
- `stdin`
- `stdout`
- `stderr`
- float `TIMING_MARGIN` = 1.05

12.57.1 Function Documentation

12.57.1.1 `def run_tests.cleanup()`

Definition at line 108 of file run_tests.py.

12.57.1.2 `def run_tests.create_egsinp(test_module)`

Definition at line 78 of file run_tests.py.

12.57.1.3 `def run_tests.dyn_import(name)`

Definition at line 70 of file run_tests.py.

12.57.1.4 `def run_tests.find_cpu_time(egslist)`

Definition at line 85 of file run_tests.py.

12.57.1.5 `def run_tests.find_tests()`

Definition at line 117 of file run_tests.py.

12.57.1.6 `def run_tests.run_all_tests()`

Definition at line 126 of file run_tests.py.

12.57.1.7 `def run_tests.run_simulation()`

Definition at line 92 of file run_tests.py.

12.57.2 Variable Documentation

12.57.2.1 `run_tests.CPU_MHZ = float(os.environ["CPU_MHZ"])`

Definition at line 48 of file run_tests.py.

12.57.2.2 `string run_tests.cpu_speed_cmd = """grep -i "cpu mhz" /proc/cpuinfo | tail -1 | awk -F ":" '{print $2}"""`

Definition at line 43 of file run_tests.py.

12.57.2.3 `run_tests.EGS_BRACHY = os.path.join(EGS_HOME, "egs_brachy")`

Definition at line 17 of file run_tests.py.

12.57.2.4 `run_tests.EGS_HOME = os.environ["EGS_HOME"]`

Definition at line 16 of file run_tests.py.

12.57.2.5 `string run_tests.FAIL_FMT`

Initial value:

```

1 = """%(pass_fail)s - %(test)s
2     Timing: %(timing_pass_fail)s
3         Limit: %(time_limit).3G s/MHz
4         Actual : %(actual_time).3G s/MHz
5     Results: %(results_pass_fail)s
6         Expected: %(expected_results)s
7         Actual   : %(actual_results)s
8 """

```

Definition at line 34 of file run_tests.py.

12.57.2.6 `run_tests.p`

Initial value:

```

1 = Popen(cpu_speed_cmd, shell=True,
2                 stdin=PIPE, stdout=PIPE, stderr=PIPE, close_fds=True)

```

Definition at line 53 of file run_tests.py.

12.57.2.7 `string run_tests.PASS_FMT = "%(pass_fail)s - %(test)s - ran in %(actual_time).3G s/MHz (%(real_time).3G s)"`

Definition at line 25 of file run_tests.py.

12.57.2.8 `string run_tests.source = "CPU_MHZ env variable"`

Definition at line 49 of file run_tests.py.

12.57.2.9 `run_tests.stderr`

Definition at line 55 of file run_tests.py.

12.57.2.10 run_tests.stdin

Definition at line 55 of file run_tests.py.

12.57.2.11 run_tests.stdout

Definition at line 55 of file run_tests.py.

12.57.2.12 string run_tests.TEST_EGSINP_FILE = "eb_test_run"

Definition at line 20 of file run_tests.py.

12.57.2.13 string run_tests.TEST_EGSINP_PATH = TEST_EGSINP_PATH_ROOT+.egsinp"

Definition at line 22 of file run_tests.py.

12.57.2.14 run_tests.TEST_EGSINP_PATH_ROOT = os.path.join(EGS_BRACHY,TEST_EGSINP_FILE)

Definition at line 21 of file run_tests.py.

12.57.2.15 string run_tests.timing_hard_fail = "--timing-hard-fail"

Definition at line 14 of file run_tests.py.

12.57.2.16 float run_tests.TIMING_MARGIN = 1.05

Definition at line 67 of file run_tests.py.

12.57.2.17 string run_tests.TIMING_WARN_FMT**Initial value:**

```
1 = """%(pass_fail)s - %(test)s
2     Timing: %(timing_pass_fail)s
3         Limit: %(time_limit).3G s/MHz
4         Actual : %(actual_time).3G s/MHz
5     Results: %(results_pass_fail)s
6 """
```

Definition at line 27 of file run_tests.py.

12.57.2.18 string run_tests.USER_CODE = "egs_brachy"

Definition at line 19 of file run_tests.py.

12.57.2.19 bool run_tests.VERBOSE = False

Definition at line 9 of file run_tests.py.

Chapter 13

Class Documentation

13.1 BaseSpectrumScorer Class Reference

abstract base class for scoring spectrum information

```
#include <spec_scoring.h>
```

Inheritance diagram for BaseSpectrumScorer:

Collaboration diagram for BaseSpectrumScorer:

Public Member Functions

- `BaseSpectrumScorer (EGS_Input *input, EGS_BaseSource *src, GeomInfo *ginfo, Publisher *publisher)`
- `virtual ~BaseSpectrumScorer ()`
- `EGS_Float getBinWidth () const`
- `double getParticleEnergy (const EGS_Particle *p) const`
- `virtual void update (EB_Message message, void *data=0)`

Receives messages from application. This method handles NEW_HISTORY messages but delegates all other messages to the score methods of the derived classes.

- `virtual void score (EB_Message message, void *data=0)=0`
- `void setEffectiveHistories (EGS_Float effective_histories)`
- `int outputResults (string root_name)`
, write the scored spectrum to file with filename. Returns 0 on success, all other values indicate a failure
- `virtual string getInfo () const`
- `bool isValid () const`
- `int outputData (ostream *ofile)`
- `int readData (istream *ifile)`
- `void resetCounter ()`
- `int addState (istream &data)`

Static Public Member Functions

- `static BaseSpectrumScorer * getSpectrumScorer (EGS_Input *inp, EGS_BaseSource *source, GeomInfo *ginfo, Publisher *publisher)`
factory method for creating one of the derived spectrum scoring classes

Public Attributes

- int `nbins`
number of bins to score spectrum in
- EGS_ScoringArray * `bins`
spectrum scoring array
- EGS_Float `e_min`
minimum spectrum energy to score
- EGS_Float `e_max`
maximum spectrum energy to score

Static Public Attributes

- static const int `DEFAULT_NBINS` = 100

Protected Member Functions

- string `outputCSV` (string filename)
output results to csv file
- string `outputXMGR` (string filename)
output results to xmgrace file
- string `outputEGSnrc` (string filename)
output results to EGSnrc tabulated spectrum format
- int `getBin` (EGS_Float E) const
get index of bin that that E falls in
- virtual string `getTitle` () const
- virtual string `getSubTitle` () const
- virtual string `getYAxisLabel` () const
- virtual string `getXAxisLabel` () const
- string `getFileName` (string root) const
- virtual string `getFileExtension` () const
- virtual void `getResult` (int bin, EGS_Float &r, EGS_Float &dr)
set r & dr to result/uncertainty for given bin. Normalization can be done in this routine
- string `getParticleName` () const
Return name of particle we are scoring.
- virtual void `outputTotal` ()

Protected Attributes

- string `format`
- int `egsnrc_mode`
- int `particle_type`
- EGS_I64 `cur_history`
- EGS_I64 `eff_history`
- EGS_Float `bin_width`
- EGS_Float `total_scored`
- EGS_BaseSource * `source`
- bool `valid`
- string `fextension`

13.1.1 Detailed Description

abstract base class for scoring spectrum information

Inputs:

```

type           - determines which derived class to initialize ('surface count',
                  'energy weighted surface', 'energy fluence in region')
particle type  - which kind of particle to score
minimum energy - don't score any particles below this energy (defaults to 0.001 MeV)
maximum energy - don't score any particles above this energy (defaults to source->getEmax())
number of bins - number of scoring bins to use (bin width = (E_max - E_min) / nbins
output format  - xmgr, csv, or egsnrc (defaults to xmgr)
egsnrc format mode - if egsnrc output format is chosen, which mode to use (see egs++ docs)

geometry        - for 'energy fluence in region' mode used in conjunction with 'scoring region'
scoring region   input for determining which geometry region to score the spectrum in
scoring region   - for 'energy fluence in region' mode used in conjunction with 'geometry'
file extension   input for determining which geometry region to score the spectrum in
file extension - if provided the output will be written to
                  sim_input_file.{file extension}.{output format} otherwise the output
                  file will be given a name like sim_input_file.surfcount.agr

```

Sample input:

```

:start spectrum scoring:
  type = surface count # surface count, energy weighted surface, energy fluence in region
  particle type = photon # photon, electron, positron
  minimum energy = 0.001
  maximum energy = 1.00
  number of bins = 1000
  output format = xmgr # xmgr (default), csv, egsnrc
  file extension = my_spectrum # (optional)
:stop spectrum scoring:

```

Definition at line 260 of file spec_scoring.h.

13.1.2 Constructor & Destructor Documentation

13.1.2.1 BaseSpectrumScorer::BaseSpectrumScorer (EGS_Input * *input*, EGS_BaseSource * *src*, GeomInfo * *ginfo*, Publisher * *publisher*)

Definition at line 112 of file spec_scoring.cpp.

13.1.2.2 BaseSpectrumScorer::~BaseSpectrumScorer () [virtual]

Definition at line 185 of file spec_scoring.cpp.

13.1.3 Member Function Documentation

13.1.3.1 int BaseSpectrumScorer::addState (istream & *data*)

Definition at line 413 of file spec_scoring.cpp.

13.1.3.2 `int BaseSpectrumScorer::getBin (EGS_Float E) const` [protected]

get index of bin that that *E* falls in

Definition at line 195 of file spec_scoring.cpp.

13.1.3.3 `EGS_Float BaseSpectrumScorer::getBinWidth () const`

Definition at line 200 of file spec_scoring.cpp.

13.1.3.4 `virtual string BaseSpectrumScorer::getFileExtension () const` [inline], [protected], [virtual]

Reimplemented in [EnergyFluenceSpectrumInVoxel](#), [EnergyWeightedSurfaceSpectrum](#), and [SurfaceCountSpectrum](#).

Definition at line 312 of file spec_scoring.h.

13.1.3.5 `string BaseSpectrumScorer::getFileName (string root) const` [inline], [protected]

Definition at line 308 of file spec_scoring.h.

13.1.3.6 `virtual string BaseSpectrumScorer:: getInfo () const` [inline], [virtual]

Definition at line 376 of file spec_scoring.h.

13.1.3.7 `double BaseSpectrumScorer::getParticleEnergy (const EGS_Particle * p) const`

Definition at line 204 of file spec_scoring.cpp.

13.1.3.8 `string BaseSpectrumScorer::getParticleName () const` [inline], [protected]

Return name of particle we are scoring.

Definition at line 321 of file spec_scoring.h.

13.1.3.9 `void BaseSpectrumScorer::getResult (int bin, EGS_Float & r, EGS_Float & dr)` [protected], [virtual]

set *r* & *dr* to result/uncertainty for given bin. Normalization can be done in this routine

Reimplemented in [EnergyFluenceSpectrumInVoxel](#), [EnergyWeightedSurfaceSpectrum](#), and [SurfaceCountSpectrum](#).

Definition at line 374 of file spec_scoring.cpp.

13.1.3.10 **BaseSpectrumScorer * BaseSpectrumScorer::getSpectrumScorer (EGS_Input * *inp*, EGS_BaseSource * *source*, GeomInfo * *ginfo*, Publisher * *publisher*) [static]**

factory method for creating one of the derived spectrum scoring classes

Definition at line 85 of file spec_scoring.cpp.

13.1.3.11 **virtual string BaseSpectrumScorer::getSubTitle () const [inline], [protected], [virtual]**

Reimplemented in [EnergyWeightedSurfaceSpectrum](#), and [SurfaceCountSpectrum](#).

Definition at line 296 of file spec_scoring.h.

13.1.3.12 **virtual string BaseSpectrumScorer::getTitle () const [inline], [protected], [virtual]**

Reimplemented in [EnergyFluenceSpectrumInVoxel](#), [EnergyWeightedSurfaceSpectrum](#), and [SurfaceCountSpectrum](#).

Definition at line 292 of file spec_scoring.h.

13.1.3.13 **virtual string BaseSpectrumScorer::getXAxisLabel () const [inline], [protected], [virtual]**

Definition at line 304 of file spec_scoring.h.

13.1.3.14 **virtual string BaseSpectrumScorer::getYAxisLabel () const [inline], [protected], [virtual]**

Reimplemented in [EnergyFluenceSpectrumInVoxel](#), [EnergyWeightedSurfaceSpectrum](#), and [SurfaceCountSpectrum](#).

Definition at line 300 of file spec_scoring.h.

13.1.3.15 **bool BaseSpectrumScorer::isValid () const [inline]**

returns true if scorer was initialized correctly, otherwise false

Definition at line 381 of file spec_scoring.h.

13.1.3.16 **string BaseSpectrumScorer::outputCSV (string *filename*) [protected]**

output results to csv file

Definition at line 237 of file spec_scoring.cpp.

13.1.3.17 **int BaseSpectrumScorer::outputData (ostream * *ofile*)**

Definition at line 378 of file spec_scoring.cpp.

13.1.3.18 `string BaseSpectrumScorer::outputEGSnrc (string filename) [protected]`

output results to EGSnrc tabulated spectrum format

Definition at line 253 of file spec_scoring.cpp.

13.1.3.19 `int BaseSpectrumScorer::outputResults (string root_name)`

, write the scored spectrum to file with filename. Returns 0 on success, all other values indicate a failure

Definition at line 209 of file spec_scoring.cpp.

13.1.3.20 `virtual void BaseSpectrumScorer::outputTotal () [inline], [protected], [virtual]`

Reimplemented in [EnergyFluenceSpectrumInVoxel](#), [EnergyWeightedSurfaceSpectrum](#), and [SurfaceCountSpectrum](#).

Definition at line 334 of file spec_scoring.h.

13.1.3.21 `string BaseSpectrumScorer::outputXMGR (string filename) [protected]`

output results to xmgrace file

Definition at line 306 of file spec_scoring.cpp.

13.1.3.22 `int BaseSpectrumScorer::readData (istream * ifile)`

Definition at line 391 of file spec_scoring.cpp.

13.1.3.23 `void BaseSpectrumScorer::resetCounter ()`

Definition at line 404 of file spec_scoring.cpp.

13.1.3.24 `virtual void BaseSpectrumScorer::score (EB_Message message, void * data = 0) [pure virtual]`

override in derived classes to do scoring

Implemented in [EnergyFluenceSpectrumInVoxel](#), [EnergyWeightedSurfaceSpectrum](#), and [SurfaceCountSpectrum](#).

13.1.3.25 `void BaseSpectrumScorer::setEffectiveHistories (EGS_Float effective_histories)`

Definition at line 191 of file spec_scoring.cpp.

```
13.1.3.26 void BaseSpectrumScorer::update ( EB_Message message, void * data = 0 ) [virtual]
```

Receives messages from application. This method handles NEW_HISTORY messages but delegates all other messages to the `score` methods of the derived classes.

Implements [Subscriber](#).

Definition at line 363 of file `spec_scoring.cpp`.

13.1.4 Member Data Documentation

```
13.1.4.1 EGS_Float BaseSpectrumScorer::bin_width [protected]
```

Definition at line 270 of file `spec_scoring.h`.

```
13.1.4.2 EGS_ScoringArray* BaseSpectrumScorer::bins
```

spectrum scoring array

Definition at line 345 of file `spec_scoring.h`.

```
13.1.4.3 EGS_I64 BaseSpectrumScorer::cur_history [protected]
```

keep track of the current history we are on

Definition at line 267 of file `spec_scoring.h`.

```
13.1.4.4 const int BaseSpectrumScorer::DEFAULT_NBINS = 100 [static]
```

Definition at line 341 of file `spec_scoring.h`.

```
13.1.4.5 EGS_Float BaseSpectrumScorer::e_max
```

maximum spectrum energy to score

Definition at line 347 of file `spec_scoring.h`.

```
13.1.4.6 EGS_Float BaseSpectrumScorer::e_min
```

minimum spectrum energy to score

Definition at line 346 of file `spec_scoring.h`.

13.1.4.7 **EGS_I64 BaseSpectrumScorer::eff_history** [protected]

effective histories (for normalization)

Definition at line 268 of file spec_scoring.h.

13.1.4.8 **int BaseSpectrumScorer::egsnrc_mode** [protected]

egsnrc spectrum output format mode

Definition at line 265 of file spec_scoring.h.

13.1.4.9 **string BaseSpectrumScorer::fextension** [protected]

file extension to use

Definition at line 277 of file spec_scoring.h.

13.1.4.10 **string BaseSpectrumScorer::format** [protected]

format to output results in

Definition at line 264 of file spec_scoring.h.

13.1.4.11 **int BaseSpectrumScorer::nbins**

number of bins to score spectrum in

Definition at line 344 of file spec_scoring.h.

13.1.4.12 **int BaseSpectrumScorer::particle_type** [protected]

What kind of particle are we interested in

Definition at line 266 of file spec_scoring.h.

13.1.4.13 **EGS_BaseSource* BaseSpectrumScorer::source** [protected]

simulation source, used for limits on energy, normalization etc

Definition at line 273 of file spec_scoring.h.

13.1.4.14 **EGS_Float BaseSpectrumScorer::total_scored** [protected]

Definition at line 271 of file spec_scoring.h.

13.1.4.15 bool BaseSpectrumScorer::valid [protected]

Definition at line 275 of file spec_scoring.h.

The documentation for this class was generated from the following files:

- /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/spec_scoring.h
- /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/spec_scoring.cpp

13.2 EB_Application Class Reference

The main egs_brachy application class. See the [Main Page](#) for full documentation.

```
#include <egs_brachy.h>
```

Inheritance diagram for EB_Application:

Collaboration diagram for EB_Application:

Public Member Functions

- **EB_Application** (int argc, char **argv)
egs_brachy constructor
- **~EB_Application** ()
egs_brachy destructor
- **void describeUserCode** () const
Print information about the egs_brachy user code.
- **void describeSimulation** ()
Describe the simulation.
- **void printIncludedFiles** ()
- int **initSimulation** ()
set the run mode and then call EGS_AdvancedApplication::initSimulation
- int **initRunControl** ()
egs_brachy specific run control initialization
- int **initRunMode** ()
Get run mode from the input file.
- int **initScoring** ()
initialize all scoring and variance reduction parameters
- int **initVarianceReduction** ()
initialize all variance reduction parameters
- int **initRussianRoulette** (EGS_Input *)
Initialize Russian roulette variance reduction if requested.
- int **initBCSE** (EGS_Input *)
Initialize BCSE variance reduction if requested.
- int **ausgab** (int iarg)
user scoring of dose, spectra etc
- int **outputData** ()

Output intermediate results. The egs_brachy version outputs the standard egs++ data along with egs_brachy specific information such as phantom and spectrum scoring information. egs_brachy also allows you to output data in gzip format.

- int [outputDataHelper](#) (ostream *)

helper function for outputData
- int [egsApplicationOutputData](#) (ostream *)

helper function for outputData
- int [egsAdvApplicationOutputData](#) (ostream *)

helper function for outputData
- int [egsBrachyOutputData](#) (ostream *)

helper function for outputData
- int [readData](#) ()

Read data required for restarting simulations.
- int [readDataHelper](#) (istream *)

helper function for outputData
- int [egsApplicationReadData](#) (istream *)

helper function for outputData
- int [egsAdvApplicationReadData](#) (istream *)

helper function for outputData
- int [egsBrachyReadData](#) (istream *)

helper function for outputData
- int [combineResults](#) ()

Reset the application to a 'pristine' state. Adapted from egs_application.cpp to allow combining in text or gzip format.
- int [addState](#) (istream &data)

Add data from a parallel job. Add standard egs++ data as well as egs_brachy specific scoring information.
- void [outputResults](#) ()

takes a phantom geometry name and returns the EB_Phantom object
- void [getCurrentResult](#) (double &sum, double &sum2, double &norm, double &count)

Reports the current results for this batch of the simulation.
- EB_Phantom * [getPhantomByName](#) (string name)

takes a phantom geometry name and returns the EB_Phantom object
- virtual void [startNewParticle](#) ()

Set source ecut/pcut if different from global ecut/pcut.
- virtual void [enterNewRegion](#) ()
- virtual int [runSimulation](#) ()
- string [getOutputVolcorFormat](#) ()

Public Attributes

- int [nsources](#)

total number of particle sources in current simulation
- EGS_Float [effective_histories](#)
- Latch [latch_control](#)

Protected Member Functions

- `void addRecycledParticlesToStack (EGS_Particle *p, bool new_hist=false)`
- `void copyParticleToSourceLoc (EGS_Particle *p, int source, bool kill_orig, bool rotate, EGS_Float new_wt)`
- `void doPhotonSplitting (int)`
- `int simulateSingleShower ()`
- `int startNewShower ()`
- `int initGeometry ()`
`override default initGeometry so we can manually create our own geometry.`
- `int initSource ()`
- `int initSourceTransforms ()`
`read in the location of all particle sources`
- `vector< EGS_AffineTransform * > createTransforms (EGS_Input *input)`

Private Types

- enum `RunMode { RM_NORMAL, RM_SUPERPOSITION, RM_VC_ONLY }`

Private Member Functions

- `int createPhantoms ()`
`set up Phantom objects for any geometries that user has requested scoring for`
- `int correctVolumes ()`
`run the volume correction routines`
- `void initTrackLengthScoring (EGS_Input *)`
`track length scoring initialization`
- `void initMuenData (EGS_Input *)`
`load muen data for requested media`
- `void initOutputFiles (EGS_Input *)`
`set up whether to output extra info files`
- `void initPHSPScoring (EGS_Input *)`
`set up phsp scoring`
- `void initEDepScoring (EGS_Input *)`
`energy deposition scoring initialization`
- `void initScatScoring (EGS_Input *)`
`energy deposition scoring initialization`
- `void clearAusgabCalls ()`
`disable all ausgab calls`
- `void enableAusgabCalls (int ncalls, AusgabCall calls[])`
`enable an array of ausgab calls`
- `void initGCRScoring (EGS_Input *)`
`setup which phantom/region will be used for getCurrentResult`
- `void initAusgabCalls ()`
`setup any required ausgab calls`
- `void initDoseScaling (EGS_Input *)`
`Initialize dose scaling factor if requested.`
- `void initXCCScaling (EGS_Input *)`
`Initialize cross section scaling if requested.`
- `void initSpectrumScoring (EGS_Input *)`
`Initialize all spectrum scoring objects.`
- `int initCrossSections ()`
- `void discardTopParticle (int idisc=1)`
- `void calcEffectiveHistories ()`
- `bool isStuck ()`

Private Attributes

- `RunMode run_mode`
`Which run mode are we using (RM_NORMAL, RM_SUPERPOSITION or RM_VC_ONLY *).`
- `string run_mode_name`
- `EnergyScoringStats * escoreing`
`Energy related scoring/stats.`
- `vector< BaseSpectrumScorer * > spectrum_scopers`
- `RecycleOpts * recycle_opts`
- `bool single_generator`
- `bool is_phsp_source`
- `vector< EGS_Float > source_weights`
- `int active_source`
- `PHSPControl * phsp`
- `bool score_tlen`
`true when tracklength estimator is enabled`
- `bool score_edep`
`true when energy deposition is enabled`
- `bool score_scat`
`true when scatter scoring is enabled`
- `string output_egsdat_format`
`text or gzip`
- `bool output_3ddose_files`
`false if run mode is 'volume correction only'`
- `string output_dose_format`
`text or gzip`
- `bool output_egsphant`
`true if user requests egsphant ouput`
- `string output_egsphant_format`
`text or gzip`
- `bool output_voxinfo`
`true if user requests voxel info file`
- `string output_voxinfo_format`
`text or gzip`
- `vector< string > output_volcor_phantoms`
`vector of phantom names to output volume correctino files for`
- `string output_volcor_format`
`text or gzip`
- `int record_n_init`
`if > 0 write initial pos of record_n_init particles to {input_file}.pinit`
- `vector< EGS_Vector > p_init_locs`
- `EGS_Vector last_position`
- `EGS_Float last_R`
- `EGS_Float cur_R`
- `int steps_at_same_loc`
- `EGS_I64 n_stuck`
- `EGS_BaseGeometry * source_envelope_geom`
`geometry that the sources are embedded in`
- `EGS_ASwitchedEnvelope * superpos_geom`
`an ASwitchedEnv cast of simulation geometry.`
- `vector< EB_Phantom * > phantom_geoms`
`pointers to all of the phantom objects`

- vector< EGS_AffineTransform * > **source_transforms**
transforms to locations of all sources
- EGS_AffineTransform * **base_transform**
same as source_transforms[0]
- EGS_AffineTransform * **base_transform_inv**
same as source_transforms[0].inverse()
- map< int, EGS_Interpolator * > **media_muen**
Map from medium index to muen interpolator for that medium.
- map< string, string > **media_muen_names**
- bool **do_brem_split**
- int **nbr_split**
Number of times to split bremsstrahlung photons.
- bool **do_bcse**
- int **bcse_med_num**
- EGS_Float **bcse_factor**
- EGS_Float **flu_cutoff**
fluorescent photon cutoff energy
- EGS_Float **source_ecut**
ecut for source objects
- EGS_Float **source_pcut**
pcut for source objects
- EGS_Float **global_ecut**
ecut for source objects
- EGS_Float **global_pcut**
pcut for source objects
- bool **global_i_do_rr**
enable range rejection outside of sources
- EGS_Float **global_e_max_rr**
max range rejection energy globally
- bool **source_i_do_rr**
enable range rejection in sources
- EGS_Float **source_e_max_rr**
max range rejection energy for source objects
- **GeomInfo ginfo**
meta data about the geometries
- **EB_Phantom * gcr_phantom**
phantom object to use in getCurrentResult (defaults to 1st phantom)
- int **gcr_phantom_reg**
region of phantom to use for getCurrentResult (default to 0)
- map< string, vector< int > > **extra_scoring_reg**
- map< string, vector< EGS_Float > > **extra_scoring_vols**
- map< string, vector< EGS_Float > > **extra_scoring_mass**
- map< string, EGS_ScoringArray * > **extra_scoring_doses**
- map< string, EGS_ScoringArray * > **extra_scoring_doses_edep**
- **ebvolcor::Results source_vc_results**
results from source volume correction box phantom
- **ebvolcor::Results gen_vc_results**
results from general volume correction
- **ebvolcor::FileResults file_vc_results**
results from precomputed volume correction
- **Publisher pevent_pub**

Particle event publisher.

- `EB_TimingTree timing_blocks`

Track CPU times of various functions.

- `map< int, EGS_I64 > steps_in_sources`
- `map< int, EGS_I64 > steps_in_phantoms`
- `map< int, EGS_I64 > steps_in_other`
- `ogzstream * gz_data_out`

GZip file for outputting egsdat.

- `igzstream * gz_data_in`

GZip file for outputting egsdat.

Static Private Attributes

- `static const EGS_Float DEFAULT_BCSE_FACTOR = 100`

- `static string revision = "$Revision: 0.9.1 $"`

the usercode revision number

13.2.1 Detailed Description

The main egs_brachy application class. See the [Main Page](#) for full documentation.

Definition at line 90 of file egs_brachy.h.

13.2.2 Member Enumeration Documentation

13.2.2.1 enum EB_Application::RunMode [private]

Enumerator

`RM_NORMAL` Standard running mode.

`RM_SUPERPOSITION` Superposition mode for intersource effects.

`RM_VC_ONLY` Run volume correction routines then quit.

Definition at line 92 of file egs_brachy.h.

13.2.3 Constructor & Destructor Documentation

13.2.3.1 EB_Application::EB_Application (int argc, char ** argv) [inline]

egs_brachy constructor

Definition at line 266 of file egs_brachy.h.

13.2.3.2 EB_Application::~EB_Application () [inline]

egs_brachy destructor

Definition at line 303 of file egs_brachy.h.

13.2.4 Member Function Documentation

13.2.4.1 **void EB_Application::addRecycledParticlesToStack (EGS_Particle * *p*, bool *new_hist* = false)** [protected]

Definition at line 1422 of file egs_brachy.cpp.

13.2.4.2 **int EB_Application::addState (istream & *data*)**

Add data from a parallel job. Add standard egs++ data as well as egs_brachy specific scoring information.

Definition at line 2365 of file egs_brachy.cpp.

13.2.4.3 **int EB_Application::ausgab (int *iarg*)**

user scoring of dose, spectra etc

Definition at line 1484 of file egs_brachy.cpp.

13.2.4.4 **void EB_Application::calcEffectiveHistories ()** [private]

Definition at line 1743 of file egs_brachy.cpp.

13.2.4.5 **void EB_Application::clearAusgabCalls ()** [private]

disable all ausgab calls

Definition at line 1089 of file egs_brachy.cpp.

13.2.4.6 **int EB_Application::combineResults ()**

Definition at line 2282 of file egs_brachy.cpp.

13.2.4.7 **void EB_Application::copyParticleToSourceLoc (EGS_Particle * *p*, int *source*, bool *kill_orig*, bool *rotate*, EGS_Float *new_wt*)** [protected]

Definition at line 1321 of file egs_brachy.cpp.

13.2.4.8 **int EB_Application::correctVolumes ()** [private]

run the volume correction routines

Definition at line 447 of file egs_brachy.cpp.

13.2.4.9 int EB_Application::createPhantoms () [private]

set up Phantom objects for any geometries that user has requested scoring for

Definition at line 538 of file egs_brachy.cpp.

13.2.4.10 vector< EGS_AffineTransform * > EB_Application::createTransforms (EGS_Input * *input*) [protected]

Definition at line 393 of file egs_brachy.cpp.

13.2.4.11 void EB_Application::describeSimulation ()

Describe the simulation.

Add extra information to egs_applications describeSimulation

Definition at line 127 of file egs_brachy.cpp.

13.2.4.12 void EB_Application::describeUserCode () const

Print information about the egs_brachy user code.

Definition at line 113 of file egs_brachy.cpp.

13.2.4.13 void EB_Application::discardTopParticle (int *idisc* = 1) [private]

Definition at line 1414 of file egs_brachy.cpp.

13.2.4.14 void EB_Application::doPhotonSplitting (int *iarg*) [protected]

Definition at line 1691 of file egs_brachy.cpp.

13.2.4.15 int EB_Application::egsAdvApplicationOutputData (ostream * *out*)

helper function for outputData

Definition at line 2029 of file egs_brachy.cpp.

13.2.4.16 int EB_Application::egsAdvApplicationReadData (istream * *in*)

helper function for outputData

Definition at line 2168 of file egs_brachy.cpp.

13.2.4.17 int EB_Application::egsApplicationOutputData (ostream * *out*)

helper function for outputData

Definition at line 2005 of file egs_brachy.cpp.

13.2.4.18 int EB_Application::egsApplicationReadData (istream * *in*)

helper function for outputData

Definition at line 2145 of file egs_brachy.cpp.

13.2.4.19 int EB_Application::egsBrachyOutputData (ostream * *out*)

helper function for outputData

Definition at line 2056 of file egs_brachy.cpp.

13.2.4.20 int EB_Application::egsBrachyReadData (istream * *in*)

helper function for outputData

Definition at line 2196 of file egs_brachy.cpp.

13.2.4.21 void EB_Application::enableAusgabCalls (int *ncalls*, AusgabCall *calls*[]) [private]

enable an array of ausgab calls

Definition at line 1217 of file egs_brachy.cpp.

13.2.4.22 void EB_Application::enterNewRegion () [virtual]

Definition at line 1395 of file egs_brachy.cpp.

13.2.4.23 void EB_Application::getCurrentResult (double & *sum*, double & *sum2*, double & *norm*, double & *count*)

Reports the current results for this batch of the simulation.

Definition at line 1882 of file egs_brachy.cpp.

13.2.4.24 string EB_Application::getOutputVolcorFormat () [inline]

Definition at line 474 of file egs_brachy.h.

13.2.4.25 **EB_Phantom * EB_Application::getPhantomByName (string *name*)**

takes a phantom geometry name and returns the [EB_Phantom](#) object

Definition at line 804 of file egs_brachy.cpp.

13.2.4.26 **void EB_Application::initAusgabCalls () [private]**

setup any required ausgab calls

For efficiency, only those ausgab calls which are strictly neccessary should be enabled

Definition at line 1096 of file egs_brachy.cpp.

13.2.4.27 **int EB_Application::initBCSE (EGS_Input * *inp*)**

Initialize BCSE variance reduction if requested.

Definition at line 1031 of file egs_brachy.cpp.

13.2.4.28 **int EB_Application::initCrossSections () [private]**

Definition at line 684 of file egs_brachy.cpp.

13.2.4.29 **void EB_Application::initDoseScaling (EGS_Input * *scoring_options*) [private]**

Initialize dose scaling factor if requested.

Definition at line 1272 of file egs_brachy.cpp.

13.2.4.30 **void EB_Application::initEDepScoring (EGS_Input * *scoring_options*) [private]**

energy deposition scoring initialization

Definition at line 1224 of file egs_brachy.cpp.

13.2.4.31 **void EB_Application::initGCRScoring (EGS_Input * *inp*) [private]**

setup which phantom/region will be used for getCurrentResult

Definition at line 760 of file egs_brachy.cpp.

13.2.4.32 int EB_Application::initGeometry () [protected]

override default initGeometry so we can manually create our own geometry.

This allows us to track region numbers for each geometry object individually

Definition at line 314 of file egs_brachy.cpp.

13.2.4.33 void EB_Application::initMuenData (EGS_Input * *scoring_options*) [private]

load muen data for requested media

Definition at line 1160 of file egs_brachy.cpp.

13.2.4.34 void EB_Application::initOutputFiles (EGS_Input * *inp*) [private]

set up whether to output extra info files

Definition at line 815 of file egs_brachy.cpp.

13.2.4.35 void EB_Application::initPHSPScoring (EGS_Input * *inp*) [private]

set up phsp scoring

Definition at line 844 of file egs_brachy.cpp.

13.2.4.36 int EB_Application::initRunControl ()

egs_brachy specific run control initialization

Definition at line 638 of file egs_brachy.cpp.

13.2.4.37 int EB_Application::initRunMode ()

Get run mode from the input file.

Definition at line 651 of file egs_brachy.cpp.

13.2.4.38 int EB_Application::initRussianRoulette (EGS_Input * *scoring_options*)

Initialize Russian roulette variance reduction if requested.

Definition at line 1005 of file egs_brachy.cpp.

13.2.4.39 `void EB_Application::initScatScoring (EGS_Input * scoring_options) [private]`

energy deposition scoring initialization

Definition at line 1243 of file egs_brachy.cpp.

13.2.4.40 `int EB_Application::initScoring ()`

initialize all scoring and variance reduction parameters

Definition at line 726 of file egs_brachy.cpp.

13.2.4.41 `int EB_Application::initSimulation ()`

set the run mode and then call EGS_AdvancedApplication::initSimulation

Definition at line 618 of file egs_brachy.cpp.

13.2.4.42 `int EB_Application::initSource () [protected]`

Definition at line 575 of file egs_brachy.cpp.

13.2.4.43 `int EB_Application::initSourceTransforms () [protected]`

read in the location of all particle sources

Definition at line 415 of file egs_brachy.cpp.

13.2.4.44 `void EB_Application::initSpectrumScoring (EGS_Input * scoring_input) [private]`

Initialize all spectrum scoring objects.

Definition at line 1068 of file egs_brachy.cpp.

13.2.4.45 `void EB_Application::initTrackLengthScoring (EGS_Input * scoring_options) [private]`

track length scoring initialization

Definition at line 1108 of file egs_brachy.cpp.

13.2.4.46 `int EB_Application::initVarianceReduction ()`

initialize all variance reduction parameters

Definition at line 855 of file egs_brachy.cpp.

```
13.2.4.47 void EB_Application::initXCCScaling ( EGS_Input * scoring_options ) [private]
```

Initialize cross section scaling if requested.

Definition at line 1285 of file egs_brachy.cpp.

```
13.2.4.48 bool EB_Application::isStuck ( ) [private]
```

Definition at line 1454 of file egs_brachy.cpp.

```
13.2.4.49 int EB_Application::outputData ( )
```

Output intermediate results. The egs_brachy version outputs the standard egs++ data along with egs_brachy specific information such as phantom and spectrum scoring information. egs_brachy also allows you to output data in gzip format.

Definition at line 2103 of file egs_brachy.cpp.

```
13.2.4.50 int EB_Application::outputDataHelper ( ostream * out )
```

helper function for outputData

Definition at line 2089 of file egs_brachy.cpp.

```
13.2.4.51 void EB_Application::outputResults ( )
```

Definition at line 1762 of file egs_brachy.cpp.

```
13.2.4.52 void EB_Application::printIncludedFiles ( )
```

Definition at line 294 of file egs_brachy.cpp.

```
13.2.4.53 int EB_Application::readData ( )
```

Read data required for restarting simulations.

Definition at line 2240 of file egs_brachy.cpp.

```
13.2.4.54 int EB_Application::readDataHelper ( istream * in )
```

helper function for outputData

Definition at line 2225 of file egs_brachy.cpp.

13.2.4.55 `void EB_Application::resetCounter ()`

Reset the application to a 'pristine' state. Adapted from egs_application.cpp to allow combining in text or gzip format.

Definition at line 2344 of file egs_brachy.cpp.

13.2.4.56 `int EB_Application::runSimulation () [virtual]`

Definition at line 1892 of file egs_brachy.cpp.

13.2.4.57 `int EB_Application::simulateSingleShower () [protected]`

Definition at line 1900 of file egs_brachy.cpp.

13.2.4.58 `void EB_Application::startNewParticle () [virtual]`

Set source ecut/pcut if different from global ecut/pcut.

Definition at line 1380 of file egs_brachy.cpp.

13.2.4.59 `int EB_Application::startNewShower () [protected]`

Definition at line 1979 of file egs_brachy.cpp.

13.2.5 Member Data Documentation

13.2.5.1 `int EB_Application::active_source [private]`

Definition at line 111 of file egs_brachy.h.

13.2.5.2 `EGS_AffineTransform* EB_Application::base_transform [private]`

same as source_transforms[0]

Definition at line 147 of file egs_brachy.h.

13.2.5.3 `EGS_AffineTransform* EB_Application::base_transform_inv [private]`

same as source_transforms[0].inverse()

Definition at line 148 of file egs_brachy.h.

13.2.5.4 `EGS_Float EB_Application::bcse_factor [private]`

Definition at line 159 of file egs_brachy.h.

13.2.5.5 `int EB_Application::bcse_med_num [private]`

Definition at line 158 of file egs_brachy.h.

13.2.5.6 `EGS_Float EB_Application::cur_R [private]`

Definition at line 137 of file egs_brachy.h.

13.2.5.7 `const EGS_Float EB_Application::DEFAULT_BCSE_FACTOR = 100 [static], [private]`

Definition at line 160 of file egs_brachy.h.

13.2.5.8 `bool EB_Application::do_bcse [private]`

Definition at line 157 of file egs_brachy.h.

13.2.5.9 `bool EB_Application::do_brem_split [private]`

Definition at line 154 of file egs_brachy.h.

13.2.5.10 `EGS_Float EB_Application::effective_histories`

Definition at line 366 of file egs_brachy.h.

13.2.5.11 `EnergyScoringStats* EB_Application::escoring [private]`

Energy related scoring/stats.

Definition at line 102 of file egs_brachy.h.

13.2.5.12 `map<string, EGS_ScoringArray*> EB_Application::extra_scoring_doses [private]`

Definition at line 182 of file egs_brachy.h.

13.2.5.13 `map<string, EGS_ScoringArray*> EB_Application::extra_scoring_doses_edep [private]`

Definition at line 183 of file egs_brachy.h.

13.2.5.14 `map<string, vector<EGS_Float>> EB_Application::extra_scoring_mass [private]`

Definition at line 181 of file egs_brachy.h.

13.2.5.15 `map<string, vector<int>> EB_Application::extra_scoring_reg [private]`

Definition at line 179 of file egs_brachy.h.

13.2.5.16 `map<string, vector<EGS_Float>> EB_Application::extra_scoring_vols [private]`

Definition at line 180 of file egs_brachy.h.

13.2.5.17 `ebvolcor::FileResults EB_Application::file_vc_results [private]`

results from precomputed volume correction

Definition at line 187 of file egs_brachy.h.

13.2.5.18 `EGS_Float EB_Application::flu_cutoff [private]`

fluorescent photon cutoff energy

Definition at line 162 of file egs_brachy.h.

13.2.5.19 `EB_Phantom* EB_Application::gcr_phantom [private]`

phantom object to use in getCurrentResult (defaults to 1st phantom)

Definition at line 176 of file egs_brachy.h.

13.2.5.20 `int EB_Application::gcr_phantom_reg [private]`

region of phantom to use for getCurrentResult (default to 0)

Definition at line 177 of file egs_brachy.h.

13.2.5.21 `ebvolcor::Results EB_Application::gen_vc_results [private]`

results from general volume correction

Definition at line 186 of file egs_brachy.h.

13.2.5.22 **GeomInfo** `EB_Application::ginfo` [private]

meta data about the geometries

Definition at line 174 of file egs_brachy.h.

13.2.5.23 **EGS_Float** `EB_Application::global_e_max_rr` [private]

max range rejection energy globally

Definition at line 169 of file egs_brachy.h.

13.2.5.24 **EGS_Float** `EB_Application::global_ecut` [private]

ecut for source objects

Definition at line 165 of file egs_brachy.h.

13.2.5.25 **bool** `EB_Application::global_i_do_rr` [private]

enable range rejection outside of sources

Definition at line 168 of file egs_brachy.h.

13.2.5.26 **EGS_Float** `EB_Application::global_pcut` [private]

pcut for source objects

Definition at line 166 of file egs_brachy.h.

13.2.5.27 **igzstream*** `EB_Application::gz_data_in` [private]

GZip file for outputing egsdat.

Definition at line 198 of file egs_brachy.h.

13.2.5.28 **ogzstream*** `EB_Application::gz_data_out` [private]

GZip file for outputing egsdat.

Definition at line 197 of file egs_brachy.h.

13.2.5.29 **bool** `EB_Application::is_phsp_source` [private]

Definition at line 108 of file egs_brachy.h.

13.2.5.30 `EGS_Vector EB_Application::last_position` [private]

Definition at line 135 of file egs_brachy.h.

13.2.5.31 `EGS_Float EB_Application::last_R` [private]

Definition at line 136 of file egs_brachy.h.

13.2.5.32 `Latch EB_Application::latch_control`

Definition at line 368 of file egs_brachy.h.

13.2.5.33 `map<int, EGS_Interpolator *> EB_Application::media_muen` [private]

Map from medium index to muen interpolator for that medium.

Definition at line 150 of file egs_brachy.h.

13.2.5.34 `map<string, string> EB_Application::media_muen_names` [private]

Definition at line 151 of file egs_brachy.h.

13.2.5.35 `EGS_I64 EB_Application::n_stuck` [private]

Definition at line 139 of file egs_brachy.h.

13.2.5.36 `int EB_Application::nbr_split` [private]

Number of times to split bremsstrahlung photons.

Definition at line 155 of file egs_brachy.h.

13.2.5.37 `int EB_Application::nsources`

total number of particle sources in current simulation

Definition at line 362 of file egs_brachy.h.

13.2.5.38 `bool EB_Application::output_3ddose_files` [private]

false if run mode is 'volume correction only'

Definition at line 121 of file egs_brachy.h.

13.2.5.39 `string EB_Application::output_dose_format [private]`

text or gzip

Definition at line 122 of file egs_brachy.h.

13.2.5.40 `string EB_Application::output_egsdat_format [private]`

text or gzip

Definition at line 119 of file egs_brachy.h.

13.2.5.41 `bool EB_Application::output_egsphant [private]`

true if user requests egsphant output

Definition at line 123 of file egs_brachy.h.

13.2.5.42 `string EB_Application::output_egsphant_format [private]`

text or gzip

Definition at line 124 of file egs_brachy.h.

13.2.5.43 `string EB_Application::output_volcor_format [private]`

text or gzip

Definition at line 130 of file egs_brachy.h.

13.2.5.44 `vector<string> EB_Application::output_volcor_phantoms [private]`

vector of phantom names to output volume correction files for

Definition at line 129 of file egs_brachy.h.

13.2.5.45 `bool EB_Application::output_voxinfo [private]`

true if user requests voxel info file

Definition at line 126 of file egs_brachy.h.

13.2.5.46 `string EB_Application::output_voxinfo_format [private]`

text or gzip

Definition at line 127 of file egs_brachy.h.

13.2.5.47 `vector<EGS_Vector> EB_Application::p_init_locs [private]`

Definition at line 133 of file egs_brachy.h.

13.2.5.48 `Publisher EB_Application::pevent_pub [private]`

Particle event publisher.

Definition at line 189 of file egs_brachy.h.

13.2.5.49 `vector<EB_Phantom*> EB_Application::phantom_geoms [private]`

pointers to all of the phantom objects

Definition at line 144 of file egs_brachy.h.

13.2.5.50 `PHSPControl* EB_Application::phsp [private]`

Definition at line 113 of file egs_brachy.h.

13.2.5.51 `int EB_Application::record_n_init [private]`

if > 0 write initial pos of record_n_init particles to {input_file}.pinit

Definition at line 132 of file egs_brachy.h.

13.2.5.52 `RecycleOpts* EB_Application::recycle_opts [private]`

Definition at line 106 of file egs_brachy.h.

13.2.5.53 `string EB_Application::revision = "$Revision: 0.9.1 $" [static], [private]`

the usercode revision number

Definition at line 200 of file egs_brachy.h.

13.2.5.54 `RunMode EB_Application::run_mode [private]`

Which run mode are we using (RM_NORMAL, RM_SUPERPOSITION or RM_VC_ONLY */.

Definition at line 99 of file egs_brachy.h.

13.2.5.55 `string EB_Application::run_mode_name [private]`

Definition at line 100 of file egs_brachy.h.

13.2.5.56 `bool EB_Application::score_edep [private]`

true when energy deposition is enabled

Definition at line 116 of file egs_brachy.h.

13.2.5.57 `bool EB_Application::score_scat [private]`

true when scatter scoring is enabled

Definition at line 117 of file egs_brachy.h.

13.2.5.58 `bool EB_Application::score_tlen [private]`

true when tracklength estimator is enabled

Definition at line 115 of file egs_brachy.h.

13.2.5.59 `bool EB_Application::single_generator [private]`

Definition at line 107 of file egs_brachy.h.

13.2.5.60 `EGS_Float EB_Application::source_e_max_rr [private]`

max range rejection energy for source objects

Definition at line 172 of file egs_brachy.h.

13.2.5.61 `EGS_Float EB_Application::source_ecut [private]`

ecut for source objects

Definition at line 163 of file egs_brachy.h.

13.2.5.62 `EGS_BaseGeometry* EB_Application::source_envelope_geom [private]`

geometry that the sources are embedded in

Definition at line 141 of file egs_brachy.h.

13.2.5.63 `bool EB_Application::source_i_do_rr` [private]

enable range rejection in sources

Definition at line 171 of file egs_brachy.h.

13.2.5.64 `EGS_Float EB_Application::source_pcut` [private]

pcut for source objects

Definition at line 164 of file egs_brachy.h.

13.2.5.65 `vector<EGS_AffineTransform *> EB_Application::source_transforms` [private]

transforms to locations of all sources

Definition at line 146 of file egs_brachy.h.

13.2.5.66 `ebvolcor::Results EB_Application::source_vc_results` [private]

results from source volume correctio box phantom

Definition at line 185 of file egs_brachy.h.

13.2.5.67 `vector<EGS_Float> EB_Application::source_weights` [private]

Definition at line 110 of file egs_brachy.h.

13.2.5.68 `vector<BaseSpectrumScorer *> EB_Application::spectrum_scorers` [private]

Definition at line 103 of file egs_brachy.h.

13.2.5.69 `int EB_Application::steps_at_same_loc` [private]

Definition at line 138 of file egs_brachy.h.

13.2.5.70 `map<int, EGS_I64> EB_Application::steps_in_other` [private]

Definition at line 195 of file egs_brachy.h.

13.2.5.71 `map<int, EGS_I64> EB_Application::steps_in_phantoms` [private]

Definition at line 194 of file egs_brachy.h.

13.2.5.72 `map<int, EGS_I64> EB_Application::steps_in_sources` [private]

Definition at line 193 of file egs_brachy.h.

13.2.5.73 `EGS_ASwitchedEnvelope* EB_Application::superpos_geom` [private]

an ASwitchedEnv cast of simulation geometry.

Definition at line 142 of file egs_brachy.h.

13.2.5.74 `EB_TimingTree EB_Application::timing_blocks` [private]

Track CPU times of various functions.

Definition at line 191 of file egs_brachy.h.

The documentation for this class was generated from the following files:

- /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy.h
- /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy.cpp

13.3 EB_IAEASource Class Reference

A phase space file source for egs_brachy.

```
#include <eb_iaeaphsp_source.h>
```

Inheritance diagram for EB_IAEASource:

Collaboration diagram for EB_IAEASource:

Public Member Functions

- [`EB_IAEASource`](#) (`EGS_Input *`, `EGS_ObjectFactory *f=0`)

Constructor.
- [`~EB_IAEASource`](#) ()
- [`EGS_I64 getNextParticle`](#) (`EGS_RandomGenerator *rndm`, `int &q`, `int &latch`, `EGS_Float &E`, `EGS_Float &wt`, `EGS_Vector &x`, `EGS_Vector &u`)
- [`EGS_Float getEmax`](#) () const
- [`EGS_Float getFluence`](#) () const
- [`void setSimulationChunk`](#) (`EGS_I64 nstart`, `EGS_I64 nrun`)
- [`bool storeState`](#) (`ostream &data`) const
- [`bool setState`](#) (`istream &data`)
- [`bool addState`](#) (`istream &data`)
- [`void resetCounter`](#) ()
- [`bool isValid`](#) () const

Protected Member Functions

- void `openPHSPFile ()`
- void `initSourceParams ()`

Protected Attributes

- bool `is_valid`
- string `phsp_file_name`
The phase space file name.
- ifstream `phsp_file`
Phase space data stream.
- IAEA_I32 `source_id`
- IAEA_I32 * `p_source_id`
- EGS_Float `Emax`
Maximum energy (obtained from the phsp file)
- EGS_Float `Emin`
Minimum energy (obtained from the phsp file)
- EGS_Float `Nincident`
Number of incident particles that created the file.
- IAEA_I64 `Nparticle`
Number of particles in the file.
- IAEA_I64 `Nphoton`
Number of photons in the file.
- IAEA_I64 `Nused`
Number of particles used so far.
- IAEA_I64 `Npos`
Next record to be read.
- IAEA_I64 `Nfirst`
first record this source can use
- IAEA_I64 `Nlast`
Last record this source can use.
- IAEA_I64 `Nread`
Number of particles read from file so far.
- IAEA_I64 `count`
Particles delivered so far.
- IAEA_I32 `n_parallel`
- IAEA_I32 `i_parallel`

Static Protected Attributes

- static IAEA_I32 `next_source_id` = 0
- static const string `iae_header_ext` = ".IAEHeader"

13.3.1 Detailed Description

A phase space file source for egs_brachy.

A phase space file source reads and delivers particles from a an IAEA phase space file. Note this source is an incomplete implementation and may only be suitable for use with egs_brachy.

A phase space file source is defined as follows:

```
:start source:  
    library = eb_iaeaphsp_source  
    name = some_name  
    header file = path to the phase space header file  
    particle type = one of photons, electrons, positrons, all, or charged  
:stop source:
```

Definition at line 101 of file eb_iaeaphsp_source.h.

13.3.2 Constructor & Destructor Documentation

13.3.2.1 EB_IAEASource::EB_IAEASource (EGS_Input * *input*, EGS_ObjectFactory * *f* = 0)

Constructor.

Construct a phase space file source from the information pointed to by *inp*.

Definition at line 53 of file eb_iaeaphsp_source.cpp.

13.3.2.2 EB_IAEASource::~EB_IAEASource ()

Definition at line 107 of file eb_iaeaphsp_source.cpp.

13.3.3 Member Function Documentation

13.3.3.1 bool EB_IAEASource::addState (istream & *data*)

Definition at line 319 of file eb_iaeaphsp_source.cpp.

13.3.3.2 EGS_Float EB_IAEASource::getEmax () const

Definition at line 232 of file eb_iaeaphsp_source.cpp.

13.3.3.3 EGS_Float EB_IAEASource::getFluence () const

Definition at line 240 of file eb_iaeaphsp_source.cpp.

13.3.3.4 `IAEA_I64 EB_IAEASource::getNextParticle (EGS_RandomGenerator * rndm, int & q, int & latch, EGS_Float & E, EGS_Float & wt, EGS_Vector & x, EGS_Vector & u)`

Definition at line 157 of file eb_iaeaphsp_source.cpp.

13.3.3.5 `void EB_IAEASource::initSourceParams () [protected]`

Definition at line 131 of file eb_iaeaphsp_source.cpp.

13.3.3.6 `bool EB_IAEASource::isValid () const`

Definition at line 236 of file eb_iaeaphsp_source.cpp.

13.3.3.7 `void EB_IAEASource::openPHSPFile () [protected]`

Definition at line 116 of file eb_iaeaphsp_source.cpp.

13.3.3.8 `void EB_IAEASource::resetCounter ()`

Definition at line 330 of file eb_iaeaphsp_source.cpp.

13.3.3.9 `void EB_IAEASource::setSimulationChunk (EGS_I64 nstart, EGS_I64 nrun)`

Definition at line 208 of file eb_iaeaphsp_source.cpp.

13.3.3.10 `bool EB_IAEASource::setState (istream & data)`

Definition at line 282 of file eb_iaeaphsp_source.cpp.

13.3.3.11 `bool EB_IAEASource::storeState (ostream & data) const`

Definition at line 245 of file eb_iaeaphsp_source.cpp.

13.3.4 Member Data Documentation

13.3.4.1 `IAEA_I64 EB_IAEASource::count [protected]`

Particles delivered so far.

Definition at line 142 of file eb_iaeaphsp_source.h.

13.3.4.2 **EGS_Float EB_IAEASource::Emax** [protected]

Maximum energy (obtained from the phsp file)

Definition at line 138 of file eb_iaeaphsp_source.h.

13.3.4.3 **EGS_Float EB_IAEASource::Emin** [protected]

Minimum energy (obtained from the phsp file)

Definition at line 138 of file eb_iaeaphsp_source.h.

13.3.4.4 **IAEA_I32 EB_IAEASource::i_parallel** [protected]

Definition at line 151 of file eb_iaeaphsp_source.h.

13.3.4.5 **const string EB_IAEASource::iaea_header_ext = ".IAEHeader"** [static], [protected]

Definition at line 159 of file eb_iaeaphsp_source.h.

13.3.4.6 **bool EB_IAEASource::is_valid** [protected]

Definition at line 131 of file eb_iaeaphsp_source.h.

13.3.4.7 **IAEA_I32 EB_IAEASource::n_parallel** [protected]

Definition at line 151 of file eb_iaeaphsp_source.h.

13.3.4.8 **IAEA_I32 EB_IAEASource::next_source_id = 0** [static], [protected]

Definition at line 157 of file eb_iaeaphsp_source.h.

13.3.4.9 **IAEA_I64 EB_IAEASource::Nfirst** [protected]

first record this source can use

Definition at line 142 of file eb_iaeaphsp_source.h.

13.3.4.10 **EGS_Float EB_IAEASource::Nincident** [protected]

Number of incident particles that created the file.

Definition at line 138 of file eb_iaeaphsp_source.h.

13.3.4.11 IAEA_I64 EB_IAEASource::Nlast [protected]

Last record this source can use.

Definition at line 142 of file eb_iaeaphsp_source.h.

13.3.4.12 IAEA_I64 EB_IAEASource::Nparticle [protected]

Number of particles in the file.

Definition at line 142 of file eb_iaeaphsp_source.h.

13.3.4.13 IAEA_I64 EB_IAEASource::Nphoton [protected]

Number of photons in the file.

Definition at line 142 of file eb_iaeaphsp_source.h.

13.3.4.14 IAEA_I64 EB_IAEASource::Npos [protected]

Next record to be read.

Definition at line 142 of file eb_iaeaphsp_source.h.

13.3.4.15 IAEA_I64 EB_IAEASource::Nread [protected]

Number of particles read from file so far.

Definition at line 142 of file eb_iaeaphsp_source.h.

13.3.4.16 IAEA_I64 EB_IAEASource::Nused [protected]

Number of particles used so far.

Definition at line 142 of file eb_iaeaphsp_source.h.

13.3.4.17 IAEA_I32* EB_IAEASource::p_source_id [protected]

Definition at line 136 of file eb_iaeaphsp_source.h.

13.3.4.18 ifstream EB_IAEASource::phsp_file [protected]

Phase space data stream.

Definition at line 133 of file eb_iaeaphsp_source.h.

13.3.4.19 string EB_IAEASource::phsp_file_name [protected]

The phase space file name.

Definition at line 132 of file eb_iaeaphsp_source.h.

13.3.4.20 IAEA_I32 EB_IAEASource::source_id [protected]

Definition at line 135 of file eb_iaeaphsp_source.h.

The documentation for this class was generated from the following files:

- /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_iaeaphsp_source/[eb_iaeaphsp_source.h](#)
- /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_iaeaphsp_source/[eb_iaeaphsp_source.cpp](#)

13.4 EB_Phantom Class Reference

A class to represent a single phantom for scoring dose in egs_brachy.

```
#include <phantom.h>
```

Inheritance diagram for EB_Phantom:

Collaboration diagram for EB_Phantom:

Public Types

- enum [GeomDirections](#) { [XDIR](#), [YDIR](#), [ZDIR](#) }

Public Member Functions

- [EB_Phantom](#) (EGS_Application *, EGS_BaseGeometry *, set< int > [global_regions](#), int nsources, [Publisher](#) *publisher)

EB_Phantom constructor.
- [~EB_Phantom](#) ()

EB_Phantom destructor.
- [void scoreTlen](#) (int ir, EGS_Float dose, EGS_Particle *p)

add tracklength dose to region ir
- [void scoreEdep](#) (int ir, EGS_Float dose)

add energy deposition dose to region ir
- [void getCurrentScore](#) (int ireg, double &sum, double &sum2)

get current tlen score for region
- [double getTlenNorm](#) (int ireg)

get tlen norm for region
- [void setDoseScale](#) (EGS_Float)

set dose scaling factor for output
- [void update](#) ([EB_Message](#) message, void *data)

update message with phantom data
- [EGS_Float getCorrectedVolume](#) (int ireg)

get uncorrected volume for a given region

- EGS_Float `getUncorrectedVolume` (int ireg)
get corrected volume for a given region
- `vector< int > getRegionsWithCorrections ()`
return a vector of all regions which were corrected
- `void setCorrectedVolume` (int ir, double fraction)
Allow user to tell phantom what the actual volume of a region is.
- `void enableTLenScoring ()`
enableTLenScoring must be called before simulation begins if you want to score dose with tracklength estimator in addition to tracklength scoring
- `void enableInteractionScoring ()`
enableInteractionScoring must be called before simulation begins if you want to score dose with interaction scoring in addition to tracklength scoring
- `void enableScatterScoring ()`
enableInteractionScoring must be called before simulation begins if you want to score dose with interaction scoring in addition to tracklength scoring
- `void setHistory` (EGS_I64 current_case)
set current history on scoring arrays for proper statistics
- `void setEffectiveHistories` (EGS_Float current_case)
set number of effective histories for normalizing scoring arrays
- EGS_Float `avgVoxelVol ()`
return average voxel volume
- `void outputVoxelInfo` (string format)
write voxel volumes, mass, desnity etc
- `void writeVoxelInfo` (ostream &)
write voxel info file
- `void outputVolumeCorrection` (string format)
initialize and output write voxel volumes to file
- `void writeVolumeCorrection` (ostream &)
write voxel volumes to file
- `void outputResults` (int top_n=20, string output_3ddose="text", string output_egsphant="text", string output_voxinfo="text", string output_volcor="text")
tell phantom to output its results.
- bool `globalRegIsInPhant` (int global_reg)
check whether a global region falls within this phantom
- int `globalToLocal` (int global_reg)
convert global region to local phantom region
- int `outputData` (ostream *ofile)
- int `readData` (istream *ifile)
- `void resetCounter ()`
- int `addState` (istream &ifile)
- EGS_Float `getRealRho` (int ireg)
return actual density for region
- EGS_Float `getRealMass` (int ireg)
return (corrected) real mass for region
- EGS_Float `getUncorrectedMass` (int ireg)
return uncorrected for region
- `void getResult` (EGS_ScoringArray *, int ireg, string type, EGS_Float &r, EGS_Float &dr)
get result for region from scoring array and normalize based on the type requested.

Static Public Member Functions

- static bool `needsUserVolumes` (const string &geom_type)
function for checking whether a given geometry type requires user specified volumes
- static bool `canWrite3ddose` (const string &geom_type)
function for checking whether a given geometry type can output 3ddose files

Public Attributes

- EGS_BaseGeometry * `geometry`
the phantom geometry object
- set< int > `global_regions`
the set of all global regions contained in this phantom
- int `global_reg_start`
starting global region index for this phantom
- int `global_reg_stop`
ending global region index for this phantom
- bool `needs_user_geoms`
this phantom requires user specified geometries
- bool `can_write_3ddose`
this phantom can output 3ddose files

Private Member Functions

- void `outputDoseStats` (EGS_ScoringArray *score, string type)
write some stats about dose arrays
- void `outputTopDoses` (int top_n, vector< RegionResult > region_results)
write the top_n doses to console
- void `output3ddoseResults` (string)
write the phantom boundaries, doses and uncertainties to 3ddose file
- void `output3DDoses` (ostream &out, EGS_ScoringArray *score, string type)
write input scoring array to 3ddose file
- void `output3DBounds` (ostream &out)
write the phantom bounds to 3ddose file
- void `outputEGSPphant` (string)
initialize and write an egsphant file for this phantom
- void `writeEGSPphant` (ostream &)
write actual egsphant data to file for this phantom
- vector< RegionResult > `getRegionResults` ()
create a vector of RegionResult structs which can then be sorted by dose value. used for output routines
- void `getScoringArrays` (vector< EGS_ScoringArray * > &scores, vector< string > &types, vector< string > &descriptions)
get all active scoring arrays, their types and descriptions
- void `getEGSdatScoringArrays` (vector< EGS_ScoringArray * > &scores)
get all active scoring arrays for writing to egsdat file

Private Attributes

- EGS_Application * `app`
Parent application instance. Required for constructing filenames.
- EGS_ScoringArray * `tlen_score`
Tracklength dose scoring array.
- EGS_ScoringArray * `edep_score`
Interaction scored dose scoring array.
- EGS_ScoringArray * `prim_score`
Tracklenth scored dose from primary particles.
- EGS_ScoringArray * `sscat_score`
Tracklenth scored dose from single scattered particles.
- EGS_ScoringArray * `mscat_score`
Tracklenth scored dose from multiple scattered particles.
- int `nsources`
- EGS_Float `dose_scale`
- EGS_Float `total_radiant_e`
- EGS_I64 `cur_history`
- EGS_Float `effective_histories`
- Publisher * `publisher`
- std::map< int, double > `corrected_volumes`
Corrected volume in a given region.

Static Private Attributes

- static const string `autovol_phantom_geom_types` [] = {"EGS_cSpheres", "EGS_cSphericalShell", "EGS_X↔YZGeometry", "EGS_RZ"}
- static const string `threeddose_geom_types` [] = {"EGS_cSpheres", "EGS_cSphericalShell", "EGS_XYZ↔Geometry", "EGS_RZ"}

13.4.1 Detailed Description

A class to represent a single phantom for scoring dose in egs_brachy.

A simulation may have an arbitrary number of these phantoms. This class handles scoring both tracklength and interaction scoring, outputting the top N doses to the console and output to 3ddose files.

Region numbers are all 'local' region numbers. That is the phantom does not know anything about its global region number. egs_brachy should convert to local region number before calling any method taking a region number as input.

Definition at line 71 of file phantom.h.

13.4.2 Member Enumeration Documentation

13.4.2.1 enum EB_Phantom::GeomDirections

Enumerator

XDIR XDIR=0 x dir for rectilinear, r dir for spherical, z dir for cylindrical.

YDIR YDIR=1 y dir for rectilinear, r dir for cylindrical.

ZDIR ZDIR=2 z dir for rectilinear.

Definition at line 132 of file phantom.h.

13.4.3 Constructor & Destructor Documentation

13.4.3.1 **EB_Phantom::EB_Phantom (EGS_Application * *parent*, EGS_BaseGeometry * *geom*, set< int > *global_regions*, int *nsource*, Publisher * *publisher*)**

[EB_Phantom](#) constructor.

Definition at line 103 of file phantom.cpp.

13.4.3.2 **EB_Phantom::~EB_Phantom () [inline]**

[EB_Phantom](#) destructor.

Definition at line 142 of file phantom.h.

13.4.4 Member Function Documentation

13.4.4.1 **int EB_Phantom::addState (istream & *ifile*)**

Definition at line 832 of file phantom.cpp.

13.4.4.2 **EGS_Float EB_Phantom::avgVoxelVol ()**

return average voxel volume

Definition at line 694 of file phantom.cpp.

13.4.4.3 **bool EB_Phantom::canWrite3ddose (const string & *geom_type*) [static]**

function for checking whether a given geometry type can output 3ddose files

Definition at line 179 of file phantom.cpp.

13.4.4.4 **void EB_Phantom::enableInteractionScoring ()**

enableInteractionScoring must be called before simulation begins if you want to score dose with interaction scoring in addition to tracklength scoring

Definition at line 213 of file phantom.cpp.

13.4.4.5 **void EB_Phantom::enableScatterScoring ()**

enableInteractionScoring must be called before simulation begins if you want to score dose with interaction scoring in addition to tracklength scoring

Definition at line 220 of file phantom.cpp.

13.4.4.6 void EB_Phantom::enableTLenScoring ()

enableTLenScoring must be called before simulation begins if you want to score dose with tracklength estimator in addition to tracklength scoring

Definition at line 206 of file phantom.cpp.

13.4.4.7 EGS_Float EB_Phantom::getCorrectedVolume (int ireg)

get uncorrected volume for a given region

Definition at line 310 of file phantom.cpp.

13.4.4.8 void EB_Phantom::getCurrentScore (int ireg, double & sum, double & sum2)

get current tlen score for region

Definition at line 319 of file phantom.cpp.

13.4.4.9 void EB_Phantom::getEGSdatScoringArrays (vector< EGS_ScoringArray * > & scores) [private]

get all active scoring arrays for writing to egsdat file

Definition at line 520 of file phantom.cpp.

13.4.4.10 EGS_Float EB_Phantom::getRealMass (int ireg)

return (corrected) real mass for region

Definition at line 289 of file phantom.cpp.

13.4.4.11 EGS_Float EB_Phantom::getRealRho (int ireg)

return actual density for region

Definition at line 283 of file phantom.cpp.

13.4.4.12 vector< RegionResult > EB_Phantom::getRegionResults () [private]

create a vector of [RegionResult](#) structs which can then be sorted by dose value. used for output routines

Definition at line 365 of file phantom.cpp.

13.4.4.13 `vector< int > EB_Phantom::getRegionsWithCorrections ()`

return a vector of all regions which were corrected

Definition at line 193 of file phantom.cpp.

13.4.4.14 `void EB_Phantom::getResult (EGS_ScoringArray * score, int ireg, string type, EGS_Float & r, EGS_Float & dr)`

get result for region from scoring array and normalize based on the type requested.

Definition at line 336 of file phantom.cpp.

13.4.4.15 `void EB_Phantom::getScoringArrays (vector< EGS_ScoringArray * > & scores, vector< string > & types, vector< string > & descriptions) [private]`

get all active scoring arrays, their types and descriptions

Definition at line 488 of file phantom.cpp.

13.4.4.16 `double EB_Phantom::getTlenNorm (int ireg)`

Definition at line 331 of file phantom.cpp.

13.4.4.17 `EGS_Float EB_Phantom::getUncorrectedMass (int ireg)`

return uncorrected for region

Definition at line 297 of file phantom.cpp.

13.4.4.18 `EGS_Float EB_Phantom::getUncorrectedVolume (int ireg)`

get corrected volume for a given region

Definition at line 301 of file phantom.cpp.

13.4.4.19 `bool EB_Phantom::globalRegIsInPhant (int global_reg) [inline]`

check whether a global region falls within this phantom

Definition at line 241 of file phantom.h.

13.4.4.20 `int EB_Phantom::globalToLocal (int global_reg) [inline]`

convert global region to local phantom region

Definition at line 246 of file phantom.h.

13.4.4.21 `bool EB_Phantom::needsUserVolumes (const string & geom_type) [static]`

function for checking whether a given geometry type requires user specified volumes

Definition at line 165 of file phantom.cpp.

13.4.4.22 `void EB_Phantom::output3DBounds (ostream & out) [private]`

write the phantom bounds to 3ddose file

Definition at line 587 of file phantom.cpp.

13.4.4.23 `void EB_Phantom::output3ddoseResults (string format) [private]`

write the phantom boundaries, doses and uncertainties to 3ddose file

Definition at line 540 of file phantom.cpp.

13.4.4.24 `void EB_Phantom::output3DDoses (ostream & out, EGS_ScoringArray * score, string type) [private]`

write input scoring array to 3ddose file

Definition at line 610 of file phantom.cpp.

13.4.4.25 `int EB_Phantom::outputData (ostream * ofile)`

Definition at line 794 of file phantom.cpp.

13.4.4.26 `void EB_Phantom::outputDoseStats (EGS_ScoringArray * score, string type) [private]`

write some stats about dose arrays

Definition at line 395 of file phantom.cpp.

13.4.4.27 `void EB_Phantom::outputEGSPhant (string format) [private]`

initialize and write an egsphant file for this phantom

Definition at line 672 of file phantom.cpp.

13.4.4.28 `void EB_Phantom::outputResults (int top_n = 20, string output_3ddose = "text", string output_egsphant = "text", string output_voxinfo = "text", string output_volcor = "text")`

tell phantom to output its results.

Definition at line 257 of file phantom.cpp.

13.4.4.29 `void EB_Phantom::outputTopDoses (int top_n, vector< RegionResult > region_results) [private]`

write the top_n doses to console

Definition at line 438 of file phantom.cpp.

13.4.4.30 `void EB_Phantom::outputVolumeCorrection (string format)`

intialize and output write voxel volumes to file

Definition at line 770 of file phantom.cpp.

13.4.4.31 `void EB_Phantom::outputVoxelInfo (string format)`

write voxel volumes, mass, desnity etc

Definition at line 732 of file phantom.cpp.

13.4.4.32 `int EB_Phantom::readData (istream * ifile)`

Definition at line 813 of file phantom.cpp.

13.4.4.33 `void EB_Phantom::resetCounter ()`

Definition at line 858 of file phantom.cpp.

13.4.4.34 `void EB_Phantom::scoreEdep (int ir, EGS_Float dose)`

add energy deposition dose to region ir

Definition at line 154 of file phantom.cpp.

13.4.4.35 `void EB_Phantom::scoreTlen (int ir, EGS_Float dose, EGS_Particle * p)`

add tracklength dose to region ir

Definition at line 132 of file phantom.cpp.

13.4.4.36 `void EB_Phantom::setCorrectedVolume (int ir, double fraction)`

Allow user to tell phantom what the actual volume of a region is.

Definition at line 201 of file phantom.cpp.

13.4.4.37 **void EB_Phantom::setDoseScale (EGS_Float *scale*)**

set dose scaling factor for output

add energy deposition dose to region ir

Definition at line 161 of file phantom.cpp.

13.4.4.38 **void EB_Phantom::setEffectiveHistories (EGS_Float *current_case*)**

set number of effective histories for normalizing scoring arrays

Definition at line 251 of file phantom.cpp.

13.4.4.39 **void EB_Phantom::setHistory (EGS_I64 *current_case*)**

set current history on scoring arrays for proper statistics

Definition at line 232 of file phantom.cpp.

13.4.4.40 **void EB_Phantom::update (EB_Message *message*, void * *data*) [virtual]**

Implements [Subscriber](#).

Definition at line 123 of file phantom.cpp.

13.4.4.41 **void EB_Phantom::writeEGSPhant (ostream & *out*) [private]**

write actual egsphant data to file for this phantom

Definition at line 632 of file phantom.cpp.

13.4.4.42 **void EB_Phantom::writeVolumeCorrection (ostream & *out*)**

write voxel volumes to file

Definition at line 757 of file phantom.cpp.

13.4.4.43 **void EB_Phantom::writeVoxelInfo (ostream & *out*)**

write voxel info file

Definition at line 704 of file phantom.cpp.

13.4.5 Member Data Documentation

13.4.5.1 `EGS_Application* EB_Phantom::app [private]`

Parent application instance. Required for constructing filenames.

Definition at line 78 of file phantom.h.

13.4.5.2 `const string EB_Phantom::autovol_phantom_geom_types = {"EGS_cSpheres", "EGS_cSphericalShell", "EGS_XYZGeometry", "EGS_RZ"} [static], [private]`

Definition at line 75 of file phantom.h.

13.4.5.3 `bool EB_Phantom::can_write_3ddose`

this phantom can output 3ddose files

Definition at line 289 of file phantom.h.

13.4.5.4 `std::map<int, double> EB_Phantom::corrected_volumes [private]`

Corrected volume in a given region.

Definition at line 95 of file phantom.h.

13.4.5.5 `EGS_I64 EB_Phantom::cur_history [private]`

Definition at line 90 of file phantom.h.

13.4.5.6 `EGS_Float EB_Phantom::dose_scale [private]`

Definition at line 87 of file phantom.h.

13.4.5.7 `EGS_ScoringArray* EB_Phantom::edep_score [private]`

Interaction scored dose scoring array.

Definition at line 80 of file phantom.h.

13.4.5.8 `EGS_Float EB_Phantom::effective_histories [private]`

Definition at line 91 of file phantom.h.

13.4.5.9 EGS_BaseGeometry* EB_Phantom::geometry

the phantom geometry object

Definition at line 276 of file phantom.h.

13.4.5.10 int EB_Phantom::global_reg_start

starting global region index for this phantom

Definition at line 285 of file phantom.h.

13.4.5.11 int EB_Phantom::global_reg_stop

ending global region index for this phantom

Definition at line 286 of file phantom.h.

13.4.5.12 set<int> EB_Phantom::global_regions

the set of all global regions contained in this phantom

Definition at line 283 of file phantom.h.

13.4.5.13 EGS_ScoringArray* EB_Phantom::mscat_score [private]

Tracklenth scored dose from multiple scattered particles.

Definition at line 84 of file phantom.h.

13.4.5.14 bool EB_Phantom::needs_user_geoms

this phantom requires user specified geometries

Definition at line 288 of file phantom.h.

13.4.5.15 int EB_Phantom::nsources [private]

Definition at line 86 of file phantom.h.

13.4.5.16 EGS_ScoringArray* EB_Phantom::prim_score [private]

Tracklenth scored dose from primary particles.

Definition at line 81 of file phantom.h.

13.4.5.17 `Publisher* EB_Phantom::publisher` [private]

Definition at line 93 of file phantom.h.

13.4.5.18 `EGS_ScoringArray* EB_Phantom::sscat_score` [private]

Tracklength scored dose from single scattered particles.

Definition at line 82 of file phantom.h.

13.4.5.19 `const string EB_Phantom::threeddose_geom_types = {"EGS_cSpheres", "EGS_cSphericalShell", "EGS_XYZGeometry", "EGS_RZ"} [static], [private]`

Definition at line 76 of file phantom.h.

13.4.5.20 `EGS_ScoringArray* EB_Phantom::tlen_score` [private]

Tracklength dose scoring array.

Definition at line 79 of file phantom.h.

13.4.5.21 `EGS_Float EB_Phantom::total_radiant_e` [private]

Definition at line 89 of file phantom.h.

The documentation for this class was generated from the following files:

- /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/[phantom.h](#)
- /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/[phantom.cpp](#)

13.5 EB_Timer Class Reference

```
#include <timing.h>
```

Public Member Functions

- `EB_Timer` (string tname, int level)
- `void start ()`
- `void stop ()`
- `EGS_Float getElapsedTime ()`
- `EGS_Float getStartTime ()`
- `EGS_Float getStop ()`
- `EGS_Float getDuration ()`
- `string getName ()`
- `bool isStopped ()`
- `bool isRunning ()`
- `int getLevel ()`

Private Attributes

- string `name`
- EGS_Timer `timer`
- EGS_Float `start_time`
- EGS_Float `stop_time`
- int `nested_level`

13.5.1 Detailed Description

Definition at line 47 of file timing.h.

13.5.2 Constructor & Destructor Documentation

13.5.2.1 `EB_Timer::EB_Timer (string tname, int level) [inline]`

Definition at line 56 of file timing.h.

13.5.3 Member Function Documentation

13.5.3.1 `EGS_Float EB_Timer::getDuration () [inline]`

Definition at line 84 of file timing.h.

13.5.3.2 `EGS_Float EB_Timer::getElapsedTime () [inline]`

Definition at line 72 of file timing.h.

13.5.3.3 `int EB_Timer::getLevel () [inline]`

Definition at line 103 of file timing.h.

13.5.3.4 `string EB_Timer::getName () [inline]`

Definition at line 91 of file timing.h.

13.5.3.5 `EGS_Float EB_Timer::getStartTime () [inline]`

Definition at line 76 of file timing.h.

13.5.3.6 `EGS_Float EB_Timer::getStop () [inline]`

Definition at line 80 of file timing.h.

13.5.3.7 `bool EB_Timer::isRunning() [inline]`

Definition at line 99 of file timing.h.

13.5.3.8 `bool EB_Timer::isStopped() [inline]`

Definition at line 95 of file timing.h.

13.5.3.9 `void EB_Timer::start() [inline]`

Definition at line 63 of file timing.h.

13.5.3.10 `void EB_Timer::stop() [inline]`

Definition at line 68 of file timing.h.

13.5.4 Member Data Documentation

13.5.4.1 `string EB_Timer::name [private]`

Definition at line 49 of file timing.h.

13.5.4.2 `int EB_Timer::nested_level [private]`

Definition at line 53 of file timing.h.

13.5.4.3 `EGS_Float EB_Timer::start_time [private]`

Definition at line 51 of file timing.h.

13.5.4.4 `EGS_Float EB_Timer::stop_time [private]`

Definition at line 52 of file timing.h.

13.5.4.5 `EGS_Timer EB_Timer::timer [private]`

Definition at line 50 of file timing.h.

The documentation for this class was generated from the following file:

- /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/[timing.h](#)

13.6 EB_TimingTree Class Reference

```
#include <timing.h>
```

Public Member Functions

- `EB_TimingTree ()`
- `~EB_TimingTree ()`
- `void addTimer (string name)`
- `void stopTimer ()`
- `void outputInfo ()`

Private Attributes

- `vector< EB_Timer * > running_blocks`
- `vector< EB_Timer * > stopped_blocks`
- `int level`

13.6.1 Detailed Description

Definition at line 110 of file timing.h.

13.6.2 Constructor & Destructor Documentation

13.6.2.1 `EB_TimingTree::EB_TimingTree () [inline]`

Definition at line 118 of file timing.h.

13.6.2.2 `EB_TimingTree::~EB_TimingTree () [inline]`

Definition at line 120 of file timing.h.

13.6.3 Member Function Documentation

13.6.3.1 `void EB_TimingTree::addTimer (string name) [inline]`

Definition at line 132 of file timing.h.

13.6.3.2 `void EB_TimingTree::outputInfo () [inline]`

Definition at line 159 of file timing.h.

13.6.3.3 `void EB_TimingTree::stopTimer() [inline]`

Definition at line 139 of file timing.h.

13.6.4 Member Data Documentation

13.6.4.1 `int EB_TimingTree::level [private]`

Definition at line 115 of file timing.h.

13.6.4.2 `vector<EB_Timer *> EB_TimingTree::running_blocks [private]`

Definition at line 112 of file timing.h.

13.6.4.3 `vector<EB_Timer *> EB_TimingTree::stopped_blocks [private]`

Definition at line 113 of file timing.h.

The documentation for this class was generated from the following file:

- /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/timing.h

13.7 EnergyFluenceSpectrumInVoxel Class Reference

A class for scoring the energy weighted spectrum (normalized to total radiant energy) of particles on the surface of a source geometry.

```
#include <spec_scoring.h>
```

Inheritance diagram for EnergyFluenceSpectrumInVoxel:

Collaboration diagram for EnergyFluenceSpectrumInVoxel:

Public Member Functions

- `EnergyFluenceSpectrumInVoxel (EGS_Input *input, EGS_BaseSource *src, GeomInfo *ginfo, Publisher *publisher)`
- virtual `void score (EB_Message message, void *data=0)`

Private Member Functions

- `void getResult (int bin, EGS_Float &r, EGS_Float &dr)`
`set r & dr to result/uncertainty for given bin. Normalization can be done in this routine`
- string `getTitle () const`
- string `getYAxisLabel () const`
- `void outputTotal ()`
- string `getFileExtension () const`

Private Attributes

- EGS_BaseGeometry * [geometry](#)
- EGS_Float [region_volume](#)
- int [local_scoring_region](#)
- int [scoring_region](#)

Additional Inherited Members

13.7.1 Detailed Description

A class for scoring the energy weighted spectrum (normalized to total radiant energy) of particles on the surface of a source geometry.

Note: this currently only works if there are no other geometries overlapping the scoring region. If there is, you will get incorrect results!

Sample input:

```
:start spectrum scoring:
  type = energy weighted surface
  particle type = photon
  minimum energy = 0.001
  maximum energy = 1.00
  number of bins = 1000
  output format = xmgr
  geometry = your_phantom_geom_name
  scoring region = 1 # which region of `your_phantom_geom` to score in (defaults to 0)
:stop spectrum scoring:
```

Definition at line 528 of file spec_scoring.h.

13.7.2 Constructor & Destructor Documentation

13.7.2.1 EnergyFluenceSpectrumInVoxel::EnergyFluenceSpectrumInVoxel (EGS_Input * *input*, EGS_BaseSource * *src*, GeomInfo * *ginfo*, Publisher * *publisher*) [inline]

Definition at line 558 of file spec_scoring.h.

13.7.3 Member Function Documentation

13.7.3.1 string EnergyFluenceSpectrumInVoxel::getFileExtension () const [inline], [private], [virtual]

Reimplemented from [BaseSpectrumScorer](#).

Definition at line 551 of file spec_scoring.h.

```
13.7.3.2 void EnergyFluenceSpectrumInVoxel::getResult ( int bin, EGS_Float & r, EGS_Float & dr ) [private],  
[virtual]
```

set r & dr to result/uncertainty for given bin. Normalization can be done in this routine

Reimplemented from [BaseSpectrumScorer](#).

Definition at line 527 of file spec_scoring.cpp.

```
13.7.3.3 string EnergyFluenceSpectrumInVoxel::getTitle ( ) const [inline], [private], [virtual]
```

Reimplemented from [BaseSpectrumScorer](#).

Definition at line 538 of file spec_scoring.h.

```
13.7.3.4 string EnergyFluenceSpectrumInVoxel::getYAxisLabel ( ) const [inline], [private], [virtual]
```

Reimplemented from [BaseSpectrumScorer](#).

Definition at line 545 of file spec_scoring.h.

```
13.7.3.5 void EnergyFluenceSpectrumInVoxel::outputTotal ( ) [private], [virtual]
```

Reimplemented from [BaseSpectrumScorer](#).

Definition at line 537 of file spec_scoring.cpp.

```
13.7.3.6 void EnergyFluenceSpectrumInVoxel::score ( EB_Message message, void * data = 0 ) [virtual]
```

override in derived classes to do scoring

Implements [BaseSpectrumScorer](#).

Definition at line 509 of file spec_scoring.cpp.

13.7.4 Member Data Documentation

```
13.7.4.1 EGS_BaseGeometry* EnergyFluenceSpectrumInVoxel::geometry [private]
```

Definition at line 530 of file spec_scoring.h.

```
13.7.4.2 int EnergyFluenceSpectrumInVoxel::local_scoring_region [private]
```

Definition at line 532 of file spec_scoring.h.

13.7.4.3 EGS_Float EnergyFluenceSpectrumInVoxel::region_volume [private]

Definition at line 531 of file spec_scoring.h.

13.7.4.4 int EnergyFluenceSpectrumInVoxel::scoring_region [private]

Definition at line 533 of file spec_scoring.h.

The documentation for this class was generated from the following files:

- /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/spec_scoring.h
- /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/spec_scoring.cpp

13.8 EnergyScoringStats Class Reference

a class to use for scoring information about total energy initialized, escaping sources etc

```
#include <spec_scoring.h>
```

Inheritance diagram for EnergyScoringStats:

Collaboration diagram for EnergyScoringStats:

Public Member Functions

- [EnergyScoringStats \(Publisher *publisher\)](#)
 • [void scoreEnergyInitialized \(EGS_Float E\)](#)
Needed for loading data from egsdat file.
- [EGS_Float escapingSourcesRatio \(\)](#)
return the ratio of energy escaping the source to total energy initialized
- [EGS_Float escapingGeomRatio \(\)](#)
return the ratio of energy escaping the simulation geometry to total energy initialized
- [EGS_Float totalEnergyInitialized \(\)](#)
returns the total energy initialized
- [EGS_Float energyEscapingSources \(\)](#)
returns the total particle energy escaping source geometry
- [EGS_Float energyEscapingGeom \(\)](#)
returns the total energy of particles escaping simulation geometry
- [void update \(EB_Message message, void *particle\)](#)
delegate messages to appropriate scoring functions
- [void outputResults \(\)](#)
write results to console
- [int outputData \(ostream *ofile\)](#)
- [int readData \(istream *ifile\)](#)
- [void resetCounter \(\)](#)
- [int addState \(istream &data\)](#)

Private Member Functions

- EGS_Float [getParticleEnergy](#) (const EGS_Particle **p*, bool subtractRM=true)
- void [scoreParticleInitialized](#) (EGS_Particle **p*)
add energy from initial particle to total
- void [scoreParticleEscapingSource](#) (EGS_Particle **p*)
add energy from a particle escaping a source to the total
- void [scoreParticleEscapingGeom](#) (EGS_Particle **p*)
add energy from a escaping simulation geometry to the total

Private Attributes

- EGS_Float [total_energy_initialized](#)
total energy of particles initialized so far
- EGS_Float [energy_escaping_sources](#)
total energy of particles escaping the source geometry note: doesn't currently exclude particles reentering the source geometry and then escaping again
- EGS_Float [energy_escaping_geom](#)
total energy of particles escaping the simulation geometry

13.8.1 Detailed Description

a class to use for scoring information about total energy initialized, escaping sources etc

Definition at line 57 of file spec_scoring.h.

13.8.2 Constructor & Destructor Documentation

13.8.2.1 EnergyScoringStats::EnergyScoringStats (Publisher * *publisher*) [inline]

Definition at line 94 of file spec_scoring.h.

13.8.3 Member Function Documentation

13.8.3.1 int EnergyScoringStats::addState (istream & *data*) [inline]

Definition at line 205 of file spec_scoring.h.

13.8.3.2 EGS_Float EnergyScoringStats::energyEscapingGeom () [inline]

returns the total energy of particles escaping simulation geometry

Definition at line 141 of file spec_scoring.h.

13.8.3.3 **EGS_Float EnergyScoringStats::energyEscapingSources () [inline]**

returns the total particle energy escaping source geometry

Definition at line 136 of file spec_scoring.h.

13.8.3.4 **EGS_Float EnergyScoringStats::escapingGeomRatio () [inline]**

return the ratio of energy escaping the simulation geometry to total energy initialized

Definition at line 122 of file spec_scoring.h.

13.8.3.5 **EGS_Float EnergyScoringStats::escapingSourcesRatio () [inline]**

return the ratio of energy escaping the source to total energy initialized

Definition at line 112 of file spec_scoring.h.

13.8.3.6 **EGS_Float EnergyScoringStats::getParticleEnergy (const EGS_Particle * p, bool subtractRM = true) [inline], [private]**

Definition at line 66 of file spec_scoring.h.

13.8.3.7 **int EnergyScoringStats::outputData (ostream * ofile) [inline]**

Definition at line 185 of file spec_scoring.h.

13.8.3.8 **void EnergyScoringStats::outputResults () [inline]**

write results to console

Definition at line 165 of file spec_scoring.h.

13.8.3.9 **int EnergyScoringStats::readData (istream * ifile) [inline]**

Definition at line 192 of file spec_scoring.h.

13.8.3.10 **void EnergyScoringStats::resetCounter () [inline]**

Definition at line 199 of file spec_scoring.h.

13.8.3.11 void EnergyScoringStats::scoreEnergyInitialized (EGS_Float *E*) [inline]

Needed for loading data from egsdat file.

Definition at line 107 of file spec_scoring.h.

13.8.3.12 void EnergyScoringStats::scoreParticleEscapingGeom (EGS_Particle * *p*) [inline], [private]

add energy from a escaping simulation geometry to the total

Definition at line 88 of file spec_scoring.h.

13.8.3.13 void EnergyScoringStats::scoreParticleEscapingSource (EGS_Particle * *p*) [inline], [private]

add energy from a particle escaping a source to the total

Definition at line 83 of file spec_scoring.h.

13.8.3.14 void EnergyScoringStats::scoreParticleInitialized (EGS_Particle * *p*) [inline], [private]

add energy from initial particle to total

Definition at line 75 of file spec_scoring.h.

13.8.3.15 EGS_Float EnergyScoringStats::totalEnergyInitialized () [inline]

returns the total energy initialized

Definition at line 131 of file spec_scoring.h.

13.8.3.16 void EnergyScoringStats::update (EB_Message *message*, void * *particle*) [inline], [virtual]

delegate messages to appropriate scoring functions

Implements [Subscriber](#).

Definition at line 147 of file spec_scoring.h.

13.8.4 Member Data Documentation

13.8.4.1 EGS_Float EnergyScoringStats::energy_escaping_geom [private]

total energy of particles escaping the simulation geometry

Definition at line 64 of file spec_scoring.h.

13.8.4.2 EGS_Float EnergyScoringStats::energyEscapingSources [private]

total energy of particles escaping the source geometry note: doesn't currently exclude particles reentering the source geometry and then escaping again

Definition at line 60 of file spec_scoring.h.

13.8.4.3 EGS_Float EnergyScoringStats::totalEnergyInitialized [private]

total energy of particles initialized so far

Definition at line 59 of file spec_scoring.h.

The documentation for this class was generated from the following file:

- /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/spec_scoring.h

13.9 EnergyWeightedSurfaceSpectrum Class Reference

A class for scoring the energy weighted spectrum (normalized to total radiant energy) of particles on the surface of a source geometry.

```
#include <spec_scoring.h>
```

Inheritance diagram for EnergyWeightedSurfaceSpectrum:

Collaboration diagram for EnergyWeightedSurfaceSpectrum:

Public Member Functions

- [EnergyWeightedSurfaceSpectrum](#) (EGS_Input *input, EGS_BaseSource *src, GeomInfo *ginfo, Publisher *publisher)
- virtual [void score](#) ([EB_Message](#) message, [void](#) *data=0)

Private Member Functions

- [void getResult](#) (int bin, EGS_Float &r, EGS_Float &dr)
set r & dr to result/uncertainty for given bin. Normalization can be done in this routine
- string [getTitle](#) () const
- string [getSubTitle](#) () const
- string [getYAxisLabel](#) () const
- [void outputTotal](#) ()
- string [getFileExtension](#) () const

Additional Inherited Members

13.9.1 Detailed Description

A class for scoring the energy weighted spectrum (normalized to total radiant energy) of particles on the surface of a source geometry.

See Taylor & Rogers, Med. Phys., 35 , 4933 – 4944, 2008

Sample input:

```
:start spectrum scoring:  
    type = energy weighted surface  
    particle type = photon  
    minimum energy = 0.001  
    maximum energy = 1.00  
    number of bins = 1000  
    output format = xmgr  
:stop spectrum scoring:
```

Definition at line 471 of file spec_scoring.h.

13.9.2 Constructor & Destructor Documentation

13.9.2.1 **EnergyWeightedSurfaceSpectrum::EnergyWeightedSurfaceSpectrum (EGS_Input * *input*, EGS_BaseSource * *src*, GeomInfo * *ginfo*, Publisher * *publisher*) [inline]**

Definition at line 495 of file spec_scoring.h.

13.9.3 Member Function Documentation

13.9.3.1 **string EnergyWeightedSurfaceSpectrum::getFileExtension () const [inline], [private], [virtual]**

Reimplemented from [BaseSpectrumScorer](#).

Definition at line 489 of file spec_scoring.h.

13.9.3.2 **void EnergyWeightedSurfaceSpectrum::getResult (int *bin*, EGS_Float & *r*, EGS_Float & *dr*) [private], [virtual]**

set r & dr to result/uncertainty for given bin. Normalization can be done in this routine

Reimplemented from [BaseSpectrumScorer](#).

Definition at line 488 of file spec_scoring.cpp.

13.9.3.3 **string EnergyWeightedSurfaceSpectrum::getSubTitle () const [inline], [private], [virtual]**

Reimplemented from [BaseSpectrumScorer](#).

Definition at line 479 of file spec_scoring.h.

13.9.3.4 `string EnergyWeightedSurfaceSpectrum::getTitle () const [inline], [private], [virtual]`

Reimplemented from [BaseSpectrumScorer](#).

Definition at line 475 of file `spec_scoring.h`.

13.9.3.5 `string EnergyWeightedSurfaceSpectrum::getYAxisLabel () const [inline], [private], [virtual]`

Reimplemented from [BaseSpectrumScorer](#).

Definition at line 483 of file `spec_scoring.h`.

13.9.3.6 `void EnergyWeightedSurfaceSpectrum::outputTotal () [private], [virtual]`

Reimplemented from [BaseSpectrumScorer](#).

Definition at line 497 of file `spec_scoring.cpp`.

13.9.3.7 `void EnergyWeightedSurfaceSpectrum::score (EB_Message message, void * data = 0) [virtual]`

override in derived classes to do scoring

Implements [BaseSpectrumScorer](#).

Definition at line 473 of file `spec_scoring.cpp`.

The documentation for this class was generated from the following files:

- /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/[spec_scoring.h](#)
- /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/[spec_scoring.cpp](#)

13.10 ebvolcor::FileResults Struct Reference

```
#include <eb_volcor.h>
```

Public Member Functions

- [FileResults \(\)](#)
- [FileResults \(map< string, string > phant_files\)](#)
- [void outputResults \(\)](#)

Public Attributes

- bool [success](#)
- EGS_Float [time](#)
- map< string, string > [phantom_files](#)
- map< string, int > [nreg](#)

13.10.1 Detailed Description

Definition at line 244 of file eb_volcor.h.

13.10.2 Constructor & Destructor Documentation

13.10.2.1 ebvolcor::FileResults::FileResults () [inline]

Definition at line 251 of file eb_volcor.h.

13.10.2.2 ebvolcor::FileResults::FileResults (map< string, string > *phant_files*) [inline]

Definition at line 255 of file eb_volcor.h.

13.10.3 Member Function Documentation

13.10.3.1 void ebvolcor::FileResults::outputResults () [inline]

Definition at line 260 of file eb_volcor.h.

13.10.4 Member Data Documentation

13.10.4.1 map<string, int> ebvolcor::FileResults::nreg

Definition at line 249 of file eb_volcor.h.

13.10.4.2 map<string, string> ebvolcor::FileResults::phantom_files

Definition at line 248 of file eb_volcor.h.

13.10.4.3 bool ebvolcor::FileResults::success

did the volume correction succeed?

Definition at line 246 of file eb_volcor.h.

13.10.4.4 EGS_Float ebvolcor::FileResults::time

how long (s) did the volume correction take

Definition at line 247 of file eb_volcor.h.

The documentation for this struct was generated from the following file:

- /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/[eb_volcor.h](#)
-

13.11 GeomInfo Class Reference

a container for organizing meta data about the geometries

```
#include <ginfo.h>
```

Collaboration diagram for GeomInfo:

Public Member Functions

- `GeomInfo ()`
- `~GeomInfo ()`
- int `initializeFromInput (EGS_Input *input)`

Initialize the `GeomInfo` structure (ginfo) This function reads the geometry input block, ensures all the required keys are present and pulls out information like which geometries are phantoms and sources.
- void `setGeometryIndexes (EGS_BaseGeometry *sim_geom)`

Setup all arrays required to decide which geometry/phantom a region is in and whether or not we are scoring dose in it.
- int `phantomFromRegion (int ir)`

return the phantom index for this region number or -1 if region is not in a phantom
- `GeomRegT globalToLocal (int ir)`

convert global region number to (EGS_BaseGeometry, local_reg_num) pair
- int `globalToLocalReg (int ir)`

convert global region number to local_reg_num
- int `localToGlobal (GeomRegT)`
- bool `isPhantom (int ir)`
- bool `isSource (int ir)`
- void `printInfo ()`

Public Attributes

- string `sim_geom_name`
- string `source_envelope_name`
- vector< string > `phantom_names`
- vector< string > `source_names`
- `Node * geom_tree`
- int `ngeom`

total number of geometries created
- int `nreg_total`

total number of regions in the simulation geometry
- vector< `GeomRegionInfo` > `ordered_geom_data`
- map< `EGS_BaseGeometry` *, `GeomRegionInfo` > `geom_to_regioninfo`
- vector< `EB_Phantom` * > `phantom_geoms`

pointers to all of the phantom objects

Private Member Functions

- vector< string > `getChildren (string name, EGS_Input *inp)`
- void `getGeomRegs (Node, vector< GeomRegionInfo > &, int)`
- void `setGeomMap ()`
- `Node build_tree (string root, vector< Node > &children)`

Private Attributes

- vector< int > [global_ir_to_phant](#)
array of size nreg mapping global region number to
- vector< int > [global_ir_to_source](#)
the phantoms geometry index or -1 if not a phantom
- vector< EGS_BaseGeometry * > [global_ir_to_geom](#)
the source geometry index or -1 if not a source
- vector< int > [global_ir_to_local_ir](#)
pointer for the geometry it belongs to
- [GeomRegionInfoMapT gmap](#)

13.11.1 Detailed Description

a container for organizing meta data about the geometries

Definition at line 99 of file ginfo.h.

13.11.2 Constructor & Destructor Documentation

13.11.2.1 GeomInfo::GeomInfo () [inline]

Definition at line 142 of file ginfo.h.

13.11.2.2 GeomInfo::~GeomInfo () [inline]

Definition at line 143 of file ginfo.h.

13.11.3 Member Function Documentation

13.11.3.1 Node GeomInfo::build_tree (string root, vector< Node > & children) [private]

Definition at line 71 of file ginfo.cpp.

13.11.3.2 vector< string > GeomInfo::getChildren (string name, EGS_Input * inp) [private]

Definition at line 316 of file ginfo.cpp.

13.11.3.3 void GeomInfo::getGeomRegs (Node root, vector< GeomRegionInfo > & ordered, int start) [private]

Definition at line 399 of file ginfo.cpp.

13.11.3.4 GeomRegT GeomInfo::globalToLocal (int *ir*)

convert global region number to (EGS_BaseGeometry, local_reg_num) pair

Definition at line 461 of file ginfo.cpp.

13.11.3.5 int GeomInfo::globalToLocalReg (int *ir*)

convert global region number to local_reg_num

Definition at line 469 of file ginfo.cpp.

13.11.3.6 int GeomInfo::initializeFromInput (EGS_Input * *input*)

Initialize the **GeomInfo** structure (ginfo) This function reads the geometry input block, ensures all the required keys are present and pulls out information like which geometries are phantoms and sources.

Note since we can't do a deep copy of the input we have to take all the geometry input items and then re-write them to the ginput

Definition at line 85 of file ginfo.cpp.

13.11.3.7 bool GeomInfo::isPhantom (int *ir*)

Definition at line 480 of file ginfo.cpp.

13.11.3.8 bool GeomInfo::isSource (int *ir*)

Definition at line 485 of file ginfo.cpp.

13.11.3.9 int GeomInfo::localToGlobal (GeomRegT *local*)

Definition at line 474 of file ginfo.cpp.

13.11.3.10 int GeomInfo::phantomFromRegion (int *ir*)

return the phantom index for this region number or -1 if region is not in a phantom

Definition at line 490 of file ginfo.cpp.

13.11.3.11 void GeomInfo::printInfo ()

Definition at line 495 of file ginfo.cpp.

13.11.3.12 void GeomInfo::setGeometryIndexes (EGS_BaseGeometry * *sim_geom*)

Setup all arrays required to decide which geometry/phantom a region is in and whether or not we are scoring dose in it.

To setup the arrays we loop through all geometries, decide whether it is a phantom or not, then loop through each region in the geometry and set the local region number phantom index etc

Definition at line 423 of file ginfo.cpp.

13.11.3.13 void GeomInfo::setGeomMap () [private]**13.11.4 Member Data Documentation****13.11.4.1 map<EGS_BaseGeometry *, GeomRegionInfo> GeomInfo::geom_to_regioninfo**

mapping from geometry to info about that geometry

Definition at line 151 of file ginfo.h.

13.11.4.2 Node* GeomInfo::geom_tree

a tree representing the parent/child relationships of the geometry

Definition at line 136 of file ginfo.h.

13.11.4.3 vector<EGS_BaseGeometry *> GeomInfo::global_ir_to_geom [private]

the source geometry index or -1 if not a source

array of size nreg mapping global region number to

Definition at line 108 of file ginfo.h.

13.11.4.4 vector<int> GeomInfo::global_ir_to_local_ir [private]

pointer for the geometry it belongs to

array of size nreg mapping global region number to

Definition at line 111 of file ginfo.h.

13.11.4.5 vector<int> GeomInfo::global_ir_to_phant [private]

array of size nreg mapping global region number to

Definition at line 101 of file ginfo.h.

13.11.4.6 `vector<int> GeomInfo::global_ir_to_source [private]`

the phantoms geometry index or -1 if not a phantom

array of size nreg mapping global region number to

Definition at line 104 of file ginfo.h.

13.11.4.7 `GeomRegionInfoMapT GeomInfo::gmap [private]`

the local region number of the geometry it belongs to. e.g. it would look like: global_ir_to_local_ir = [0, 1, 2, 3, 0, 1, 2, 3, 5] for a geometry consisting of two objects, the first with 4 regions and the second with 5 regions

Definition at line 118 of file ginfo.h.

13.11.4.8 `int GeomInfo::ngeom`

total number of geometries created

Definition at line 138 of file ginfo.h.

13.11.4.9 `int GeomInfo::nreg_total`

total number of regions in the simulation geometry

Definition at line 139 of file ginfo.h.

13.11.4.10 `vector<GeomRegionInfo> GeomInfo::ordered_geom_data`

All geometries in their constructed order

Definition at line 149 of file ginfo.h.

13.11.4.11 `vector<EB_Phantom *> GeomInfo::phantom_geoms`

pointers to all of the phantom objects

Definition at line 153 of file ginfo.h.

13.11.4.12 `vector<string> GeomInfo::phantom_names`

A list of all geometries to create scoring phantom objects for (arbitrary ordering)

Definition at line 132 of file ginfo.h.

13.11.4.13 string GeomInfo::sim_geom_name

name of the simulation geometry

Definition at line 130 of file ginfo.h.

13.11.4.14 string GeomInfo::source_envelope_name

name of the geometry that embeds the sources (required for superposition mode)

Definition at line 131 of file ginfo.h.

13.11.4.15 vector<string> GeomInfo::source_names

Names of geometries the user has specified as being source geoms

Definition at line 134 of file ginfo.h.

The documentation for this class was generated from the following files:

- /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/ginfo.h
- /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/ginfo.cpp

13.12 GeomRegionInfo Struct Reference

a struct to contain elementary information about a geometry

```
#include <ginfo.h>
```

Public Attributes

- string [name](#)
- string [type](#)
- vector< string > [children](#)
- int [nreg](#)
- int [start](#)
- int [end](#)

13.12.1 Detailed Description

a struct to contain elementary information about a geometry

Definition at line 83 of file ginfo.h.

13.12.2 Member Data Documentation

13.12.2.1 `vector<string> GeomRegionInfo::children`

list of children contained by this geometry (if any)

Definition at line 87 of file ginfo.h.

13.12.2.2 `int GeomRegionInfo::end`

global end region number

Definition at line 90 of file ginfo.h.

13.12.2.3 `string GeomRegionInfo::name`

the name given to the geometry by the user

Definition at line 85 of file ginfo.h.

13.12.2.4 `int GeomRegionInfo::nreg`

total number of regions in this geometry

Definition at line 88 of file ginfo.h.

13.12.2.5 `int GeomRegionInfo::start`

global start region number

Definition at line 89 of file ginfo.h.

13.12.2.6 `string GeomRegionInfo::type`

egs++ geometry type

Definition at line 86 of file ginfo.h.

The documentation for this struct was generated from the following file:

- /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/[ginfo.h](#)

13.13 gzstreambase Class Reference

```
#include <gzstream.h>
```

Inheritance diagram for gzstreambase:

Collaboration diagram for gzstreambase:

Public Member Functions

- [gzstreambase \(\)](#)
- [gzstreambase \(const char *name, int open_mode\)](#)
- [~gzstreambase \(\)](#)
- [void open \(const char *name, int open_mode\)](#)
- [void close \(\)](#)
- [gzstreambuf * rdbuf \(\)](#)

Protected Attributes

- [gzstreambuf buf](#)

13.13.1 Detailed Description

Definition at line 78 of file gzstream.h.

13.13.2 Constructor & Destructor Documentation

13.13.2.1 [gzstreambase::gzstreambase \(\) \[inline\]](#)

Definition at line 82 of file gzstream.h.

13.13.2.2 [gzstreambase::gzstreambase \(const char * name, int open_mode \)](#)

Definition at line 140 of file gzstream.C.

13.13.2.3 [gzstreambase::~gzstreambase \(\)](#)

Definition at line 145 of file gzstream.C.

13.13.3 Member Function Documentation

13.13.3.1 [void gzstreambase::close \(\)](#)

Definition at line 154 of file gzstream.C.

13.13.3.2 `void gzstreambase::open (const char * name, int open_mode)`

Definition at line 149 of file gzstream.C.

13.13.3.3 `gzstreambuf* gzstreambase::rdbuf () [inline]`

Definition at line 89 of file gzstream.h.

13.13.4 Member Data Documentation

13.13.4.1 `gzstreambuf gzstreambase::buf [protected]`

Definition at line 80 of file gzstream.h.

The documentation for this class was generated from the following files:

- /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/gzstream/[gzstream.h](#)
- /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/gzstream/[gzstream.C](#)

13.14 `gzstreambuf` Class Reference

#include <gzstream.h>

Inheritance diagram for `gzstreambuf`:

Collaboration diagram for `gzstreambuf`:

Public Member Functions

- `gzstreambuf ()`
- `int is_open ()`
- `gzstreambuf * open (const char *name, int open_mode)`
- `gzstreambuf * close ()`
- `~gzstreambuf ()`
- `virtual int overflow (int c=EOF)`
- `virtual int underflow ()`
- `virtual int sync ()`

Private Member Functions

- `int flush_buffer ()`

Private Attributes

- `gzFile file`
- `char buffer [bufferSize]`
- `char opened`
- `int mode`

Static Private Attributes

- `static const int bufferSize = 47+256`

13.14.1 Detailed Description

Definition at line 45 of file `gzstream.h`.

13.14.2 Constructor & Destructor Documentation

13.14.2.1 `gzstreambuf::gzstreambuf ()` [inline]

Definition at line 57 of file `gzstream.h`.

13.14.2.2 `gzstreambuf::~gzstreambuf ()` [inline]

Definition at line 69 of file `gzstream.h`.

13.14.3 Member Function Documentation

13.14.3.1 `gzstreambuf * gzstreambuf::close ()`

Definition at line 68 of file `gzstream.C`.

13.14.3.2 `int gzstreambuf::flush_buffer ()` [private]

Definition at line 103 of file `gzstream.C`.

13.14.3.3 `int gzstreambuf::is_open ()` [inline]

Definition at line 64 of file `gzstream.h`.

13.14.3.4 `gzstreambuf * gzstreambuf::open (const char * name, int open_mode)`

Definition at line 45 of file `gzstream.C`.

13.14.3.5 `int gzstreambuf::overflow (int c = EOF) [virtual]`

Definition at line 113 of file `gzstream.C`.

13.14.3.6 `int gzstreambuf::sync () [virtual]`

Definition at line 125 of file `gzstream.C`.

13.14.3.7 `int gzstreambuf::underflow () [virtual]`

Definition at line 78 of file `gzstream.C`.

13.14.4 Member Data Documentation

13.14.4.1 `char gzstreambuf::buffer[bufferSize] [private]`

Definition at line 51 of file `gzstream.h`.

13.14.4.2 `const int gzstreambuf::bufferSize = 47+256 [static], [private]`

Definition at line 47 of file `gzstream.h`.

13.14.4.3 `gzFile gzstreambuf::file [private]`

Definition at line 50 of file `gzstream.h`.

13.14.4.4 `int gzstreambuf::mode [private]`

Definition at line 53 of file `gzstream.h`.

13.14.4.5 `char gzstreambuf::opened [private]`

Definition at line 52 of file `gzstream.h`.

The documentation for this class was generated from the following files:

- `/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/gzstream/gzstream.h`
- `/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/gzstream/gzstream.C`

13.15 eb_tests.iaeа.IAEAPhaseSpace Class Reference

Inheritance diagram for eb_tests.iaeа.IAEAPhaseSpace:

Collaboration diagram for eb_tests.iaeа.IAEAPhaseSpace:

Public Member Functions

- def `__init__` (self, path, mode='r')
- def `num_particles` (self, particle_type='all')
- def `num_orig_particles` (self)
- def `maximum_energy` (self)
- def `source_id` (self)

Public Attributes

- `access`
- `path`

Static Public Attributes

- string `header_ext` = '.IAEAheader'
- string `phsp_ext` = '.IAEApHSP'

Private Member Functions

- def `_create_source` (self)
- def `_set_path` (self, path)

Private Attributes

- `_source_id`

13.15.1 Detailed Description

Definition at line 22 of file iaea.py.

13.15.2 Constructor & Destructor Documentation

13.15.2.1 def eb_tests.iaeа.IAEAPhaseSpace.__init__ (self, path, mode = 'r')

Set up access to an IAEA phase space file

Arguments:

path -- The path to the iaea phase space file

Keyword arguments:

mode -- 'r' for read, 'w' for read/write or 'a' for 'append' (default 'r')

Definition at line 28 of file iaea.py.

13.15.3 Member Function Documentation

13.15.3.1 def eb_tests.iaeа.IAEAPhaseSpace._create_source (*self*) [private]

Definition at line 49 of file iaea.py.

13.15.3.2 def eb_tests.iaeа.IAEAPhaseSpace._set_path (*self*, *path*) [private]

Definition at line 119 of file iaea.py.

13.15.3.3 def eb_tests.iaeа.IAEAPhaseSpace.maximum_energy (*self*)

Return maximum energy in this source in (MeV)

Definition at line 105 of file iaea.py.

13.15.3.4 def eb_tests.iaeа.IAEAPhaseSpace.num_orig_particles (*self*)

Return max number of particles of type particle_type

Keyword arguments:
particle_type -- type or category of particle to check (default 'all')

Definition at line 85 of file iaea.py.

13.15.3.5 def eb_tests.iaeа.IAEAPhaseSpace.num_particles (*self*, *particle_type* = 'all')

Return max number of particles of type particle_type

Keyword arguments:
particle_type -- type or category of particle to check (default 'all')

Definition at line 58 of file iaea.py.

13.15.3.6 def eb_tests.iaeа.IAEAPhaseSpace.source_id (*self*)

Definition at line 116 of file iaea.py.

13.15.4 Member Data Documentation

13.15.4.1 eb_tests.iaeа.IAEAPhaseSpace._source_id [private]

Definition at line 39 of file iaea.py.

13.15.4.2 eb_tests.iaeas.IAEAPhaseSpace.access

Definition at line 42 of file iaea.py.

13.15.4.3 string eb_tests.iaeas.IAEAPhaseSpace.header_ext = '.IAEAbheader' [static]

Definition at line 24 of file iaea.py.

13.15.4.4 eb_tests.iaeas.IAEAPhaseSpace.path

Definition at line 120 of file iaea.py.

13.15.4.5 string eb_tests.iaeas.IAEAPhaseSpace.phsp_ext = '.IAEAbphsp' [static]

Definition at line 25 of file iaea.py.

The documentation for this class was generated from the following file:

- /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/[iaeas.py](#)

13.16 eb_tests.iaeas_errors.IAEAPhaseSpaceError Class Reference

Inheritance diagram for eb_tests.iaeas_errors.IAEAPhaseSpaceError:

Collaboration diagram for eb_tests.iaeas_errors.IAEAPhaseSpaceError:

Public Member Functions

- def [__init__](#) (self, err_id=None, [message](#)= "")

Public Attributes

- [message](#)

13.16.1 Detailed Description

Definition at line 28 of file iaea_errors.py.

13.16.2 Constructor & Destructor Documentation

13.16.2.1 def eb_tests.iaeas_errors.IAEAPhaseSpaceError.[__init__](#) (self, err_id=None, message = " ")

Definition at line 29 of file iaea_errors.py.

13.16.3 Member Data Documentation

13.16.3.1 eb_tests.iae_errors.IAEAPhaseSpaceError.message

Definition at line 32 of file iaea_errors.py.

The documentation for this class was generated from the following file:

- /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/[iae_errors.py](#)

13.17 eb_tests.iae_errors.IAEAPhaseSpaceSetupError Class Reference

Inheritance diagram for eb_tests.iae_errors.IAEAPhaseSpaceSetupError:

Collaboration diagram for eb_tests.iae_errors.IAEAPhaseSpaceSetupError:

13.17.1 Detailed Description

Definition at line 25 of file iaea_errors.py.

The documentation for this class was generated from the following file:

- /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/[iae_errors.py](#)

13.18 igzstream Class Reference

```
#include <gzstream.h>
```

Inheritance diagram for igzstream:

Collaboration diagram for igzstream:

Public Member Functions

- [igzstream \(\)](#)
- [igzstream \(const char *name, int open_mode=std::ios::in\)](#)
- [gzstreambuf * rdbuf \(\)](#)
- [void open \(const char *name, int open_mode=std::ios::in\)](#)

Additional Inherited Members

13.18.1 Detailed Description

Definition at line 100 of file gzstream.h.

13.18.2 Constructor & Destructor Documentation

13.18.2.1 `igzstream::igzstream() [inline]`

Definition at line 102 of file gzstream.h.

13.18.2.2 `igzstream::igzstream(const char * name, int open_mode = std::ios::in) [inline]`

Definition at line 103 of file gzstream.h.

13.18.3 Member Function Documentation

13.18.3.1 `void igzstream::open(const char * name, int open_mode = std::ios::in) [inline]`

Definition at line 108 of file gzstream.h.

13.18.3.2 `gzstreambuf* igzstream::rdbuf() [inline]`

Definition at line 105 of file gzstream.h.

The documentation for this class was generated from the following file:

- /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/gzstream/[gzstream.h](#)

13.19 Latch Class Reference

A class for handling latch bits relevant to egs_brachy. The [Latch](#) class listens for particle events and sets/unsets latch bits on the particle based on the event type.

```
#include <latch.h>
```

Inheritance diagram for Latch:

Collaboration diagram for Latch:

Public Member Functions

- `void update(EB_Message message, void *particle)`
listen to events and delegate to appropriate handler

Static Public Member Functions

- static bool `hasEscaped` (EGS_Particle **p*)
True if particle is currently in a source.
- static void `setFlag` (Flag *flag*, EGS_Particle **p*)
*Set flag on input particle *p*.*
- static void `setFlag` (Flag *flag*, int &*latch*)
Set flag on input latch.
- static void `unsetFlag` (Flag *flag*, EGS_Particle **p*)
*Unset flag on input particle *p*.*
- static void `unsetFlag` (Flag *flag*, int &*latch*)
*Unset flag on input latch *p*.*
- static bool `checkFlag` (Flag *flag*, EGS_Particle **p*)
*Check whether flag is set on particle *p*.*
- static bool `checkFlag` (Flag *flag*, int *latch*)
Check whether flag is set on latch.
- static void `addScatter` (EGS_Particle **p*)
- static void `addScatter` (int &*latch*)
- static void `setPrimary` (int &*latch*)
- static void `setPrimary` (EGS_Particle **p*)
- static bool `isPrimary` (int *latch*)
- static bool `isPrimary` (EGS_Particle **p*)
- static bool `isSingleScat` (int *latch*)
- static bool `isSingleScat` (EGS_Particle **p*)
- static bool `isMultScat` (int *latch*)
- static bool `isMultScat` (EGS_Particle **p*)

Private Types

- enum Flag {
 IN_SOURCE, ESCAPED_SOURCE, PRIM_PARTICLE, SSCAT_PARTICLE,
 MSCAT_PARTICLE }

13.19.1 Detailed Description

A class for handling latch bits relevant to egs_brachy. The `Latch` class listens for particle events and sets/unsets latch bits on the particle based on the event type.

Definition at line 51 of file `latch.h`.

13.19.2 Member Enumeration Documentation

13.19.2.1 enum Latch::Flag [private]

Enumerator

- IN_SOURCE** a particle is in the source (either hasn't escaped yet, or has re-entered)
- ESCAPED_SOURCE** an initial particle has escaped the source (this bit will still be set on particles which ave re-entered a source geometry)
- PRIM_PARTICLE**
- SSCAT_PARTICLE**
- MSCAT_PARTICLE**

Definition at line 53 of file `latch.h`.

13.19.3 Member Function Documentation

13.19.3.1 `void Latch::addScatter (EGS_Particle * p) [static]`

Definition at line 80 of file latch.cpp.

13.19.3.2 `void Latch::addScatter (int & latch) [static]`

Definition at line 92 of file latch.cpp.

13.19.3.3 `bool Latch::checkFlag (Flag flag, EGS_Particle * p) [static]`

Check whether flag is set on particle p.

Definition at line 62 of file latch.cpp.

13.19.3.4 `bool Latch::checkFlag (Flag flag, int latch) [static]`

Check whether flag is set on latch.

Definition at line 66 of file latch.cpp.

13.19.3.5 `bool Latch::hasEscaped (EGS_Particle * p) [static]`

True if particle is currently in a source.

True if particle has escaped a source

Definition at line 134 of file latch.cpp.

13.19.3.6 `bool Latch::isMultScat (int latch) [static]`

Definition at line 121 of file latch.cpp.

13.19.3.7 `bool Latch::isMultScat (EGS_Particle * p) [static]`

Definition at line 125 of file latch.cpp.

13.19.3.8 `bool Latch::isPrimary (int latch) [static]`

Definition at line 105 of file latch.cpp.

13.19.3.9 **bool Latch::isPrimary (EGS_Particle * *p*) [static]**

Definition at line 109 of file latch.cpp.

13.19.3.10 **bool Latch::isSingleScat (int *latch*) [static]**

Definition at line 113 of file latch.cpp.

13.19.3.11 **bool Latch::isSingleScat (EGS_Particle * *p*) [static]**

Definition at line 117 of file latch.cpp.

13.19.3.12 **void Latch::setFlag (Flag *flag*, EGS_Particle * *p*) [static]**

Set flag on input particle p.

Definition at line 46 of file latch.cpp.

13.19.3.13 **void Latch::setFlag (Flag *flag*, int & *latch*) [static]**

Set flag on input latch.

Definition at line 50 of file latch.cpp.

13.19.3.14 **void Latch::setPrimary (int & *latch*) [static]**

Definition at line 88 of file latch.cpp.

13.19.3.15 **void Latch::setPrimary (EGS_Particle * *p*) [static]**

Definition at line 84 of file latch.cpp.

13.19.3.16 **void Latch::unsetFlag (Flag *flag*, EGS_Particle * *p*) [static]**

Unset flag on input particle p.

Definition at line 54 of file latch.cpp.

13.19.3.17 **void Latch::unsetFlag (Flag *flag*, int & *latch*) [static]**

Unset flag on input latch p.

Definition at line 58 of file latch.cpp.

13.19.3.18 void Latch::update (EB_Message message, void * particle) [virtual]

listen to events and delegate to appropriate handler

Implements [Subscriber](#).

Definition at line 70 of file [latch.cpp](#).

The documentation for this class was generated from the following files:

- [/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/latch.h](#)
- [/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/latch.cpp](#)

13.20 muen::MuenDataParser Class Reference

class for parsing muen data from a file.

```
#include <muen.h>
```

Public Member Functions

- [MuenDataParser \(\)](#)
construct class by parsing the data file. Note the actual EGS_Interpolator classes are only created when user calls getMuenInterpolator. User is responsible for deleting the interpolator when they are done with it.
- int [setMuenFile \(string filename\)](#)
- EGS_Interpolator * [getMuenInterpolator \(string med_name\)](#)
Create a new EGS_Interpolator of muen data for the requested medium and return pointer to it. Ownership of the object belongs to the caller.

Static Public Attributes

- static const string [MUEN_START](#) = "Muen values for medium MEDIUM ="

Private Member Functions

- [MuenMapT splitFileByMed \(ifstream &in\)](#)
does the actual parsing of data from the muen file

Private Attributes

- [MuenMapT med_data](#)

Static Private Attributes

- static const int [NSKIP](#) = 3

13.20.1 Detailed Description

class for parsing muen data from a file.

The muen data must be in the format generated by the egsnrc usercode g:

```
Muen values for medium MEDIUM = MED_NAME_1
Medium used is MED_NAME_1 found in your_pegs_data_set
Number of energy intervals is 2000
Energy      Muen
0.001000 MeV 4075.692785 cm^2/g
0.001004 MeV 4036.185761 cm^2/g
0.001007 MeV 3997.307705 cm^2/g
(# 1997 more lines)
Muen values for medium MEDIUM = MED_NAME_2
Medium used is MED_NAME_2 found in your_pegs_data_set
Number of energy intervals is 500
0.001000 MeV 4075.692785 cm^2/g
0.001004 MeV 4036.185761 cm^2/g
0.001007 MeV 3997.307705 cm^2/g
(# 497 more lines)
```

Definition at line 131 of file muen.h.

13.20.2 Constructor & Destructor Documentation

13.20.2.1 muen::MuenDataParser::MuenDataParser() [inline]

construct class by parsing the data file. Note the actual EGS_Interpolator classes are only created when user calls getMuenInterpolator. User is responsible for deleting the interpolator when they are done with it.

Note

Rather than just calling egsFatal on failure we should probably set a success flag and then let the users check the flag and decide what they want to do.

Definition at line 205 of file muen.h.

13.20.3 Member Function Documentation

13.20.3.1 EGS_Interpolator* muen::MuenDataParser::getMuenInterpolator(string med_name) [inline]

Create a new EGS_Interpolator of muen data for the requested medium and return pointer to it. Ownership of the object belongs to the caller.

Note

currently calling repeatedly with the same med_name will create a new instance of EGS_Interpolator for every call. We could change this to return a cached copy if it had already been created in the past.

Definition at line 228 of file muen.h.

13.20.3.2 int muen::MuenDataParser::setMuenFile (string *filename*) [inline]

Definition at line 207 of file muen.h.

13.20.3.3 MuenMapT muen::MuenDataParser::splitFileByMed (ifstream & *in*) [inline], [private]

does the actual parsing of data from the muen file

Definition at line 141 of file muen.h.

13.20.4 Member Data Documentation

13.20.4.1 MuenMapT muen::MuenDataParser::med_data [private]

holds all muen data from file.

Definition at line 133 of file muen.h.

13.20.4.2 const string muen::MuenDataParser::MUEN_START = "Muen values for medium MEDIUM =" [static]

string indicating start of a new medium

Definition at line 193 of file muen.h.

13.20.4.3 const int muen::MuenDataParser::NSKIP = 3 [static], [private]

number of lines in muen data for a medium to skip between first line for a medium and the start of the data

Definition at line 135 of file muen.h.

The documentation for this class was generated from the following file:

- /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/muen.h

13.21 Node Class Reference

```
#include <ginfo.h>
```

Public Member Functions

- [Node \(string n, vector< Node > children\)](#)
- [void addNode \(Node node\)](#)

Public Attributes

- string `name`
- vector<`Node`> `children`

13.21.1 Detailed Description

Definition at line 58 of file ginfo.h.

13.21.2 Constructor & Destructor Documentation

13.21.2.1 `Node::Node (string n, vector< Node > children) [inline]`

Definition at line 63 of file ginfo.h.

13.21.3 Member Function Documentation

13.21.3.1 `void Node::addNode (Node node) [inline]`

Definition at line 71 of file ginfo.h.

13.21.4 Member Data Documentation

13.21.4.1 `vector<Node> Node::children`

Definition at line 61 of file ginfo.h.

13.21.4.2 `string Node::name`

Definition at line 60 of file ginfo.h.

The documentation for this class was generated from the following file:

- /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/ginfo.h

13.22 ogzstream Class Reference

```
#include <gzstream.h>
```

Inheritance diagram for ogzstream:

Collaboration diagram for ogzstream:

Public Member Functions

- [ogzstream \(\)](#)
- [ogzstream \(const char *name, int mode=std::ios::out\)](#)
- [gzstreambuf * rdbuf \(\)](#)
- [void open \(const char *name, int open_mode=std::ios::out\)](#)

Additional Inherited Members

13.22.1 Detailed Description

Definition at line 113 of file gzstream.h.

13.22.2 Constructor & Destructor Documentation

13.22.2.1 [ogzstream::ogzstream \(\) \[inline\]](#)

Definition at line 115 of file gzstream.h.

13.22.2.2 [ogzstream::ogzstream \(const char * name, int mode = std::ios::out \) \[inline\]](#)

Definition at line 116 of file gzstream.h.

13.22.3 Member Function Documentation

13.22.3.1 [void ogzstream::open \(const char * name, int open_mode = std::ios::out \) \[inline\]](#)

Definition at line 121 of file gzstream.h.

13.22.3.2 [gzstreambuf* ogzstream::rdbuf \(\) \[inline\]](#)

Definition at line 118 of file gzstream.h.

The documentation for this class was generated from the following file:

- /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/gzstream/[gzstream.h](#)

13.23 ebvolcor::Options Class Reference

Volume correction initialization helper class.

```
#include <eb_volcor.h>
```

Public Member Functions

- [Options \(EGS_Input *inp\)](#)
- [~Options \(\)](#)
- [EGS_Vector getRandomPoint \(\)](#)

Public Attributes

- [bool valid](#)
- [EGS_Float bounds_volume](#)
- [EGS_Float density](#)
- [EGS_Float npoints](#)
- [VolCorMode mode](#)

Private Member Functions

- [void setMode \(\)](#)
read mode from input
- [int setBoundsShape \(\)](#)
create bounding shape from the shape input and calculate its volume
- [void setDensity \(\)](#)
- [void setRNG \(\)](#)

Private Attributes

- [EGS_Input * input](#)
- [EGS_BaseShape * bounds](#)
- [bool sobolAllowed](#)
- [EGS_RandomGenerator * rng](#)

Static Private Attributes

- [static const unsigned long DEFAULT RAND POINT DENSITY = 100000000](#)

13.23.1 Detailed Description

Volume correction initialization helper class.

[Options](#) is a small helper class for parsing a volume correction input item A sample input including both a source specific correction and a general purpose correction would look like this:

```

:start volume correction:

:start source volume correction:
    correction type = correct # correct, none, zero dose
    density of random points (cm^-3) = 1E8

:start shape:

    type = sphere
    radius = 0.11
    midpoint = 0 0 0

:stop shape:

:stop source volume correction:

:start extra volume correction:

    correction type = correct # correct, none, zero dose
    density of random points (cm^-3) = 1E5

:start shape:

    type = box
    box size = 8
    midpoint = 0 0 0

:stop shape:

:stop extra volume correction:

:stop volume correction:

```

An EGS_RNG input can also optionally be included in either of the volume correction inputs to use something other than the EGSnrc default RNG.

Definition at line 138 of file eb_volcor.h.

13.23.2 Constructor & Destructor Documentation

13.23.2.1 ebvolcor::Options::Options (EGS_Input * *inp*) [inline]

Definition at line 157 of file eb_volcor.h.

13.23.2.2 ebvolcor::Options::~Options () [inline]

Definition at line 181 of file eb_volcor.h.

13.23.3 Member Function Documentation

13.23.3.1 EGS_Vector ebvolcor::Options::getRandomPoint ()

Definition at line 232 of file eb_volcor.cpp.

13.23.3.2 `int ebvolcor::Options::setBoundsShape() [private]`

create bounding shape from the shape input and calculate its volume

Definition at line 159 of file eb_volcor.cpp.

13.23.3.3 `void ebvolcor::Options::setDensity() [private]`

set user requested density or default to DEFAULT RAND POINT DENSITY

Definition at line 189 of file eb_volcor.cpp.

13.23.3.4 `void ebvolcor::Options::setMode() [private]`

read mode from input

Definition at line 149 of file eb_volcor.cpp.

13.23.3.5 `void ebvolcor::Options::setRNG() [private]`

set user requested RNG or default to EGS_RandomGenerator::defaultRNG

Definition at line 201 of file eb_volcor.cpp.

13.23.4 Member Data Documentation

13.23.4.1 `EGS_BaseShape* ebvolcor::Options::bounds [private]`

Definition at line 145 of file eb_volcor.h.

13.23.4.2 `EGS_Float ebvolcor::Options::bounds_volume`

Definition at line 192 of file eb_volcor.h.

13.23.4.3 `const unsigned long ebvolcor::Options::DEFAULT RAND POINT DENSITY = 100000000 [static], [private]`

Definition at line 140 of file eb_volcor.h.

13.23.4.4 `EGS_Float ebvolcor::Options::density`

Definition at line 193 of file eb_volcor.h.

13.23.4.5 `EGS_Input* ebvolcor::Options::input` [private]

Definition at line 142 of file eb_volcor.h.

13.23.4.6 `VolCorMode ebvolcor::Options::mode`

Definition at line 195 of file eb_volcor.h.

13.23.4.7 `EGS_Float ebvolcor::Options::npoints`

Definition at line 194 of file eb_volcor.h.

13.23.4.8 `EGS_RandomGenerator* ebvolcor::Options::rng` [private]

Definition at line 149 of file eb_volcor.h.

13.23.4.9 `bool ebvolcor::Options::sobolAllowed` [private]

Definition at line 146 of file eb_volcor.h.

13.23.4.10 `bool ebvolcor::Options::valid`

Definition at line 190 of file eb_volcor.h.

The documentation for this class was generated from the following files:

- /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/[eb_volcor.h](#)
- /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/[eb_volcor.cpp](#)

13.24 PHSPControl Class Reference

```
#include <phsp.h>
```

Inheritance diagram for PHSPControl:

Collaboration diagram for PHSPControl:

Public Member Functions

- **PHSPControl** (EGS_Input *inp, EGS_AffineTransform *trans, EGS_AdvancedApplication *app, Publisher *pub)
PHSP Control constructor.
- **void finish** (EGS_I64 n_orig_particles)
set final number of particles written and destroy source
- **void destroySource ()**
destroy the source
- **void outputResults ()**
output file name and number of particles written
- **void update (EB_Message message, void *particle)**
receive PARTICLE_ESCAPED_SOURCE message

Private Types

- enum **ACCESS** { **READ** = 1, **WRITE** = 2, **APPEND** = 3 }
- enum **PARTICLE_TYPE** {
ALL_TYPES = -1, **PHOTON** = 1, **ELECTRON** = 2, **POSITRON** = 3,
NEUTRON = 4, **PROTON** = 5 }

Private Member Functions

- **void initSource ()**
create/open new source and set extra numbers
- **void writeParticle (EGS_Particle *p)**
write a single particle to the phsp
- short **getIAEAParticleType (const EGS_Particle *p)**
convert a particle to its IAEA Particle type

Private Attributes

- IAEA_I32 **mode**
Access mode.
- string **fname**
root name of phsp header
- IAEA_I32 **id**
IAEA Source ID (just set to 1 currently)
- IAEA_I64 **num_written**
Number of particles written to phsp file.
- EGS_AffineTransform * **transform**
- EGS_Float **boundary_step**
- bool **kill_after_scoring**
Set wt = 0 for particle after scoring if true.
- bool **print_header**
User has requested the phsp header gets printed after run.

13.24.1 Detailed Description

Definition at line 51 of file phsp.h.

13.24.2 Member Enumeration Documentation

13.24.2.1 enum PHSPControl::ACCESS [private]

Enumerator

READ IAEA Read mode.

WRITE IAEA Write mode.

APPEND IAEA Append mode.

Definition at line 53 of file phsp.h.

13.24.2.2 enum PHSPControl::PARTICLE_TYPE [private]

Enumerator

ALL_TYPES

PHOTON

ELECTRON

POSITRON

NEUTRON

PROTON

Definition at line 59 of file phsp.h.

13.24.3 Constructor & Destructor Documentation

13.24.3.1 PHSPControl::PHSPControl (EGS_Input * *inp*, EGS_AffineTransform * *trans*, EGS_AdvancedApplication * *app*, Publisher * *pub*)

PHSP Control constructor.

Definition at line 59 of file phsp.cpp.

13.24.4 Member Function Documentation

13.24.4.1 void PHSPControl::destroySource ()

destroy the source

Definition at line 221 of file phsp.cpp.

13.24.4.2 void PHSPControl::finish (EGS_J64 *n_orig_particles*)

set final number of particles written and destroy source

Definition at line 193 of file phsp.cpp.

13.24.4.3 `short PHSPControl::getIAEAParticleType (const EGS_Particle * p) [private]`

convert a particle to its IAEA Particle type

Definition at line 103 of file phsp.cpp.

13.24.4.4 `void PHSPControl::initSource () [private]`

create/open new source and set extra numbers

Definition at line 163 of file phsp.cpp.

13.24.4.5 `void PHSPControl::outputResults ()`

output file name and number of particles written

Definition at line 199 of file phsp.cpp.

13.24.4.6 `void PHSPControl::update (EB_Message message, void * particle) [virtual]`

receive PARTICLE_ESCAPED_SOURCE message

Implements [Subscriber](#).

Definition at line 185 of file phsp.cpp.

13.24.4.7 `void PHSPControl::writeParticle (EGS_Particle * p) [private]`

write a single particle to the phsp

Definition at line 117 of file phsp.cpp.

13.24.5 Member Data Documentation

13.24.5.1 `EGS_Float PHSPControl::boundary_step [private]`

transform used to return particle to origin before writing to phsp

Definition at line 78 of file phsp.h.

13.24.5.2 `string PHSPControl::fname [private]`

root name of phsp header

Definition at line 69 of file phsp.h.

13.24.5.3 **IAEA_I32 PHSPControl::id** [private]

IAEA Source ID (just set to 1 currently)

Definition at line 70 of file phsp.h.

13.24.5.4 **bool PHSPControl::kill_after_scoring** [private]

Set wt = 0 for particle after scoring if true.

Distance to push particle past source boundary before writing to phase space. Defaults to 1E-4 cm

Definition at line 82 of file phsp.h.

13.24.5.5 **IAEA_I32 PHSPControl::mode** [private]

Access mode.

Definition at line 68 of file phsp.h.

13.24.5.6 **IAEA_I64 PHSPControl::num_written** [private]

Number of particles written to phsp file.

Definition at line 72 of file phsp.h.

13.24.5.7 **bool PHSPControl::print_header** [private]

User has requested the phsp header gets printed after run.

Definition at line 84 of file phsp.h.

13.24.5.8 **EGS_AffineTransform* PHSPControl::transform** [private]

Definition at line 75 of file phsp.h.

The documentation for this class was generated from the following files:

- /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/[phsp.h](#)
- /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/[phsp.cpp](#)

13.25 Publisher Class Reference

```
#include <pubsub.h>
```

Public Member Functions

- `Publisher ()`
- `virtual ~Publisher ()`
- `void subscribe (Subscriber *s, EB_Message message)`
- `void unsubscribe (Subscriber *s, EB_Message message)`
- `void notify (EB_Message message, void *what=0, Subscriber *s=0)`
- `void setNotifyEnabled (bool flag)`
- `bool getNotifyEnabled () const`

Private Attributes

- `map< EB_Message, list< Subscriber * > > subscribers`
- `bool notifyEnabled`

13.25.1 Detailed Description

Definition at line 77 of file pubsub.h.

13.25.2 Constructor & Destructor Documentation

13.25.2.1 Publisher::Publisher () [inline]

Definition at line 79 of file pubsub.h.

13.25.2.2 virtual Publisher::~Publisher () [inline], [virtual]

Definition at line 82 of file pubsub.h.

13.25.3 Member Function Documentation

13.25.3.1 bool Publisher::getNotifyEnabled () const [inline]

Definition at line 93 of file pubsub.h.

13.25.3.2 void Publisher::notify (EB_Message message, void * what = 0, Subscriber * s = 0)

Definition at line 46 of file pubsub.cpp.

13.25.3.3 void Publisher::setNotifyEnabled (bool flag) [inline]

Definition at line 90 of file pubsub.h.

13.25.3.4 void Publisher::subscribe (**Subscriber** * *s*, **EB_Message** *message*) [inline]

Definition at line 83 of file pubsub.h.

13.25.3.5 void Publisher::unsubscribe (**Subscriber** * *s*, **EB_Message** *message*) [inline]

Definition at line 86 of file pubsub.h.

13.25.4 Member Data Documentation

13.25.4.1 bool Publisher::notifyEnabled [private]

Definition at line 98 of file pubsub.h.

13.25.4.2 map<**EB_Message**,list<**Subscriber***>> Publisher::subscribers [private]

Definition at line 97 of file pubsub.h.

The documentation for this class was generated from the following files:

- /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/[pubsub.h](#)
- /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/[pubsub.cpp](#)

13.26 RecycleOpts Class Reference

```
#include <recycle.h>
```

Public Member Functions

- [RecycleOpts](#) (EGS_Input **inp*)
- [void printInfo \(\)](#)

Public Attributes

- int [nrecycle](#)
- bool [rotate](#)

13.26.1 Detailed Description

Definition at line 64 of file recycle.h.

13.26.2 Constructor & Destructor Documentation

13.26.2.1 RecycleOpts::RecycleOpts (EGS_Input * *inp*)

Definition at line 45 of file recycle.cpp.

13.26.3 Member Function Documentation

13.26.3.1 void RecycleOpts::printInfo ()

Definition at line 68 of file recycle.cpp.

13.26.4 Member Data Documentation

13.26.4.1 int RecycleOpts::nrecycle

Definition at line 71 of file recycle.h.

13.26.4.2 bool RecycleOpts::rotate

Definition at line 72 of file recycle.h.

The documentation for this class was generated from the following files:

- /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/[recycle.h](#)
- /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/[recycle.cpp](#)

13.27 RegionResult Struct Reference

Public Attributes

- int [reg](#)
- double [volume](#)
- double [tlen](#)
- double [tlen_err](#)
- double [edep](#)
- double [edep_err](#)

13.27.1 Detailed Description

Definition at line 57 of file phantom.cpp.

13.27.2 Member Data Documentation

13.27.2.1 double RegionResult::edep

Definition at line 65 of file phantom.cpp.

13.27.2.2 double RegionResult::edep_err

Definition at line 66 of file phantom.cpp.

13.27.2.3 int RegionResult::reg

Definition at line 59 of file phantom.cpp.

13.27.2.4 double RegionResult::tlen

Definition at line 62 of file phantom.cpp.

13.27.2.5 double RegionResult::tlen_err

Definition at line 63 of file phantom.cpp.

13.27.2.6 double RegionResult::volume

Definition at line 60 of file phantom.cpp.

The documentation for this struct was generated from the following file:

- /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/[phantom.cpp](#)

13.28 ebvolcor::Results Struct Reference

Struct used to collect and output results about a volume correction run.

```
#include <eb_volcor.h>
```

Public Member Functions

- [Results \(\)](#)
- [Results \(Options *opts\)](#)
- [void outputResults \(string extra=""\)](#)

Public Attributes

- bool `success`
- EGS_Float `time`
- double `density`
- double `npoints`
- EGS_Float `bounds_volume`
- EGS_Float `other_volume`
- map< int, vector< int > > `regions_corrected`

13.28.1 Detailed Description

Struct used to collect and output results about a volume correction run.

Definition at line 202 of file eb_volcor.h.

13.28.2 Constructor & Destructor Documentation

13.28.2.1 ebvolcor::Results::Results () [inline]

Definition at line 213 of file eb_volcor.h.

13.28.2.2 ebvolcor::Results::Results (Options * *opts*) [inline]

Definition at line 221 of file eb_volcor.h.

13.28.3 Member Function Documentation

13.28.3.1 void ebvolcor::Results::outputResults (string *extra* = " ") [inline]

Definition at line 230 of file eb_volcor.h.

13.28.4 Member Data Documentation

13.28.4.1 EGS_Float ebvolcor::Results::bounds_volume

what was the volume of the bounding shape

Definition at line 208 of file eb_volcor.h.

13.28.4.2 double ebvolcor::Results::density

what was the density of points used for the VC

Definition at line 206 of file eb_volcor.h.

13.28.4.3 double ebvolcor::Results::npoints

what was the total number of points used for the VC

Definition at line 207 of file eb_volcor.h.

13.28.4.4 EGS_Float ebvolcor::Results::other_volume

what was the estimated volume of the inscribed geometry

Definition at line 209 of file eb_volcor.h.

13.28.4.5 map<int, vector<int> > ebvolcor::Results::regions_corrected

Definition at line 211 of file eb_volcor.h.

13.28.4.6 bool ebvolcor::Results::success

did the volume correction succeed?

Definition at line 204 of file eb_volcor.h.

13.28.4.7 EGS_Float ebvolcor::Results::time

how long (s) did the volume correction take

Definition at line 205 of file eb_volcor.h.

The documentation for this struct was generated from the following file:

- /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/[eb_volcor.h](#)

13.29 Subscriber Class Reference

```
#include <pubsub.h>
```

Inheritance diagram for Subscriber:

Public Member Functions

- virtual [~Subscriber \(\)](#)
- virtual [void update \(EB_Message message, void *what=0\)=0](#)

13.29.1 Detailed Description

Definition at line 71 of file pubsub.h.

13.29.2 Constructor & Destructor Documentation

13.29.2.1 virtual Subscriber::~Subscriber() [inline], [virtual]

Definition at line 73 of file pubsub.h.

13.29.3 Member Function Documentation

13.29.3.1 virtual void Subscriber::update (EB_Message message, void * what = 0) [pure virtual]

Implemented in [BaseSpectrumScorer](#), [EB_Phantom](#), [EnergyScoringStats](#), [PHSPControl](#), and [Latch](#).

The documentation for this class was generated from the following file:

- /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/[pubsub.h](#)

13.30 SurfaceCountSpectrum Class Reference

A class for scoring a histogram of the number of particles escaping a source geometry.

```
#include <spec_scoring.h>
```

Inheritance diagram for SurfaceCountSpectrum:

Collaboration diagram for SurfaceCountSpectrum:

Public Member Functions

- [SurfaceCountSpectrum](#) (EGS_Input *input, EGS_BaseSource *src, GeomInfo *ginfo, Publisher *publisher)
- virtual void [score](#) (EB_Message message, void *data=0)

Private Member Functions

- void [getResult](#) (int bin, EGS_Float &r, EGS_Float &dr)
set r & dr to result/uncertainty for given bin. Normalization can be done in this routine
- string [getTitle](#) () const
- string [getSubTitle](#) () const
- string [getYAxisLabel](#) () const
- void [outputTotal](#) ()
- string [getFileExtension](#) () const

Additional Inherited Members

13.30.1 Detailed Description

A class for scoring a histogram of the number of particles escaping a source geometry.

Sample input:

```
:start spectrum scoring:  
    type = surface count  
    particle type = photon  
    minimum energy = 0.001  
    maximum energy = 1.00  
    number of bins = 1000  
    output format = xmgr  
:stop spectrum scoring:
```

Definition at line 414 of file spec_scoring.h.

13.30.2 Constructor & Destructor Documentation

13.30.2.1 **SurfaceCountSpectrum::SurfaceCountSpectrum (EGS_Input * *input*, EGS_BaseSource * *src*, GeomInfo * *ginfo*, Publisher * *publisher*) [inline]**

Definition at line 440 of file spec_scoring.h.

13.30.3 Member Function Documentation

13.30.3.1 **string SurfaceCountSpectrum::getFileExtension () const [inline], [private], [virtual]**

Reimplemented from [BaseSpectrumScorer](#).

Definition at line 433 of file spec_scoring.h.

13.30.3.2 **void SurfaceCountSpectrum::getResult (int *bin*, EGS_Float & *r*, EGS_Float & *dr*) [private], [virtual]**

set r & dr to result/uncertainty for given bin. Normalization can be done in this routine

Reimplemented from [BaseSpectrumScorer](#).

Definition at line 453 of file spec_scoring.cpp.

13.30.3.3 **string SurfaceCountSpectrum::getSubTitle () const [inline], [private], [virtual]**

Reimplemented from [BaseSpectrumScorer](#).

Definition at line 423 of file spec_scoring.h.

13.30.3.4 `string SurfaceCountSpectrum::getTitle () const` [inline], [private], [virtual]

Reimplemented from [BaseSpectrumScorer](#).

Definition at line 419 of file `spec_scoring.h`.

13.30.3.5 `string SurfaceCountSpectrum::getYAxisLabel () const` [inline], [private], [virtual]

Reimplemented from [BaseSpectrumScorer](#).

Definition at line 427 of file `spec_scoring.h`.

13.30.3.6 `void SurfaceCountSpectrum::outputTotal ()` [private], [virtual]

Reimplemented from [BaseSpectrumScorer](#).

Definition at line 462 of file `spec_scoring.cpp`.

13.30.3.7 `void SurfaceCountSpectrum::score (EB_Message message, void * data = 0)` [virtual]

override in derived classes to do scoring

Implements [BaseSpectrumScorer](#).

Definition at line 438 of file `spec_scoring.cpp`.

The documentation for this class was generated from the following files:

- /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/[spec_scoring.h](#)
- /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/[spec_scoring.cpp](#)

13.31 ebvolcor::VolumeCorrector Class Reference

An object for controlling the volume correction routine.

```
#include <eb_volcor.h>
```

Collaboration diagram for ebvolcor::VolumeCorrector:

Public Member Functions

- `VolumeCorrector (EGS_Input *volcor_input, vector< EB_Phantom * > phantoms, EGS_BaseGeometry *base_geom, GeomInfo *geom_info, vector< EGS_AffineTransform * > transforms=vector< EGS_AffineTransform * >())`
- `~VolumeCorrector ()`
- `Results runSourceCorrection (EB_TimingTree &timer)`
- `Results runGeneralCorrection (EB_TimingTree &timer)`
- `FileResults runFileCorrection (EB_TimingTree &timer)`

Private Member Functions

- `void setupOptions ()`
- `double correctPhantomVolumesForSources ()`
- `double correctGeneralVolumes ()`
- `void applyVolumeCorrections (Options *options, HitCounterT hit_counter)`
- `map< string, int > loadFileVolumeCorrections ()`

Private Attributes

- `EGS_Input * input`
- `Options * source_opts`
- `Options * gen_opts`
- `map< string, string > phantom_files`
- `vector< EB_Phantom * > phantoms`
- `EGS_BaseGeometry * base_geom`
- `GeomInfo * ginfo`
- `vector< EGS_AffineTransform * > transforms`
- `EGS_AffineTransform * base_transform`
- `EGS_AffineTransform * base_transform_inv`

13.31.1 Detailed Description

An object for controlling the volume correction routine.

See [EB_Application::correctVolumes](#) for usage.

Definition at line 280 of file eb_volcor.h.

13.31.2 Constructor & Destructor Documentation

13.31.2.1 ebvolcor::VolumeCorrector::VolumeCorrector (EGS_Input * volcor_input, vector< EB_Phantom * > phantoms, EGS_BaseGeometry * base_geom, GeomInfo * geom_info, vector< EGS_AffineTransform * > transforms = vector<EGS_AffineTransform *>()) [inline]

Definition at line 302 of file eb_volcor.h.

13.31.2.2 ebvolcor::VolumeCorrector::~VolumeCorrector () [inline]

Definition at line 322 of file eb_volcor.h.

13.31.3 Member Function Documentation

13.31.3.1 void ebvolcor::VolumeCorrector::applyVolumeCorrections (Options * options, HitCounterT hit_counter) [private]

Definition at line 364 of file eb_volcor.cpp.

13.31.3.2 `double ebvolcor::VolumeCorrector::correctGeneralVolumes()` [private]

Definition at line 277 of file eb_volcor.cpp.

13.31.3.3 `double ebvolcor::VolumeCorrector::correctPhantomVolumesForSources()` [private]

Definition at line 317 of file eb_volcor.cpp.

13.31.3.4 `map< string, int > ebvolcor::VolumeCorrector::loadFileVolumeCorrections()` [private]

Definition at line 415 of file eb_volcor.cpp.

13.31.3.5 `FileResults ebvolcor::VolumeCorrector::runFileCorrection(EB_TimingTree & timer)` [inline]

Definition at line 376 of file eb_volcor.h.

13.31.3.6 `Results ebvolcor::VolumeCorrector::runGeneralCorrection(EB_TimingTree & timer)` [inline]

Definition at line 356 of file eb_volcor.h.

13.31.3.7 `Results ebvolcor::VolumeCorrector::runSourceCorrection(EB_TimingTree & timer)` [inline]

Definition at line 335 of file eb_volcor.h.

13.31.3.8 `void ebvolcor::VolumeCorrector::setupOptions()` [private]

Definition at line 236 of file eb_volcor.cpp.

13.31.4 Member Data Documentation

13.31.4.1 `EGS_BaseGeometry* ebvolcor::VolumeCorrector::base_geom` [private]

Definition at line 287 of file eb_volcor.h.

13.31.4.2 `EGS_AffineTransform* ebvolcor::VolumeCorrector::base_transform` [private]

Definition at line 291 of file eb_volcor.h.

13.31.4.3 `EGS_AffineTransform* ebvolcor::VolumeCorrector::base_transform_inv` [private]

Definition at line 292 of file eb_volcor.h.

13.31.4.4 **Options*** `ebvolcor::VolumeCorrector::gen_opts` [private]

Definition at line 284 of file eb_volcor.h.

13.31.4.5 **GeomInfo*** `ebvolcor::VolumeCorrector::ginfo` [private]

Definition at line 289 of file eb_volcor.h.

13.31.4.6 **EGS_Input*** `ebvolcor::VolumeCorrector::input` [private]

Definition at line 282 of file eb_volcor.h.

13.31.4.7 **map<string, string>** `ebvolcor::VolumeCorrector::phantom_files` [private]

Definition at line 285 of file eb_volcor.h.

13.31.4.8 **vector<EB_Phantom *>** `ebvolcor::VolumeCorrector::phantoms` [private]

Definition at line 286 of file eb_volcor.h.

13.31.4.9 **Options*** `ebvolcor::VolumeCorrector::source_opts` [private]

Definition at line 283 of file eb_volcor.h.

13.31.4.10 **vector<EGS_AffineTransform *>** `ebvolcor::VolumeCorrector::transforms` [private]

Definition at line 290 of file eb_volcor.h.

The documentation for this class was generated from the following files:

- /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/[eb_volcor.h](#)
- /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/[eb_volcor.cpp](#)

Chapter 14

File Documentation

14.1 doc_utils.py File Reference

Namespaces

- [doc_utils](#)

Functions

- def [doc_utils.find_file_descriptions](#) (dir_path, include_key=None)

14.2 egs_brachy.dox File Reference

14.3 egs_brachy.md File Reference

14.4 gen_docs.py File Reference

Namespaces

- [gen_docs](#)

Functions

- def [gen_docs.gen_docs](#) ()

Variables

- list [gen_docs.modules](#)

14.5 gen_geom.py File Reference

Namespaces

- `gen_geom`

Functions

- def `gen_geom.get_readme` (dir_path)
- def `gen_geom.get_filetype_links` (dir_path, extension)
- def `gen_geom.get_images` (dir_path)
- def `gen_geom.gen_geom_docs` (droot, title, is_sources=False)
- def `gen_geom.gen_docs` (fname)

Variables

- `gen_geom.root = os.path.join(.., "lib")`
- `gen_geom.abs_root = os.path.abspath(root)`
- `gen_geom.geom = os.path.join(abs_root, "geometry")`
- string `gen_geom.outfile = "geom.md"`

14.6 gen_media.py File Reference

Namespaces

- `gen_media`

Functions

- def `gen_media.get_pegless_materials` ()
- def `gen_media.get_muen` ()
- def `gen_media.gen_docs` (fname)

Variables

- `gen_media.root = os.path.join(.., "lib")`
- `gen_media.abs_root = os.path.abspath(root)`
- `gen_media.media_file = os.path.join(abs_root, "media", "material.dat")`
- `gen_media.muen_dir = os.path.join(abs_root, "muen")`
- string `gen_media.outfile = "media.md"`

14.7 gen_specs.py File Reference

Namespaces

- `gen_specs`

Functions

- def `gen_specs.get_spectra ()`
- def `gen_specs.gen_docs (fname)`

Variables

- `gen_specs.root = os.path.join(.., "lib")`
- `gen_specs.abs_root = os.path.abspath(root)`
- `gen_specs.specs = os.path.join(abs_root, "spectra")`
- string `gen_specs.outfile = "spectra.md"`

14.8 gen_tests.py File Reference

Namespaces

- `gen_tests`

Functions

- def `gen_tests.get_tests ()`
- def `gen_tests.gen_docs (fname)`

Variables

- `gen_tests.root_tests = os.path.join(.., "eb_tests")`
- `gen_tests.globber = os.path.join(root_tests, "*", "test.py")`
- string `gen_tests.outfile = "tests.md"`

14.9 gen_transport.py File Reference

Namespaces

- `gen_transport`

Functions

- def `gen_transport.gen_docs (fname)`

Variables

- `gen_transport.root = os.path.join(.., "lib")`
- `gen_transport.abs_root = os.path.abspath(root)`
- `gen_transport.transport = os.path.join(abs_root, "transport")`
- string `gen_transport.outfile = "transport.md"`

14.10 geom.md File Reference

14.11 media.md File Reference

14.12 spectra.md File Reference

14.13 tests.md File Reference

14.14 transport.md File Reference

14.15 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/array_sizes.h File Reference

Macros

- `#define MXMED 50`
- `#define MXSTACK 200000`

14.15.1 Macro Definition Documentation

14.15.1.1 `#define MXMED 50`

Definition at line 57 of file array_sizes.h.

14.15.1.2 `#define MXSTACK 200000`

Definition at line 58 of file array_sizes.h.

14.16 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_ieaphsp_source/docs/eb_ieaphsp_source.dox File Reference

14.17 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/egs_brachy/eb_ieaphsp_source/docs/output/html File Reference

Functions

- function `toggleVisibility` (`linkObj`)
- function `updateStripes` ()
- function `toggleLevel` (`level`)
- function `toggleFolder` (`id`)
- function `toggleInherit` (`id`)

14.17.1 Function Documentation

14.17.1.1 function toggleFolder (*id*)

Definition at line 49 of file dynsections.js.

14.17.1.2 function toggleInherit (*id*)

Definition at line 84 of file dynsections.js.

14.17.1.3 function toggleLevel (*level*)

Definition at line 28 of file dynsections.js.

14.17.1.4 function toggleVisibility (*linkObj*)

Definition at line 1 of file dynsections.js.

14.17.1.5 function updateStripes ()

Definition at line 22 of file dynsections.js.

14.18 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_ieaphsp_source/docs/output/html

File Reference

Functions

- **b extend** ({cssHooks:{opacity:{get:function(bw, bv){**if**(bv){var e=**Z**(bw,"opacity","opacity");return e=="?"1"**else**{return bw.style.opacity}}}}, cssNumber:{fillOpacity:true, fontWeight:true, lineHeight:true, opacity:true, orphans:true, widows:true, zIndex:true, zoom:true}, cssProps:{"float":b.support.cssFloat?"cssFloat":"styleFloat"}, style:function(bx, bw, bD, by){**if**(!bx||bx.nodeType==3||bx.nodeType==8||!bx.style){return}var bb, bC, bz=b.camelCase(bw), bv=bx.style, bE=b.cssHooks[bz];bw=b.cssProps[bz]||bz;**if**(b**D!=L**){bC=typeof bD;**if**(bC=="string"&&(bB=l.exec(bD))){bD=(+**(bB[1]+1)*+bB[2])+parseFloat(**b.css**(bx, bw));bC="number"}**if**(bD==null||bC=="number"&&isNaN(bD)){return}**if**(bC=="number"&&!b.cssNumber[bz]){bD+="px"}**if**(!bE||bE||(bD=bE.set(bx, bD))!=**L**){try{bv[bw]=bD}catch(bA){}}**else**{**if**(bE &&"get"in bE &&(bB=bE.get(bx, false, bv))!=**L**){return bB}return bv[bw]}}, css:function(by, bx, bv){var bw, e;bx=b.camelCase(bx);e=b.cssHooks[bx];bx=b.cssProps[bx]||bx;**if**(bx=="cssFloat"){bx="float"}**if**(e &&"get"in e &&(bw=e.get(by, true, bv))!=**L**){return bw}**else**{**if**(Z){return Z(by, bx)}}}, swap:function(bx, bw, by){var e={};for(var bv in bw){e[bv]=bx.style[bv];bx.style[bv]=bw[bv];by.call(bx);for(bv in bw){bx.style[bv]=e[bv]}}}}**
- **b each** (["height", "width"], function(bv, e){b.cssHooks[e]={get:function(by, bx, bw){var bz;**if**(bx){**if**(by.offsetWidth!=0){return p(by, e, bw)}**else**{b.swap(by, a7, function(){bz=p(by, e, bw)});return bz}}, set:function(bw, bx){**if**(bc.test(bx)){bx=parseFloat(bx);**if**(bx>=0){return bx+"px"}**else**{return bx}}}}})
- **if** (!b.support.opacity)
- **b** (function(){**if**(!b.support.reliableMarginRight){b.cssHooks.marginRight={get:function(bw, bv){var e;b.swap(bw,{display:"inline-block"}, function(){**if**(bv){e=**Z**(bw,"margin-right","marginRight")}**else**{e=bw.style.marginRight}});return e}}};})
- **if** (av.defaultView &&av.defaultView.getComputedStyle)

- **if** (av.documentElement.currentStyle)
- function **p** (by, bw, bv)
- **if** (b.expr && b.expr.filters)
- function **bh** ()
- function **at** ()
- function **a0** (bv, e)
- **b each** ({slideDown:a0("show", 1), slideUp:a0("hide", 1), slideToggle:a0("toggle", 1), fadeIn:{opacity:"show"}, fadeOut:{opacity:"hide"}, fadeToggle:{opacity:"toggle"}}, function(e, bv){b.fn[e]=function(bw, by, bx){return this.animate(bv, bw, by, bx)}})
- **b extend** (b.fx,{tick:function(){var bw, bv=b.timers, e=0;for(;e< bv.length;e++){bw=bv[e];**if**(!bw()&&bv[e]===bw){bv.splice(e--, 1)}**if**(!bv.length){b.fx.stop()}}, interval:13, stop:function(){clearInterval(a3);a3=null}, speeds:{slow:600, fast:200, _default:400}, step:{opacity:function(e){b.style(e.elem,"opacity", e.now)}, _default:**function**(e){**if**(e.elem.style &&e.elem.style[e.prop]!=null){e.elem.style[e.prop]=e.now+e.unit}**else**{e.elem[e.prop]=e.now}}}}})
- function **x** (bx)
- **if** ("getBoundingClientRect" in av.documentElement)
- function **aK** (e)
- **if** (typeof define==="function"&&define.amd &&**define.amd.jQuery**)

Variables

- function **bb**
- function **L** {var av=bb.document,bu=bb.navigator,bl=bb.location
- var **b**
- var **au** =/opacity=([^"]*)/,z=/([A-Z]|^ms)/g,bc=/^-?\d+(?:px)?\$/i,bn=/^-?\d/,l=/^([^-]+)([^-]\.\de]+)/,a7={position :"absolute",visibility:"hidden",display:"block"},an=["Left","Right"],a1=["Top","Bottom"],Z,al,aX
- **b fn css** =function(e,bv){**if**(arguments.length==2&&bv===**L**){return this}return b.access(this,e,bv,true,function(bx,bw,by){return by!==**L**?b.style(bx,bw,by):b.css(bx,bw)})}
- **b curCSS** =**b.css**
- **Z** =al||aX
- var **k** =/%20/g
- var **ap** =/\n\$/
- var **bs** =/\r?\n/g
- var **bq** =/#.*\$/
- var **aD** =/^(.*):[\t]*([^\r\n]*)\r?\$/mg
- var **aZ** =/^(:color|date|datetime|datetime-local|email|hidden|month|**number**|password|range|search|tel|text|time|url|week)\$/**i**
- var **aM** =/^(:about|app|app\storage|.+extension|file|res|widget)\$/**i**
- var **aQ** =/^(:GET|HEAD)\$/**i**
- var **c**
- **b fx prototype** ={update:function(){**if**(this.options.step){this.options.step.call(this.elem,this.now,this)}(b.fx.**step**[this.prop]||b.fx.step._default)(this)},cur:function(){**if**(this.elem[this.prop]!=null&&(!this.elem.style||this.elem.style[this.prop]==null)){return this.elem[this.prop]}var e,bv=**b.css**(this.elem,this.prop);return isNaN(e=parseFloat(bv))?!bv||bv=="auto"?0:bv:e,custom:function(bz,bw,bx){var e=this,bw=b.fx>this.startTime=a4||bh();this.end=by;this.now=this.start=bz;this.pos=this.state=0;this.unit=bw||this.unit||(b.cssthis.prop)?"":"px");function bv(bA){return e.step(bA)}bv.queue=this.options.queue;bv.elem=this.elem;bv.saveState=function(){**if**(e.options.hide&&b._data(e.elem,"fxshow"+e.prop)===**L**){b._data(e.elem,"fxshow"+e.prop,e.start)}**if**(bv()&&b.timers.push(bv)&&!a3){a3=setInterval(bw.tick,bw.interval)}},show:function(){var e=b._data(this.elem,"fxshow"+this.prop);this.options.orig[this.prop]=e||b.style(this.elem,this.prop);this.options.show=true;**if**(e!==**L**){this.custom(this.cur(),e)}**else**{this.custom(this.prop=="width"||this.prop=="height"?1:0,this.cur())}**if**(this.elem.show(),hide:function(){this.options.orig[this.prop]=b._data(this.elem,"fxshow"+this.prop)||b.style(this.elem,this.prop);this.options.hide=true;this.custom(this.cur(),0)},step:function(by){var

```

bA,bB,bv,bx=a4||bh(),e=true,bz=this.elem,bw=this.options;if(by||bx>=bw.duration+this.startTime){this.←
now=this.end;this.pos=this.state=1;this.update();bw.animatedProperties[this.prop]=true;for(bA in bw.←
animatedProperties){if(bw.animatedProperties[bA]!==true){e=false}}if(e){if(bw.overflow!=null&&!b.support.←
shrinkWrapBlocks){b.each(["","X","Y"],function(bC,bD){bz.style["overflow"+bD]=bw.overflow[bC]})}if(bw.←
hide){bz.hide()}if(bw.hide||bw.show){for(bA in bw.animatedProperties){b.style(bz,bA,bw.orig[bA]);b.←
removeData(bz,"fxshow"+bA,true);b.removeData(bz,"toggle"+bA,true)}}bw=bw.complete;if(bv){bw.complete=false;bv.←
call(bz)}}return false}else{if(bw.duration==Infinity){this.now=bx}else{bB=bx-this.startTime;this.state=bB/bw.←
duration;this.pos=b.easing[bw.animatedProperties[this.prop]](this.state,bB,0,1,bw.duration);this.now=this.←
start+((this.end-this.start)*this.pos)}this.update()}return true}
• var V =/^t(?:able|d|h)$/
• var ad =/^(:body|html)$/
• else {b.fn.offset=function(bF){var bz=this[0];if(bF){return this.each(function(bG){b.offset.setOffset(this,bF,bG))})}if(!bz||!bz.←
ownerDocument){return null}if(bz==bz.ownerDocument.body){return b.offset.bodyOffset(bz)}var bC,bw=bz.←
offsetParent,bv=bz,bE=bz.ownerDocument,bx=bE.documentElement,bA=bE.body,bB=bE.defaultView,e=bB?b.←
B.getComputedStyle(bz,null):bz.currentStyle,bD=bz.offsetTop,by=bz.offsetLeft;while((bz=bz.parentNode)&&bz!=bA&&bz!=b.←
support.fixedPosition&&e.position=="fixed"){break}bC=bB?bB.getComputedStyle(bz,null):bz.current.←
Style;bd=bz.scrollTop;by-=bz.scrollLeft;if(bz==bw){bD+=bz.offsetTop;by+=bz.offsetLeft;if(b.support.←
doesNotAddBorder&&!(b.support.doesAddBorderForTableAndCells&&V.test(bz.nodeName))){bD+=parse.←
Float(bC.borderTopWidth)||0;by+=parseFloat(bC.borderLeftWidth)||0}bv=bw;bw=bz.offsetParent}if(b.←
support.subtractsBorderForOverflowNotVisible&&bC.overflow!="visible"){bD+=parseFloat(bC.borderTop.←
Width)||0;by+=parseFloat(bC.borderLeftWidth)||0}e=bC;if(e.position=="relative"||e.position=="static"){bD+=b.←
A.offsetTop;by+=bA.offsetLeft}if(b.support.fixedPosition&&e.position=="fixed"){bD+=Math.max(bx.scroll.←
Top,bA.scrollTop);by+=Math.max(bx.scrollLeft,bA.scrollLeft))}return{top:bD,left:by}}}b.offset={bodyOffset.←
:function(e){var bw=e.offsetTop,bv=e.offsetLeft;if(b.support.doesNotIncludeMarginInBodyOffset){bw+=parse.←
Float(b.css(e,"marginTop"))||0;bv+=parseFloat(b.css(e,"marginLeft"))||0}return{top:bw,left:bv}},setOffset.←
:function(bx,bG,bA){var bB=b.css(bx,"position");if(bB=="static"){bx.style.position="relative"}var bz=b(bx),bv=bz.←
offset(),e=b.css(bx,"top"),bE=b.css(bx,"left"),bF=(bB=="absolute"||bB=="fixed")&&b.inArray("auto",[e,bE])>-1,bD={},bC={},bw,by;if(bF){bC=bz.position();bw=bC.top;by=bC.left}else{bw=parseFloat(e)||0;by=parse.←
Float(bE)||0}if(b.isFunction(bG)){bG=bG.call(bx,bA,bv)}if(bG.top!=null){bD.top=(bG.top-bv.top)+bw}if(bG.←
left!=null){bD.left=(bG.left-bv.left)+by}if("using" in bG){bG.using.call(bx,bD)}else{bz.css(bD)}}}
• bb jQuery =bb.$=b
• window

```

14.18.1 Function Documentation

14.18.1.1 function a0 (bv, e)

Definition at line 30 of file jquery.js.

14.18.1.2 function aK (e)

Definition at line 30 of file jquery.js.

14.18.1.3 function at ()

Definition at line 30 of file jquery.js.

14.18.1.4 b (function(){if(!b.support.reliableMarginRight){b.cssHooks.marginRight={get:function(bw, bv){var.← e;b.swap(bw,{display:"inline-block"}, function(){if(bv){e=Z(bw,"margin-right","marginRight")}else{e=bw.style.← marginRight}});return e}}}))

14.18.1.5 function bh ()

Definition at line 30 of file jquery.js.

```

14.18.1.6 b each ( function(bv, e){b.cssHooks[e]={get:function(by, bx, bw){var bz;if(bx){if(by.offsetWidth!==0){return p(by, e, bw)}else{b.swap(by, a7, function(){bz=p(by, e, bw)}))return bz}, set:function(bw, bx){if(bc.test(bx)){bx=parseFloat(bx);if(bx >=0){return bx+"px"}else{return bx}}}} } )

14.18.1.7 b each ( {slideDown:a0("show", 1), slideUp:a0("hide", 1), slideToggle:a0("toggle", 1), fadeIn:{opacity:"show"}, fadeOut:{opacity:"hide"}, fadeToggle:{opacity:"toggle"}}, function(e, bv){b.fn[e]=function(bw, by, bx){return this.animate(bv, bw, by, bx)}} )

14.18.1.8 b fn extend ( {cssHooks:{opacity:{get:function(bw, bv){var e=Z(bw,"opacity","opacity");return e=="?":e:else{return bw.style.opacity}}}}, cssNumber:{fillOpacity:true, fontWeight:true, lineHeight:true, opacity:true, orphans:true, widows:true, zIndex:true, zoom:true}, cssProps:{"float":b.support.cssFloat?"cssFloat"← :"styleFloat"}, style:function(bx, bw, bD, by){if(!bx||bx.nodeType==3||bx.nodeType==8||!bx.style){return}var bB, bC, bz=b.camelCase(bw), bv=bx.style, bE=b.cssHooks[bz];bw=b.cssProps[bz]||bz;if(bD!=L){bC=typeof bD;if(bC=="string"&&(bB=l.exec(bD))){bD=(+bB[1]+1)*+bB[2])+parseFloat(b.css(bx, bw));bC="number"}if(bD=null||bC=="number"&&isNaN(bD)){return}if(bC=="number"&&!b.css← Number[bz])bD+="px"}if(!bE||!("set"in bE)||((bD=bE.set(bx, bD))!=L){try{bv[bw]=bD}catch(bA){}})else{if(bE &&"get"in bE &&(bB=bE.get(bx, false, by))!=L){return bB}return bv[bw]}}, css:function(by, bx, bv){var bw, e;bx=b.camelCase(bx);e=b.cssHooks[bx];bx=b.cssProps[bx]||bx;if(bx=="cssFloat"){bx="float"}if(e &&"get"in e &&(bw=e.get(by, true, bv))!=L){return bw}else{if(Z){return Z(by, bx)}}, swap:function(bx, bw, by){var e={};for(var bv in bw){e[bv]=bx.style[bv];bx.style[bv]=bw[bv]}by.call(bx);for(bv in bw){bx.style[bv]=e[bv]}} } )

```

14.18.1.9 b extend (b, fx, {tick:function(){var bw, bv=b.timers, e=0;for(;e< bv.← length;e++){bw=bv[e];if(!bw()&&bv[e]===bw){bv.splice(e--, 1)}if(!bv.length){b.fx.stop()}}}, interval:13, stop:function(){clearInterval(a3);a3=null}, speeds:{slow:600, fast:200, _default:400}, step:{opacity:function(e){b.style(e.elem,"opacity", e.now)}, _default:function(e){if(e.elem.style &&e.elem.style[e.prop]!=null){e.elem.style[e.prop]=e.now+e.unit}else{e.elem[e.prop]=e.now}}}})

14.18.1.10 if (!b.support.opacity)

Definition at line 28 of file jquery.js.

14.18.1.11 if (av.defaultView &&av.defaultView. getComputedStyle)

Definition at line 28 of file jquery.js.

14.18.1.12 if (av.documentElement. currentStyle)

Definition at line 28 of file jquery.js.

14.18.1.13 if (b.expr &&b.expr. filters)

Definition at line 29 of file jquery.js.

14.18.1.14 if (typeof define == "function" &&define.amd&&define.amd.jQuery)

Definition at line 30 of file jquery.js.

14.18

/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_ieaphsp_source/docs/output/html/jquery.js

File Reference

231

14.18.1.15 if ("getBoundingClientRect" in av. *documentElement*)

Definition at line 30 of file jquery.js.

14.18.1.16 function p (*by*, *bw*, *bv*)

Definition at line 28 of file jquery.js.

14.18.1.17 function x (*bx*)

Definition at line 30 of file jquery.js.

14.18.2 Variable Documentation

14.18.2.1 var aD =/[^](.*?):[\t]*([^\r\n]*)\r?\$/mg

Definition at line 29 of file jquery.js.

14.18.2.2 var ad =/[^](?:body|html)\$/i

Definition at line 30 of file jquery.js.

14.18.2.3 var aM =/[^](?:about|app|app-storage|.+extension|file|res|widget):\$/

Definition at line 29 of file jquery.js.

14.18.2.4 var ap =\[\]\$

Definition at line 29 of file jquery.js.

14.18.2.5 var aQ =/[^](?:GET|HEAD)\$/

Definition at line 29 of file jquery.js.

14.18.2.6 var au =/opacity=[(\^)]*/z=/(A-Z)|^ms/g,bc=/^ - ?\d+(?:px)?\$/i, bn=/^ - ?\d/, l=/^([l-+])=(l-+.de+)/, a7={position : "absolute", visibility:"hidden", display:"block"}, an=["Left","Right"], a1=["Top","Bottom"], Z, al, aX

Definition at line 28 of file jquery.js.

**14.18.2.7 var aZ =/[^](?:color|date|datetime|datetime-
local|email|hidden|month|number|password|range|search|tel|text|time|url|week)\$/i**

Definition at line 29 of file jquery.js.

14.18.2.8 var b

Initial value:

```
= (function() {var bF=function(b0,b1){return new bF.fn.init(b0,b1,bD)},bU=bb.jQuery,bH=
  bb.$,bD,bY=/^(?:[^#<]*(<[\w\W]+>)[^>]*$|#([\w\W]+)*$)/,bM=/S/,bI=/^s+/,bE=/\s+/,bA=/^<(\w+)\s*/>(?:</\w+>)?$/,
  bN=/^[\],:{}\s]*$/,bW=/\((?:[\w\W]+bfnrz|u[0-9a-fA-F]{4})/g,bP=/^["\n\r]*["\n\r]*[true|false|null|-?]\d+(?:\.\d*)?:(?:[eE][+\-]?d+)/g,bJ=/^(?:\s*[:]|\s*+/g,by=/(webkit)[ /,bR=/^(opera)(?:.*version)?[ /]([\w.+]"/,bQ=/(msie)([\w.+]"/,bS=/(mozilla)(?:.*rv:([\w.+]"))?,bB=-([a-z|[0-9])/g,bZ=/^-\ms-/,
  bT=function(b0,b1){return(b1+"").toUpperCase()},bX=bu.userAgent,bV,bC,e,bL=Object.prototype.toString,
  bG=Object.prototype.hasOwnProperty,bz=Array.prototype.push,bk=Array.prototype.slice,bO=String.prototype.trim,
  bv=Array.prototype.indexOf,bx={};bF.fn=bF.prototype={constructor:bF,init:function(b0,b4,b3){var b2,b5,b1,b6,
  if(!b0){return this}if(b0.nodeType){this.context=this[0]=b0;this.length=1;return this}if(b0==="body"&&!b4&&av.body){this.context=av;this[0]=av.body;this.selector=b0;this.length=1;return this}if(typeof b0==="string"){
  if(b0.charCodeAt(0)==<"&b0.charCodeAt(b0.length-1)==>"&b0.length>=3){b2=[null,b0,null]}else{b2=bY.exec(b0)}if(
  b2&&(b2[1]||!b4)){if(b2[1])}{b4=b4 instanceof bF?b4[0]:b4;b6=(b4?b4.ownerDocument||b4:b4);bI=bA.exec(b0);if(
  b1){if(bF.isPlainObject(b4)){b0=[av.createElement(b1[1])];bF.fn.attr.call(b0,b4,true)}else{b0=[b6.
  createElement(b1[1])]}else{b1=bF.buildFragment([b2[1]],b6)];b0=(b1.cacheable?bF.clone(b1.fragment):b1.fragment).
  childNodes}return bF.merge(this,b0)}else{b5=av.getElementById(b2[2]);if(b5&&b5.parentNode){if(b5.id!==b2[2]){
  return b3.find(b0)}this.length=1;this[0]=b5}this.context=av;this.selector=b0;return this}else{if(!b4||b4.jquery){
  return(b4||b3).find(b0)}else{return this.constructor(b4).find(b0)}}}else{if(bF.isFunction(b0)){return b3.
  ready(b0)}if(b0.selector!=L){this.selector=b0.selector;this.context=b0.context}return bF.makeArray(b0,this),
  selector:"",jquery:"1.7.1",length:0,size:function(){return this.length},toArray:function(){return bK.call(
  this,0),get:function(b0){return b0==null?this.toArray():(b0<0?this[this.length+b0]:this[b0])},pushStack:
  function(b1,b3,b0){var b2=this.constructor();if(bF.isArray(b1)){bZ.apply(b2,b1)}else{bF.merge(b2,b1)}b2.
  prevObject=this;b2.context=this.context;if(b3==="find"){b2.selector=this.selector+this.selector?" ":"")+
  b0}else{if((b3){b2.selector=this.selector+"."+b3+"("+b0+")"}return b2},each:function(b1,b0){return bF.each(this,b1,b0)},
  ready:function(b0){bF.bindReady();bC.add(b0);return this},eq:function(b0){b0+=b0;return b0===-1?this.slice(
  b0):this.slice(b0,b0+1)},first:function(){return this.eq(0)},last:function(){return this.eq(-1)},slice:
  function(){return this.pushStack(bK.apply(this,arguments),"slice",bK.call(arguments).join(","))),map:function(b0){
  return this.pushStack(bF.map(this,function(b2,b1){return b0.call(b2,b1,b2)})),end:function(){return this.
  prevObject||this.constructor(null)},push:bZ,sort:[].sort.splice:[].splice},bF.fn.init.prototype=bF.fn.bF,
  extend=bF.fn.extend=function(){var b9,b2,b0,b1,b6,b7,b5=arguments[0]||{},b4=1,b3=arguments.length,b8=false;
  if(typeof b5==="boolean"){b8=b5;b5=arguments[1]||{};b4=2}if(typeof b5!="object"&&!bF.isFunction(b5)){b5={}}if(
  b3==b4){b5=this;--b4}for(;b4<b3;b4++){if((b9=arguments[b4])!=null){for(b2 in b9){b0=b5[b2];b1=b9[b2];
  if(b5==b1){continue}if(b8&&b1&&(bF.isPlainObject(b1)||b6=bF.isArray(b1)))}{if(b6){b6=false;b7=b0&&bF.isArray(b0)?
  b0:[ ]}else{b7=b0&&bF.isPlainObject(b0)}b0:{}}b2=bF.extend(b8,b7,b1)}else{if(b1==-
  L){b5[b2]=b1}}}}return b5};bF.extend({noConflict:function(b0){if(b0.$==bF){bb.$=bH}if(b0&&
  bb.jQuery==bF){bb.jQuery=bU}return bF},isReady:false,readyWait:1,holdReady:function(b0){if(b0){bF.
  readyWait++}else{bF.ready(true)}},ready:function(b0){if((b0==true&&!--bF.readyWait)||!(b0==true&&!
  bF.isReady)){if(av.body){return setTimeout(bF.ready,1)}bF.isReady=true;if(b0==true&&!--bF.readyWait>0){return
  bC.fireWith(av,[bF]);if(bF.fn.trigger("bF").off("ready"))},bindReady:function(){if(bC){return}bC=bF.
  Callbacks("once memory");if(av.readyState==="complete"){return setTimeout(bF.ready,1)}if(av.addEventListener){av.
  addEventListener("DOMContentLoaded",e,false);bb.addEventListener("load",bF.ready,false)}else{if(av.
  attachEvent){av.attachEvent("onreadystatechange",e);bb.attachEvent("onload",bF.ready);var b0=false;try{b0=
  bb.frameElement==null?catch(b1){if(av.documentElement.scrollTop&&b0){bW()}}:isFunction(function(b0{
  return bF.type(b0)=="function"},isArray.isArray||function(b0){return bF.type(b0)=="array"},isWindow:
  function(b0){return b0&&typeof b0==="object"&&!setInterval" in b0},isNumeric:function(b0){return !isNaN(
  parseFloat(b0))},type:function(b0){return b0==null?String(b0):bX.call(b0)||"object"},isPlainObject:
  function(b2){if(!b2||bF.type(b2)!="object"||b2.nodeType||bF.isWindow(b2)){return false}try{if(b2.
  constructor&&!bG.call(b2,"constructor")&&!bG.call(b2.constructor.prototype,"isPrototypeOf")){return
  false}}catch(b1){return false}var b0;for(b0 in b2){return b0==L||bG.call(b2,b0)},isEmptyObject:
  function(b1){for(var b0 in b1){return false}return true},error:function(b0){throw new Error(b0)},parseJSON:
  function(b0){if(typeof b0!="string")return null;b0=bF.trim(b0);if(bb.JSON&&bb.JSON.parse){return
  bb.JSON.parse(b0)}if(bN.test(b0.replace(bW,"@").replace(bJ,""))){return(new Function("return "+b0))()}bF.error("Invalid JSON:
  "+b0)},parseXML:function(b2){var b0,b1;try{if(bb.DOMParser){b1=new DOMParser();b0=b1.parseFromString(b2,
  "text/xml")}}else{b0=new ActiveXObject("Microsoft.XMLDOM");b0.async="false";b0.loadXML(b2)}}catch(b3){b0=
  L}if(!b0||!b0.documentElement||b0.getElementsByTagName("parsererror").length){bF.error("Invalid XML: "+b2)}
  return b0},noop:function(){},globalEval:function(b0){if(b0){if(b0&&Bm.test(b0)){(bb.execScript||function(b0{
  bb["eval"].call(bb,b0))}(b0))}},camelCase:function(b0){return b0.replace(bZ,"ms-").replace(bB,bT)},nodeName:
  function(b1,b0){return b1.nodeName&&b1.nodeName.toUpperCase()==b1.toUpperCase()},each:function(b3,b6,b2){
  var b1,b4=0,b5=b3.length,b0=b5==L||bF.isFunction(b3);if(b2){if(b0){for(b1 in b3){if(b6.apply(b3[b1],b2)==
  false){break}}}else{for(b4<b5){if(b6.apply(b3[b4+1],b2)==false){break}}}else{if(b0){for(b1 in b3){if(b6.call(b3[b1],b4,b3[b4+1])==
  false){break}}}}return b3},trim:b0?function(b0){return b0==null?"":b0.call(b0)}:function(b0){return
  b0==null?"":b0.toString().replace(b1,"").replace(bE,"")},makeArray:function(b3,b1){var b0=b1||[];if(b3!=null){
  var b2=bF.type(b3);if(b3.length==null||b2=="string"||b2=="function"||b2=="regexp"||bF.isWindow(b3)){bZ.
  call(b0,b3)}else{bF.merge(b0,b3)}}return b0},inArray:function(b2,b3,b1){var b0;if(b3){if(bV){return
  bV.call(b3,b2,b1)}b0=b3.length;b1=b1<0?Math.max(0,b0+b1):b1:0;for(;b1<0;b1++){if(b1 in b3&&b3[b1]==b2){return
  b1}}}-1},merge:function(b4,b2){var b3=b4.length,b1=0;if(typeof b2.length=="number"){for(var b0=b2.
  length;b1<0;b1++){b4[b3++]=b2[b1+1]}}b4.length=b3;return b4},grep:
  function(b1,b6,b0){var b2=[],b5,b0=!b0;for(var b3=0,b4=b1.length;b3<b4;b3++){b5=!b6(b1[b3],b3);
  if(b0==!b5){b2.push(b1[b3])}}return b2},map:function(b0,b7,b8){var b5,b6,b4=[],b2=0,b1=b0.length,b3=b0
  instanceof bF||b1==L&&typeof b1=="number"&&(b1>0&&b0[0]&&b0[b1-1])||b1==0||bF.isArray(b0));
  if(b3){for(;b2<b1;b2++){b5=b7(b0
```

```
[b2],b2,b8);if(b5!=null){b4[b4.length]=b5}}else{for(b6 in b0){b5=b7(b0[b6],b6,b8);if(b5!=null){b4[b4.length]=b5}}}return b4.concat.apply([],b4),guid:1,proxy:function(b4,b3){if(typeof b3==="string"){var b2=b4[b3];b3=b4;b4=b2;if(!bFisFunction(b4)){return L}var b0=bK.call(arguments,2),b1=function(){return b4.apply(b3,b0).concat(bK.call(arguments))};b1.guid=b4.guid||b1.guid||bF.guid++;return b1},access:function(b0,b8,b6,b2,b5,b7){var b1=b0.length;if(typeof b8==="object"){for(var b3 in b8){bF.access(b0,b3,b8[b3],b2,b5,b6)}return b0}if(b6==L){b2=b7&&b2&&bFisFunction(b6);for(var b4=0;b4<1;b4++){{b5(b0[b4],b8,b2)b2b6.call(b0[b4],b4,b5(b0[b4],b8),b6,b7)}return b0}return b1?b5(b0[0],b8):L},now:function(){return(new Date()).getTime()},uaMatch:function(b1){b1=b1.toLowerCase();var b0=b0.exec(b1)||bR.exec(b1)||bQ.exec(b1)||b1.indexOf("compatible")<0&&bS.exec(b1)||[];return{browser:b0[1]||'',version:b0[2]||''}},sub:function(){function b0(b3,b4){return new b0.fn.init(b3,b4)}b0.fn=b0.prototype=this();b0.fn.constructor=b0;b0.sub=this.sub;b0.fn.init=function b2(b3,b4){if(b4&&b4 instanceof bF&&(b4 instanceof b0)){b4=b0(b4)}return bF.fn.init.call(this,b3,b4,b1)};b0.fn.init.prototype=b0.fn;var b1=b0(av);return b0,browser:{}}};bF.each("Boolean Number String Function Array Date RegExp Object".split(" "),function(b1,b0){bx["[object "+b0+"]"] = b0.toLowerCase()});bV=bF.uaMatch(bX);if(bV.browser){bF.browser[bV.browser]=true;bF.browser.version=bV.version;if(bF.browser.webkit){bF.browser.safari=true}if(bM.test("\x0A")){bI=/[\s\xA0]+/;bE=/[\s\xA0]+$/;bD=bF(av);if(av.addEventListener){e=function(){av.removeEventListener("DOMContentLoaded",e,false);bF.ready()}else{if(av.attachEvent){e=function(){if(av.readyState==="complete"){av.detachEvent("onreadystatechange",e);bF.ready()}}}}function bw(){if(bF.isReady){return}try{av.documentElement.doScroll("left")}{catch(b0){setTimeout(bw,1);return}}bF.ready()}};var a2={};function X(e){var bv=a2[e]={},bw,bx;e=e.split(/\s+/);for(bw=0,bx=e.length;bw<bx;bw++){bv[e[bw]]=true}bv.callbacks=function(bw){bw=b2[bw]||X(bw)};var bB=[],bx,by,bv,bz,bA,bE=function(bF){var bG,bJ,bI,bH,bK;for(bG=0,bJ=bF.length;bG<bJ;bG++){bI=bF[bG];bH=b.type(bI);if(bH==="array"){bE(bI)}else{if(bH==="function"){if(!bw.unique||!bD.has(bI)){bB.push(bI)}}}}},e=function(bG,bF){bF=bF||[];bx=!!bG.memory||[bG,bF];by=true;bA=bv[0];bz=bB.length;for(;bB&&bA<bZ;bA++){{if(bB[bA].apply(bG,bF)==false&&bW.stopOnFalse){bx=true;break}}by=false;if(bB[b]{if(!bW.once){if(bC&&bC.length){bx=bC.shift();bD.fireWith(bx[0],bx[1])}}else{if(bx==true){bD.disable()}else{bB=[]}}},bD=add:function(){if(bB){var bF=bB.length;bE(arguments);if(by){bz=bB.length}else{if(bx&&bx==true){bv=bF;e(bx[0],bx[1])}}return this},remove:function(){if(bB){var bF=arguments,bH=0,bI=bF.length;for(;bH<bI;bH++){for(var bG=0,bH<bD.length;bG++){{if(bF[bH]===bB[bG]){if(by){if(bG==bz){bz--;if(bG<bA){bA.splice(bG--,1);if(bw.unique){break}}}}}}return this},has:function(bG){if(bB){var bF=0,bH=bB.length;for(;bF<bD;bF++){if(bG==bB[bF]){return true}}}}return false},empty:function(){bB=[];return this},disable:function(){bB=bC=bx=L;return this},disabled:function(){return !bB},lock:function(){bC=L;if(!bx||bx==true){bD.disable()}return this},locked:function(){return !bC},fireWith:function(bG,bF){if(bC){if(by){if(!bW.once){bC.push([bG,bF])}}else{if(!!(bW.once&&bx)){e(bG,bF)}}}return this},fire:function(){bD.fireWith(this,arguments);return this},fired:function(){return !bx}};return bD};var aJ=[].slice;b.extend({Deferred:function(by){var bx=b.Callbacks("once memory"),bw=b.Callbacks("once memory"),bv=b.Callbacks("memory"),e="pending",bA={resolve:bx,reject:bw,notify:bw},bC={done:bx.add,fail:bw.add,progress:bw.add,state:function(){return e},isResolved:bx.fired,isRejected:bw.fired,then:function(bE,bb,bF){bB.done(bE).fail(bD).progress(bF);return this},always:function(){bB.done.apply(bB,arguments).fail.apply(bB,arguments);return this},pipe:function(bF,bE,bD){return b.Deferred(function(bG){b.each({done:[bF,"resolve"],fail:[bE,"reject"],progress:[bD,"notify"]},{bH=bL[0],bK=bL[1],bJ;if(b.isFunction(bH)){bH[bI](function(){bJ=bH.apply(this,arguments);if(bJ&&bJ.isFunction(bJ.promise)){bJ.promise().then(bG.resolve,bG.reject,bG.notify)}else{bG[bK+"With"]((this==bB?bG:this,[bJ]))}}else{bB[bI](bG[bK]))}}).promise(),promise:function(bE){if(bE==null){bE=bC}else{for(var bD in bC){bE[bD]=bC[bD]}}return bE}},bB=bC.promise({},bz);for(bz in bA){bB[bz]=bA[bz].fire;bB[bz+"With"]=(bA[bz].fireWith)bB.done(function(){e="resolved"},bw.disable,bv.lock).fail(function(){e="rejected"},bx.disable,bv.lock);if(by){by.call(bB,bB)}return bB},when:function(bA){var bx=aJ.call(arguments,0),bv=0,e=bx.length,bB=new Array(e),bw=e,by=e,bC=e<=1&&bA&&bA.isFunction(bA.promise)?bA:b.A.Deferred(),bE=bC.promise();function bD(bF){return function(bG){bx[bF]=arguments.length>1?aJ.call(arguments,0):bG;if(!(--bw)){bC.resolveWith(bC,bx)}}}function bz(bF){return function(bG){bB[bF]=arguments.length>1?aJ.call(arguments,0):bG;bC.notifyWith(bE,bG)}if(e>1){for(;bv<e;bv++){{if(bx[bv]&&bx[bv].promise&&bA.isFunction(bx[bv].promise)){bx[bv].promise().then(bD(bv),bC.reject,bz(bv))}}else{--bw}}if(!bw){bC.resolveWith(bC,bx)}}else{if(bC==bA){bC.resolveWith(bC,e?[bA]:[])}return bE}}};b.support=(function(){var bJ,bI,bF,bG,bx,bE,bA,bD,bz,bK,bB,by,bw,bv=av.createElement("div"),bH=av.documentElement;bw.setAttribute("className","t");bw.innerHTML="<link/><table><a href='/'>";bI=bv.getElementsByTagName("*");bF=bv.getElementsByTagName("a")[0];if(!bI||!bI.length||!bF){return}bG=av.createElement("select");bx=bG.appendChild(av.createElement("option"));bE=bv.getElementsByTagName("input")[0];bJ=leadingWhitespace:(bv.firstChild.nodeType==3),tbody:!bv.getElementsByTagName("tbody").length,htmlSerialize:!bv.getElementsByTagName("link").length,style:/top/.test(bF.getAttribute("style")),hrefNormalized:(bF.getAttribute("href")==="/a"),opacity:/^0.55/.test(bF.style.opacity),cssFloat:!bf.style.cssFloat,checkOn:(bE.value=="on"),optSelected:bx.selected,getAttribute:bv.className!="t",enctype:!av.createElement("form").enctype,html5Clone:av.createElement("nav").cloneNode(true).outerHTML=="#navs</nav>",submitBubbles:true,changeBubbles:true,focusinBubbles:false,deleteExpando:true,noCloneEvent:true,inlineBlockNeedsLayout:false,shrinkWrapBlocks:false,reliableMarginRight:true};bE.checked=true;bJ.noCloneChecked=bE.cloneNode(true).checked;bG.disabled=true;bJ.optDisabled=bx.disabled;try{delete bv.test}catch(bC){bJ.deleteExpando=false}if(!bv.addEventListener&&bv.attachEvent&&bv.fireEvent){bv.attachEvent("onclick",function(){bJ.noCloneEvent=false});bv.cloneNode(true).fireEvent("onclick")}bE=av.createElement("input");bE.value="t";bE.setAttribute("type","radio");bJ.radioValue=bE.value=="t";bE.setAttribute("checked","checked");bv.appendChild(bE);bD=av.createDocumentFragment();bD.appendChild(bv.lastChild);bJ.checkClone=bD.cloneNode(true).cloneNode(true).lastChild.checked;bJ.appendChecked=bE.checked;bD.removeChild(bE);bD.appendChild(bv);bv.innerHTML="#"if(bb.getComputedStyle){bA=av.createElement("div");bA.style.width="0";bA.style.marginRight="0";bv.style.width="2px";bv.appendChild(bA);bJ.reliableMarginRight=(parseInt(bb.getComputedStyle(bA,null)||{marginRight:0}).marginRight,10)||0==0}if(bv.attachEvent){for(by in {submit:1,change:1,focusin:1})(bB="on"+by;bw=(bB in bv);if(!bw){bv.setAttribute(bB,"return");bw=(typeof bv[bB]==="function")}bJ[bY+"Bubbles"]=bw)}bD.removeChild(bv);bD=bG=bx=bA=bv=bE=null;bF(function(){var bM,bU,bV,bT,bN,bO,bL,bS,bR,e,bP,bQ=av.createElement("body")[0];if(!bQ){return}bL=1;bS="position:absolute;top:0;left:0;width:1px;height:1px;margin:0;";bR="visibility:hidden;border:0;";e="style='"+bS+"'border:#000;padding:0';";bP=<div "+e+><div></div></div><table "+e+> cellpadding="0'><tr><td></td></tr></table>;bM=av.createElement("div");bM.style.cssText=bk+"width:0;height:0;position:px";bQ.insertBefore(bM,bQ.firstChild);bv=av.createElement("div");bM.appendChild(bv);bv.innerHTML="<table><tr><td style='padding:0; border:0; display:none'></td><td></td></tr></table>";bz=bv.getElementsByTagName("td");bw=(bz[0].offsetHeight==0);bz[0].style.display="";bz[1].style.display="none";bJ.reliableHiddenOffsets=bw&&(bz[0].offsetHeight==0);bv.innerHTML="#"bv.style.width=bv.style.paddingLeft="1px";bJ.boxModel=bJ.boxModel=bv.offsetWidth==2;if(typeof bv.style.zoom!="undefined")bv.style.display="inline";bv.style.zoom=1;bJ.inlineBlockNeedsLayout=(bv.offsetWidth==2);bv.style.display="";bv.innerHTML=<div style='width:4px;'></div>;bJ.shrinkWrapBlocks=(bv.offsetWidth!=2);bv.style.cssText=bS+bR;bv.innerHTML=bP;bU=bv.firstChild;bv=bU.firstChild;bN=bU.nextSibling.firstChild.firstChild;bO=doesNotAddBorder:(bV.offsetTop==5);doesAddBorderForTableAndCells:(bN.offsetTop==5);bv.style.position="fixed";bv.style.top="20px";bO.fixedPosition=(bV.offsetTop==20||bV.offsetTop==15);bv.style.position=bV.style.top;"bU.style.overflow="hidden";bU.style.position="relative";bO.subtractsBorderForOverflowNotVisible=(bV.offsetTop==5);bO.
```

```

doesNotIncludeMarginInBodyOffset=(bQ.offsetTop!==bL);bQ.removeChild(bM);bv=bM=null;b.extend(bJ,bO});return bJ))();var
{.*})|\[.*\])$/i,aa=/([A-Z])/gi;b.extend({cache:{},uuid:0,expando:"jQuery"+(b.fn.jquery+Math.random()),replace
(/D/g,""),noData:{embed:true,object:"clsid:D27CDB6E-AE6D-11cf-96B8-44453540000",apple:true},hasData:
function(e){e==.nodeType?b.cache[e[b].expando]:e[b].expando;return !!e&&!S(e)},data:function(bx,bv,bz,by){if(!
b.acceptData(bx)){return var bG,bA,bD,bE=b.expando,bC=typeof bv=="string",bF=bx.nodeType,e=bF?
b.cache:bx,bw=bF?bx[bE]:bx[bE]&&e.bE,bB=bv==="events";if((!bw||!e[bw]||(bB&&!bBy&&e[bw].data))&&bC&&bz===
L){return if(!bw){if(bF){bx[bE]->b.uuid}else(bw=bE)}if((!e[bw])if(e[bw]={});if(!bF){e[bw].toJSON-
b.noop};if(typeof bv=="object"||typeof bv=="function"){if(by){e[bw]=b.extend(e[bw],bv)}elsee[bw].data=
b.extend(e[bw].data,bv)}bG=bA=e[bw];if(!by){if(!bA.data){bA.data={}}bA=bA.data}bif(bz!=
L){ba[b.camelCase(bv)]=bz}if(bB&&!ba[bv])return bG.events;if(bC){bD=ba[bv];if(bD==null){bD=bA[
b.camelCase(bv)}}else{bD=bA}return bD},removeData:function(bx,bv,by){if(!b.acceptData(bx)){return var bb,
ba,bz,bC=b.expando,e=bD?bx[bC]:bc;if((!e[bw])return if(bv){bB=by?e[bw]:e[bw].
data;if(bB){if(!b.isArray(bv)){if(bv in bB){bv=[bv]}elseb.camelCase(bv);if(bv in bB){bv=[bv]}else{bv=bv.
split(" ")}}for(ba=0,bz=bv.length;bA<bz;bA++)delete bB[bv[ba]];if((!by)?S(b.isEmptyObject)(bB)){return}if
(!by){delete e[bw].data;if((!S(e[bw]))){return}if(b.support.deleteExpando||!e.setInterval){delete e[bw]}else{
e[bw]=null};if(bD){if(b.support.deleteExpando){delete bx[bC]}elseif(bx.removeAttribute){bx.removeAttribute(
bC)}else{bx[bC]=null}}},_data:function(bv,e,bw){return b.data(bv,e,bw,true)},acceptData:function(bv){if(bv.
nodeName){var e=b.noData[bv.nodeName.toLowerCase()];if(e){return !(====true||bv.getAttribute("classid")!==e)}
return true)},b.fn.extend({data:function(by,ba){var bB,e,bw,bz=null;if(typeof by=="undefined"){if(this.
length){bz=b.data(this[0]);if(this[0].nodeType==!=1&&b._data(this[0],"parsedAttrs")){e=this[0].attributes;for(
var bx=0,bv=e.length;bx<bv;bx++)bw=e[bx].name;if(bw.indexOf("data-")===0){bw=b.camelCase(bw.substring(5));
a5(this[0],bw,bz[bw])}}b._data(this[0],"parsedAttrs",true)}}return bz}elseif(typeof by=="object"){return
this.each(function(){b.data(this,by)});bw=by.split(".");bw[1]=bB[1]?"":bw[1];if(bA===
L){bz=this.triggerHandler("getData"+bB[1]+!"",[bB[0]]);if(bz==!=L&&bB[1]==this.data(bB[0]):bz}
elsereturn this.each(function(){var bC=b(this),bd=[bB[0],bA];bC.triggerHandler("setData"+bB[1]+!"",bD);
b.data(this,by,ba);bC.triggerHandler("changeData"+bB[1]+!"",bD)}),removeData:function(e){return this.
each(function(){b.removeData(this,e)});functiona5(bx,bw,by){if(by==!=L&&bx.nodeType====1){var bv="data-"+
bw.replace(aA,"-$1").toLowerCase();by=bx.getAttribute(bv);if(typeof bv=="string"){try(by==true?true:
by==false?false:by==null?null:b.isNumeric(by)?parseFloat(by):aS.test(by)?b.parseJSON(by):by)}catch(bz){}
b.data(bx,bw,by)else{by=L}}return function(S(bv){for(var e in bv){if(e==="data"&&
b.isEmptyObject(bv[e]))continue;if(e!="toJSON"){return false};return true});functionbi(by,bx,bA){var bw=bx
+"defer",bx+=queue,e=bx+"mark",bz=b._data(by,bw);if(bz&&(bA==="queue"||!b._data(by,bv))&&(bA==="mark"||!
b._data(by,e)))setTimeOut(function(){if(!b._data(by,bv)&&!b._data(by,e)){b.removeData(by,bw,true);bz.fire(
)}},0)}elseextend({_mark:function(bv,e){if(bv){if(e==="fx"+"mark");b._data(bv,e,(b._data(bv,e)||0)+1)},
_unmark:function(by,bx,bv){if(by==!=true){bx=bx;bx=by;b=false};if(bx){bv=bv||"fx";var e=bx+"mark",bw=by?0:(b._data(
bx,e)||1)-1;if(bw){b._data(bx,e,bw)}else{b.removeData(bx,e,true);bi(bx,bv,"mark")}}},queue:function(bv,e,
bx){var bw;if(bv){if(e==="fx"+"queue");bw=b._data(bv,e);if(bx){if(!bw||b.isArray(bx)){bw=
b._data(bv,e,b.makeArray(bx))else{bw.push(bx)}}return bw||[]};dequeue:function(by,bx){bx=bx||"fx";var bv=
b.queue(by,bx),bw=bv.shift();e={};if(bw==="inprogress"){bw=bv.shift();if(bw){if(bx=="fx"){bv.unshift("
inprogress")};b._data(by,bx+"run",e);elsecall(function()b.dequeue(by,bv)),e)if(!bv.length){b.removeData(
by,bx+"queue "+bx+"run",true);bi(by,bx,"queue")}}};b.fn.extend({queue:function(e,bv){if(
typeof e==="string"){bv=e;if(bv==="fx"){return b.queue(this[0],e)}return this.
each(function(){var bw=b.queue(this,e,bv);if(e=="fx"&&bw[0]==="inprogress"){b.dequeue(this,e)}});
dequeue:function(e){return this.each(function(){b.dequeue(this,e)});},delay:function(bv,e){bv=
b.fx?b.fx.speeds[bv]:bw:bv;e=e||"fx";return this.queue(e,function(bx,bw){var by=setTimeout(bx,bv);bw.stop=
function()clearTimeout(by)}),clearQueue:function(e){return this.queue(e||"fx",[])},promise:function(bd,bw
){if(typeof bd==="string"){bw=bD;bD=L;bD=bD||"fx";var e=b.Deferred(),bv=this,by=bv.length,bB=1,bz=bD+"defer"
,bA=bD+"queue",bC=bD+"mark",bx;functionbE(){if((!(-bB)){e.resolveWith(bv,[bv]))}while(by--){if(bx=
b.data(bv[by],bz,L,true))||l(b.data(bv[by],bA,L,true))||b.data(bv[by],bC,L,true))&&
b.data(bv[by],bz,b.callbacks("once memory"),true));bB++;bx.add(bE)}bE();return e.promise()}},var aP=/
\n|\t|r)/g,aU=/\r/g,g=/^(?:button|input)|$|i,D=/^(?:button|input|object|select|textarea)$|i,l=/^a(?:rea
)?$/i,ao=/^(?: autofocus|autoplay|async|checked|controls|defer|disabled|hidden|loop|multiple|open|readonly|
required|scoped|selected)$|i,F=b.support.getSetAttribute,be,aY,aF;b.fn.extend({attr:function(e,bv){return b.ac
cess(this,e,bv,true,b.attr)},removeAttr:function(e){return this.each(function(){b.removeAttr(this,e)}),prop
:function(e,bv){return b.access(this,e,bv,true,b.prop)},removeProp:function(e){e=
b.propFix[e]if(e){return this.each(function(){try(this[e]=L;delete this[e])catch(bv){}})},addClass:function
(by){var bA,bw,bv,bx,bz,bE;if(b.isFunction(by)){return this.each(function(bC){b(this).addClass(by.call(this,
bC,this.className))})}if(by&&typeof by=="string"){bA=by.split(af);for(bw=0,bv=this.length;bw<bv;bw++){bx=
this[bw];if(bx.nodeType====1){if((!bx.className&&bA.length====1){bx.className=bz}else{bz=" "+bx.className+
";"for(bB=0,e=bA.length;bB<e;bB++){if((~bz.indexOf(" "+ba[Bb]+"))){bz+=ba[Bb]+"}");bx.className=
b.trim(bz)}}return this},removeClass:function(bz){var bA,bw,bv,by,bx,bz;if(b.isFunction(bz)){return
this.each(function(bC){b(this).removeClass(bz.call(this,bc,this.className))})}if((bz&&typeof bz==="string")||bz
==!=L){ba=(bz||"").split(af);for(bw=0,bv=this.length;bw<bv;bw++){by=this[bw];if(by.nodeType====1&&by.className
){if(bz){bx=( " "+by.className+" ").replace(aP," ");for(bB=0,e=bA.length;bB<e;bB++){bx=bx.replace(" "+ba[Bb]+
", " ");by.className=b.trim(bx)}else{by.className=""}}}return this},toggleClass:function(bx,bv){var bw=
typeof bx,e=typeof bv=="boolean";if(b.isFunction(bx)){return this.each(function(){if(bv==="string"){
var bA,bz=0,by=b(this),bw,bC=bx.split(af);while((ba=B[bz++])){bB=e?bB:!by.hasClass(bA);by[bB]?addClass":
removeClass"]}(BA))elseif(bv==="undefined"||bw=="boolean"){if(this.className){
b._data(this,"__className__",this.className)}this.className=this.className||bx==false?"":b_data(this,"__className__")||"");
},hasClass:function(e){var bx=" "+e+" ",bw=0,bv=this.length;for(;bw<bv;bw++){if(this.nodeType====1){return if(by){bB=bx.
call(this,bA,bz.val())}else{bB=bx}if(bB==null){bB=""}elseif(typeof bB=="number"){bB=""}elseif(
b.isArray(bB)){bB=b.B.map(bB,function(bC){return bC==null?"":bC+"")});e=b.valHooks[this.nodeName.toLowerCase()
]||b.valHooks[this.type];if(!e||!"set" in e){e.set(this,bB,"value")====L){this.value=bB}}});elseif(bv==="string"?bv.replace(aU,""):bw==="null?"":bw)return by=
bisFunction(bx);return this.each(function(bA){var bz=b(this),bB;if(this.nodeType====1){return if(by){bB=bx.
call(this,bA,bz.val())}else{bB=bx}if(bB==null){bB=""}elseif(typeof bB=="number"){bB=""}elseif(
b.isArray(bB)){bB=b.B.map(bB,function(bC){return bC==null?"":bC+"")});e=b.valHooks[this.nodeName.toLowerCase()
]||b.valHooks[this.type];if(!e||!"set" in e){e.set(this,bB,"value")====L){this.value=bB}}});elseif(valHooks:{option:{get:function(e){var bv=e.attributes.value;return !bv||bv.specified?e.value:e.
text}},select:{get:function(e){var bA,bv,bz,bx,by=e.selectedIndex,bB=[],bC=e.options,bw=e.type=="select-one";
if(by<0){return null};bv=bw?by:0;bz=bw?by+1:bC.length;for(;bv<bz;bv++)bx=bC[bv];if(bx.selected&&
b.support.optDisabled){!bx.disabled;bx.getAttribute("disabled")====null}&&(!bx.parentNode.disabled||!
b.nodeName(bx.parentNode,"optgroup"))}{bA=b(bx).val();if(bx){return bA.b.push(bA)}if(bw&&bB.length&&bC.
length){return b(bC[bv]).val()}elsereturn bB};set:function(bv,bw){var e=b.makeArray(bw);
b(bv).find("option").each(function(){if(this.selected=b.inArray(b(this).val(),e)>=0);if(!e.length){bv.

```

```

selectedIndex=-1}return e}}},attrFn:{val:true,css:true,html:true,text:true,data:true,width:true,height:true,offset:
true},attr:function(bA,bx,bB,bz){var bw,e,by,bv=bA.nodeType;
if(!bA||bv===-3||bv===-8||bv===-2){return}if(bz&&bx in b.attrFn){return b(bA)[bx](bB)}if(typeof bA.
getAttribute==='undefined'){return b.prop(bA,bx,bB)}by=bv==!=1||!b.isXMLDoc(bA);if(by){bx=bx.toLowerCase();e=
b.attrHooks[bx]||(ao.test(bx)?aY:be)}if(bB==L){if(bB==null){b.removeAttr(bA,bx);return}else{if(e&&"set"
in e&&by&&(bw=e.set(bA,bB,bx))!=L){return bw}else{bA.setAttribute(bx,""+bB);return bB}}else{if(e&&"get"
in e&&by&&(bw=e.get(bA,bx))!=null){return bw}else{bw=bA.getAttribute(bx);return bw==null?L:bw}}},removeAttr:function(bx,bz){var by,bA,bv,e,bw=0;if(bz&&bz.nodeType==!=1){bz=bz.toLowerCase().split(af
);e=bA.length;for(;bw<e;bw++){by=bA[bw];if(by){b.propFix[by]||bv;b.attr(by,bv,"");bx.removeAttribute(F?bv
:by);if(ao.test(by)&&by in bx){bx[by]=false}}}},attrHooks:{type:{set:function(e,bv){if(g.test(e.nodeName)&&
e.parentNode){b.error("type property can't be changed")}}else{if(!b.support.radioValue&&bv==="radio"&&
b.nodeName(e,"input")){var bw=e.value;e.setAttribute("type",bv);if(bw){e.value=bw}return bv}}},value:{get:
function(bv,e){if(be&&b.nodeName(bv,"button")){return be.get(bv,e)}return e in bv?bv.value:null},set:
function(bv,bw,e){if(be&&b.nodeName(bv,"button")){return be.set(bv,bw,e)}bv.value=bw},propFix:{tabIndex:
"readonly","readOnly","for":"htmlFor","class":"className",maxLength:"maxLength",cellspacing:"cellSpacing",
cellpadding:"cellPadding",rowspan:"rowSpan",colspan:"colSpan",usemap:"useMap",frameborder:"frameBorder",
contenteditable:"contentEditable"},prop:function(bz,bx,bA){var bw,e,by,bv=bz.nodeType;if(!bz||bv===-3||bv==
=-2){return}by=bv==!=1||!b.isXMLDoc(bz);if(by){bx=b.propFix[bx]||bx;e=b.propHooks[bx]}if(bA==
L){if(e&&"set" in e&&(bw=e.set(bz,bA,bx))!=L){return bw}else{return bz[bx]=bA}}else{if(e&&"get"
in e&get(bz,bx))!=null){return bw}else{return bz[bx]}},propHooks:{tabIndex:{get:function(bv){var e=bv.
getAttributeNode("tabindex");return e&&e.specified?parseInt(e.value,10):D.test(bv.nodeName)||l.test(bv.nodeName)&&
bv.href?0:L}}},b.attrHooks.tabindex=b.propHooks.tabIndex;aY={get:function(bv,e){var bx,bw=
b.prop(bv,e);return bw==true||typeof bw=="boolean"&&(bx=bv.getAttributeNode(e))&&bx.nodeValue==false?e.
toLowerCase():L},set:function(bv,bx,e){var bw;if(bw==false){b.removeAttr(bv,e)}else{bw=
b.propFix[e]||e;if(bw in bv){bv[bw]=true}bv.setAttribute(e,e.toLowerCase())return e}}},if(!F){aF={name:true
,id:true};be=b.valHooks.button={get:function(bw,bv){var e;e=bw.getAttributeNode(bv);return e&&(aF[bv]?e.
nodeValue!="":e.specified)?e.nodeValue:L},set:function(bw,bx,bv){var e=bw.getAttributeNode(bv);if(!e){e=av.
createAttribute(bv);bw.setAttributeNode(e)}return(e.nodeValue=bx+"")}},b.attrHooks.tabindex.set=be.set;
b.each(["width","height"],function(bv,e){b.attrHooks[e]=b.extend(b.attrHooks[e],{set:function(bw,bx){if(bx=
==""){bw.setAttribute(e,"auto");return bx}}});b.attrHooks.contenteditable={get:be.get,set:function(bw,bw,
e){if(bw== ""){bw=false}be.set(bw,bw,e)}},if(!b.support.hrefNormalized){b.each(["href","src","width",
"height"],function(bv,e){b.attrHooks[e]=b.extend(b.attrHooks[e],{get:function(bx){var bw=bx.getAttribute(e,2);retu
rn bw==null?L:bw}})}},if(!b.support.style){b.attrHooks.style={get:function(e){return e.style.cssText.
toLowerCase()||L},set:function(e,bv){return(e.style.cssText)+"+bv}}},if(!b.support.optSelected){
b.propHooks.selected=b.extend(b.propHooks.selected,{get:function(bv){var e=bv.parentNode;if(e){e.selectedIn
dex;if(e.parentNode.selectedIndex) return null}}},if(!b.support.enctype){b.propFix.enctype="encoding"},if(!b.suppor
t.checkOn){b.each(["radio","checkbox"],function(){
b.valHooks[this]={get:function(e){return e.getAttribute("value")==null?"on":e.value}}})
b.each(["radio","checkbox"],function(){b.valHooks[this]=b.extend(b.valHooks[this],{set:function(e,bv){if(b.
isArray(bv)){return(e.checked=b.inArray(b(e).val(),bv)>=0)}}});var bd=/^(:?textArea|input|select)/i,n=/^(
[^\.]*)(?:\.(.+))$/;J=/^:hover(.+|$)?,(aO=/^key|,bf=/^(?:mouse|contextmenu|click|,T=/^(?:focus|infocus|
focusout|blur)|,/U=/^(\w*)(?:#([^\w-]+))?(?:\.(?:([^\w-]+))?)$/;Y=function(e){var bv=U.exec(e);if(bv){bv[1]=(bv[1]
||"").toLowerCase());bv[3]=bv[3]&&new RegExp("(?:`|\\"`)+bv[3]"+"(?:`|\\"`)+")return bv},j=function(bw,e){var
bv=bw.attributes||{};return((!e[1]||bw.nodeName.toLowerCase()===e[1])&&(!e[2]||!(bv.id||{}).value==e[2])&&(!
e[3]||e[3].test((bv["class"]||{}).value))),bt=function(e){return b.event.special.hover?e:e.replace(J,"
mouseenter$1 mouseleave$1");b.event={add:function(bx,bC,bJ,bA,by){var bd,bB,bK,bI,bH,bF,e,bG,bv,bz,bw,bE;if(bx.
nodeType==3||bx.nodeType==8||!bC||!bJ||(bd=b._data(bx))}{return}if(bJ.handler){bv=bJ;bJ=bv.handler}if(!bJ.
guid){bJ.guid=b.guid++}bK=b.events;if(!bK){bD.events=bK={}}bB=bD.handle;if(!bB){bD.handle=bB=function(bL){
return typeof b!="undefined"&&(!bL||b.event.triggered==bL.type)?b.event.dispatch.apply(bB,elem,arguments):
L};bB.elem=bx;bC=b.trim(bt(bC)).split(" ");for(bI=0;bI<bC.length;bI++){bH=n.exec(bC[bI])||[];bF=bH[1];e=(bH
[2]||"").split(".").sort();bE=b.event.special[bF]||{};bF=(bF?bE.delegateType:bE.bindType)||bF;bE=
b.event.special[bF]||{};bG=b.extend({type:bF,origType:bH[1]},data:a,handler:bJ,guid:bJ.guid,selector:by,
quick:Y(by),namespace:e.join("."),bv};bw=bK[bF]=[];bw.delegateCount=0;if(!bE.setup||bE.setup
.call(bx,bA,e,B)==false){if(bx.addEventListener){bx.addEventListener(bF,bB,false)}else{if(bx.attachEvent){
bx.attachEvent("on"+bF,bB)}}}if(bE.add){bE.add.call(bx,bG);if(!bG.handler.guid){bG.handler.guid=bJ.guid}if
(by){bw.splice(bw.delegateCount++,0,bG)}else{bw.push(bG)}b.event.global[bF]=true;bx=null},global:{},remove:
function(bJ,bE,bv,bH){var bI=b.hasData(bJ)&&b._data(bJ)&&b.data(bJ);bF,bx,bL,bC,bA,bG,bw,by,bK,bD,e;if(!bI||!
(bw==bI.events)){return}bE=b.trim(bt(bE||"")).split(" ");for(bF=0;bF<bE.length;bF++){bx=n.exec(bE[bF])||[];
bz=bL=bX[1];bC=bx[2];if(!bz){for(bz in bw){b.event.remove(bJ,bz+bE[bF],bv,bH,true)}continue}by=
b.event.special[bz]||{};bz=(bH?by.delegateType:bJ.bindType)||bz;bd=bw[bz]||[];ba=bD.length;bC=bC?new RegExp
("(^|\\"`)+bC.split("\\.").sort().join("\\".:(?:\.\\"`)?")+"(\\".|$)":null;for(bG=0;bG<bD.length;bG++){e=bD[bG];
if((bB||bL==e.origType)&&(!bv||bv.guid==e.guid)&&(!bC||bC.test(e.namespace))&&(!bH||bH==e.selector)||bH===""*
*&e.selector)){bD.splice(bG--,1);if(e.selector){bD.delegateCount--}if(by.remove){by.remove.call(bJ,e)}}}
if(bD.length==0&&bA.length){if(!by.teardown){by.teardown.call(bJ,bC)==false){
b.removeEventListener(bJ,bz,bI.handle);delete bw[bz]}}if(b.isEmptyObject(bw)){bK=b.I.handle;if(bK){bK.elem=null}
b.removeData(bJ,[ "events","handle"],true)},customEvent:{getData:true,setData:true,changeData:true},trigger
:function(bv,bD,bA,bJ){if(bA&&(bA.nodeType==3||bA.nodeType==8)){return}var bG=bv.type||bv,bx=[],e,bw,bC,bH
,bz,by,bF,bE,bB,bI;if(T.test(bG+b.event.triggered)){return}if(bG.indexOf("!")>0){bG=bG.slice(0,-1);bw=true}
if(bG.indexOf(".")>0){bx=bG.split(".").shift();bx.sort();if(!(!bA||b.event.customEvent[bG])&&
b.event.global[BG]){return}bv=typeof bv==="object"?bv[b.expandable]:bv;new b.Event(bG,bv):new
b.Event(bG);bv.type=bG;bv.isTrigger=true;bv.exclusive=bw;bv.namespace=bx.join("."),bv.namespace_re=bv.
namespace?new RegExp("(^|\\"`)+bx.join("\\".:(?:\.\\"`)?")+"(\\".|$)":null;by=bG.indexOf(":")<0?"on"+bG:"";if(!bA){e
=b.cache;for(bC in e){if(e[bC].events&&e[bC].events[bG])e[bC].event.trigger(bv,bD,e[bC].handle,elem,true)}}
return}bv.result=L;if(!bv.target){bv.target=bA;bD=bD||null;b.makeArray(bD)||bD.unshift(bv);bF=
b.event.special[bG]||{};if(bF.trigger&&bF.trigger.apply(bA,bD)==false){return}bB=[bA,bF.bindType||bG];if
(!bJ&&!bF.noBubble&&!b.isWindow(bA)){bI=bF.delegateType||bG;bH=T,test(bI+bG);bA:a.parentNode;bz=null;for(
bH;bH=bH.parentNode){bH.push([bH,bI]);bz=bH;if(bz&&bz==bA.ownerDocument){bB.push([bZ.defaultView||bz.
parentWindow||bb,bI])}}for(bC=0;bC<bD.length;bC){bH=b[C][0];bv.type=bH[bC][1];bE=(
b._data(bH,"events")||{})[bv.type]&&b._data(bH,"handle");if(bE){bE.apply(bH,bD)}bE=by&&bH[by];if(bE&&
b.acceptData(bH)&&bE.apply(bH,bD)==false){bv.preventDefault()}bv.type=bG;if(!bJ&&!bv.isDefaultPrevented()
){if(!bF._default||bF._default.apply(bA.ownerDocument,bD)==false){&&!(bG=="click")&&
b.nodeName(bA,"a")}&&b.acceptData(bA)}if(by&&bA[bG]&&((bG=="focus"&&bG=="blur")||bv.target.offsetWidth!=
=0)&&!b.isWindow(bA)){bz=bA[by];if(bz){bA[by]=null;b.event.triggered=bG;bA[bG]()};
b.event.triggered=L;if(bz){bA[by]=bz}}},return bv.result},dispatch:function(e){e=
b.event.fix(e||bb.event);var bz=((b._data(this,"events")||{})[e.type]||[],bA=bz.delegateCount,bG= [].slice.
call(arguments,0),by=e.exclusive&&e.namespace,bH=[],bC,bB,bK,bx,bF,bE,bD,bI,bw,bJ;bG[0]=e;e.
delegateTarget=this;if(bA&&e.target.disabled&&(e.button&&e.type=="click")){bx=b(this);bx.context=this.ownerDocument|

```

```

|this;for(bK=e.target;bK!=this;bK=bK.parentNode||this){bE={};bD=[];bx[0]=bK;for(bC=0;bC<bA;bC++){bI=bx[bC];bw=bI.selector;if(bE[bw]===L){bE[bw]=(bI.quick?j(bk,bI.quick):bx.is(bw))}if(bE[bw]){\bB.push(bI)}}if(bD.length){bH.push({elem:bK,matches:bD})}}if(bz.length>bA){bH.push({elem:this,matches:bx.slice(bA)})}for(bC=0;bC<bH.length&&!e.isPropagationStopped();bC++){bV=bH[bC];e.currentTarget=bV.elem;for(bB=0;bB<bV.matches.length&&!e.isImmediatePropagationStopped();bB++){bI=bV.matches[bB];if(by||(!e.namespace&&!bI.namespace)||e.namespace_re&&e.namespace_re.test(bI.namespace)){e.data=bI.data;e.handleObj=bI;bF=((b.event.special[bI.origType]||{}).handle||bI.handler).apply(bv.elem,bG);if(bF==L){e.result=bF;if(bF==false){e.preventDefault();}e.stopPropagation()}}}}return e.result,props:"attrChange attrName relatedNode srcElement altKey bubbles cancelable ctrlKey currentTarget eventPhase metaKey relatedTarget shiftKey target timeStamp view which".split(" "),fixHooks:{},keyHooks:{props:"char charCode key keyCode".split(" "),filter:function(bv,e){if(bv.which==null){bv.which=e.charCode!=null?e.charCodeAt:e.keyCode}return bv}},mouseHooks:{props:"button buttons clientX clientY fromElement offsetX offsetY pageX pageY screenX screenY toElement".split(" "),filter:function(bx,bw){var by,bz,e,bv=bw.button,bA=bw.fromElement;if(bx.pageX==null&&bw.clientX!=null){by=bx.target.ownerDocument||av;bz=by.documentElement;e=by.body;bx.pageX=bw.clientX+(bz&&bz.scrollLeft||e&&e.scrollLeft||0)-(bz&&bz.clientXLeft||e&&e.clientXLeft||0);bx.pageY=bw.clientY+(bZ&&bZ.scrollTop||e&&e.scrollTopTop||0)-(bZ&&bZ.clientHeightTop||e&&e.clientHeightTop||0)}if(!bx.relatedTarget&&bA){bx.relatedTarget=bA==bx.target?bw.toElement:bA}if(!bx.which&&bV==L){bx.which=(bv&1?1:(bv&2?3:(bv&4?2:0)))return bx},fix:function(bw){if(bw[b.expand])return bw}var bv,bz,e=bw,bx=b.event.fixHooks[bw.type]||{},by=bx.props?this.props.concat(bx.props):this.props;bw=b.Event(e);for(bv=by.length;bv){bz=by[-bv];bw[bz]=e[bz]if(!bw.target){bw.target=e.srcElement||av}if(bw.target.nodeType==3){bw.target=bw.target.parentNode}if(bw.metaKey==L){bw.metaKey=bw.ctrlKey}return bx.filter?bx.filter(bw,e):bw},special:{ready:{setup:b.bindReady},load:{noBubble:true},focus:{delegateType:"focusin"},blur:{delegateType:"focusout"},beforeunload:{setup:function(bw,bv,e){if(bv.isWindow(this)){this.onerror=onbeforeunload=e},teardown:function(bv,e){if(this.onerror!=e){this.onerror=null}}},simulate:function(by,bx,bv){var bz=b.extend(new b.Event(),bx,{type:bw,isSimulated:true,originalEvent:{}}),if(bv){b.event.trigger(bz,null,bv)}else{b.event.dispatch.call(by,bz)}if(bz.isDefaultPrevented()){bx.preventDefault()}},b.event.handle=b.event.dispatch;b.removeEvent=av.removeEventListener?function(bv,e,bw){if(bv.removeEventListener){bv.removeEventListener(e,bw,false)}}:function(bv,e,bw){if(bv.detachEvent){bv.detachEvent("on"+e,bw)}};b.Event=function(bv,e){if(!(this instanceof b.Event)){return new b.Event(bv,e)}if(bv&&bv.type){this.originalEvent=bv};this.type=bv.type;this.isDefaultPrevented=(bv.defaultPrevented||bv.returnValue==false)||bv.getPreventDefault&&bv.getPreventDefault()?bk:else{this.type=bv;if(e){b.extend(this,e)}this.timeStamp=bv&&bv.timeStamp||b.now();this[b.expand]=true};function bk(){return false}function i(){return true}b.Event.prototype={preventDefault:function(){this.isDefaultPrevented=i};var bv=this.originalEvent;if(!bv){return}if(bv.preventDefault){bv.preventDefault()}else{bv.returnValue=false}},stopPropagation:function(){this.isPropagationStopped=i;var bv=this.originalEvent;if(!bv){return}if(bv.stopPropagation){bv.stopPropagation()}bv.cancelBubble=true},stopImmediatePropagation:function(){this.isImmediatePropagationStopped=i;this.stopPropagation()};isDefaultPrevented:bk,isPropagationStopped:bk,isImmediatePropagationStopped:bk};b.each({mouseenter:"mouseover",mouseleave:"mouseout"},function(bv,e){b.event.special[bv]={delegateType:e,bindType:e,handle:function(bz){var bB=this,bA=bz.relatedTarget,by=bz.handleObj,bw=bz.selector,bx;if(!bA||!(bA==bB&&!b.contains(bB,bA))){bz.type=by.origType;bx=by.handler.apply(this,arguments);bz.type=e}return bx}}};if(!b.support.submitBubbles){b.event.special.submit={setup:function(){if(b.nodeName(this,"form")){return false}}};b.event.add(this,"click._submit keypress._submit",function(bx){var bw=bx.target,bv=bw.nodeName,"input"||b.nodeName,"button"?bw.form:L;if(bv&&!bv._submit_attached){b.event.add(bv,"submit._submit",function(e){if(this.parentNode&&!e.isTrigger){b.event.simulate("submit",this.parentNode,e,true)}},teardown:function(){if(b.nodeName(this,"form")){return false}});b.event.remove(this,"_submit")}});if(!b.support.changeBubbles){b.event.special.change={setup:function(){if(bd.test(this.nodeName)){if(this.type=="checkbox"||this.type=="radio"){b.event.add(this,"propertychange._change",function(e){if(e.originalEvent.propertyName=="checked"){this._just_changed=true}});b.event.add(this,"click._change",function(e){if(this._just_changed&&!e.isTrigger){this._just_changed=false}});b.event.simulate("change",this,e,true)}}}return false});b.event.add(this,"beforeactivate._change",function(bw){var bv=bw.target;if(bd.test(bv.nodeName)&&!bv._change_attached){b.event.add(bv,"change._change",function(e){if(this.parentNode&&!e.isSimulated&&!e.isTrigger){b.event.simulate("change",this.parentNode,e,true)}});bv._change_attached=true}});handle:function(bv){var e=bv.target;if(this!==e||bv.isSimulated||bv.isTrigger||(e.type!="radio"||e.type=="checkbox")){return bv.handleObj.handler.apply(this,arguments)}},teardown:function(){b.event.remove(this,"_change");return bd.test(this.nodeName)}});if(!b.support.focusinBubbles){b.each({focus:"focusin",blur:"focusout"},function(bx,e){var bv=0,bw=function(by){b.event.simulate(e,by.target,b.event.fix(by),true)},b.event.special[e]={setup:function(){if(bv++==0){av.addEventListener(bx,bw,true)}},teardown:function(){if(--bv==0){av.removeEventListener(bx,bw,true)}}});b.fn.extend({on:function(bw,e,bz,by,bv){var bA,bx;if(typeof bw=="object"){if(typeof e=="string"){bZ=e;e=L}for(bx in bw){this.on(bx,e,bz,bw[bx],bv)}return this}if(bz==null&&by==null){by=e;bZ==L}else{if(by==null){if(typeof e=="string"){by=bZ;bZ=L}else{by=bZ;bZ=e;e=L}}if(by==false){by=bk}else{if(iby){return this}}if(bv==L){ba=by;by=function(bB){b.B.off(bB);return bA(arguments)};by.guid=bA.guid||(bA.guid+=1)}return this.each(function(){b.event.add(this,bw,by,bz,e)}),one:function(bv,e,bx,bw){return this.on.call(this,bv,e,bx,bw,1)},off:function(bw,e,by){if(bw&&bw.preventDefault&&bw.handleObj){var bv=bw.handleObj;b(bw.delegateTarget).off(bv.namespace?bV.type+"."+bV.namespace:bV.type,bv.selector,bv.handler);return this}if(typeof bw=="object"){for(var bx in bw){this.off(bx,e,bw[bx])}return this}if(e==false||typeof e=="function"){by=e;e=L}if(by==bk){return this.each(function(){b.event.remove(this,bw,by,e)}),bind:function(e,bw,bv){return this.on(e,null,bw,bv)},unbind:function(e,bv){return this.off(e,null,bv)},live:function(e,bw,bv){b(this.context).on(e,this.selector,bw,bv);return this},die:function(e,bv){b(this.context).off(e,this.selector)||"**",bv);return this},delegate:function(e,bv,bx,bw){return this.on(bv,e,bx,bw)},undelegate:function(e,bv,bw){return arguments.length==1?this.off(e,"**"):this.off(bv,e,bw)},trigger:triggerFunction(e,bv){return this}},each(function(){b.event.trigger(e,bv,this)}),triggerHandler:triggerHandlerFunction(e,bv){if(this[0]){return b.event.trigger(e,bv,this[0],true)}}},toggle:toggleFunction(bx){var bv=arguments,e=bx.guid||b.guid++,bw=0,by=function(bz){var bA=b._data(this,"lastToggle"+bx.guid)||0%bw;b._data(this,"lastToggle"+bx.guid,bA+1);bz.preventDefault();return bv[bA].apply(this,arguments)||false};by.guid=e;while(bw<bv.length){bv[bw++].guid=e}return this.click(by)},hover:hoverFunction(e,bv){return this.mouseenter(e).mouseleave(bv||e)}},b.each({"blur focus focusout load resize scroll unload click dblclick mouseover mousemove mouseout mouseleave change select submit keydown keypress keyup error contextmenu":split(" "),function(bv,e){b.fn[e]=function(bw,bv){if(bw==null){bw=bx;bX=null}return arguments.length>0?this.on(e,null,bw,bv):this.trigger(e)};if(b.attrFn){b.attrFn[e]=true}if(a0.test(e)){b.event.fixHooks[e]=b.event.keyHooks}});if(bf.test(e)){b.event.fixHooks[e]=b.event.mouseHooks}});

(function(){var bH=/((?:\((?:\((?:\[(^()\]+)\)|[^()]+)\)+\))|\[(?:\[[^\[\]]*\]\|[\'\"][^\"]*\][\'\"]|\[^[\]\"]+\])|\[\.\.\.\|^>+,(\[\[\]\]+)|[>+~])(\s*,\s*)?((?:\..|\r|\n)*)/g,bC="sizcache"+(Math.random()+"").replace(".","");
),bI=0,bL=Object.prototype.toString,bB=false,bA=true,bK=/\//g,bO=0});var by=function(bV,e,y,BZ){bY=y||[];e=e||av;var bL=e.nodeType==1&&e.nodeType==9?return[]:if(!bV||typeof bV=="string"){return bY}var bS,b3,b6,bR,b2,b5,b4,bX,bU=true,bT=bX.isXML(e),bW=[],b0=bV;do{bH.exec("")};

```

```

bS=bH.exec(b0);if(bS){b0=bS[3];bW.push(bS[1]);if(bS[2])bR=bS[3];break}})while(bS);if(bW.length>1&&bD.exec(bV)){if(bW.length==2&&bE.relative[bW[0]]){b3=bM(bW[0]+bW[1],e,bZ)}else{b3=bE.relative[bW[0]]?e:by(bW.shift(),e);while(bW.length){bV=bW.shift();if(bE.relative[bV])bV+=bW.shift();}else{if(!bZ&&bW.length>1&&e.nodeType==9&&!bT&&bE.match.ID.test(bW[0])&&!bE.match.ID.test(bW[bW.length-1]))b2=by.find(bW.shift(),e,bT);e=b2.expr?by.filter(b2.expr,b2.set)[0]:b2.set[0];if(e){b2=bZ?{expr:bW.pop(),set:bF(bZ)}:by.find(bW.pop(),bW.length==1&&(bW[0]==="#"||bW[0]=="+")&&e.parentNode?e.parentNode:e,bT);b3=b2.expr?by.filter(b2.expr,b2.set):b2.set;if(bW.length>0){b6=bF(b3)}else{bU=false};while(bW.length){b5=bW.pop();b4=b5;if(!bE.relative[b5])b5="";else{b4=bW.pop()}if(b4==null){b4=e;bE.relative[b5](b6,b4,bT)}else{b6=bW[]}}if(!b6){b6=b3;if(!b6){by.error("Array")}}if(!bU){bY.push.apply(bY,b6)}else{if(e&&e.nodeType==1){for(bX=0;b6[bX]!=null;bX++){if(b6[bX]&&(b6[bX].nodeType==1&&e.contains(e,b6[bX]))){bY.push(b3[bX])}}}}else{for(bX=0;b6[bX]!=null;bX++){if(b6[bX]&&b6[bX].nodeType==1){bY.push(b3[bX])}}}}else{if(bF(b6,bY))if(bR){bY:by.uniqueSort=function(f){if(bF(bR){bB=bA;B.R.sort(bJ);if(bB){for(var e=1;e<bR.length;e++){if(bR[e]==bB[e-1])bR.splice(e,1)}}}};bY.matches=function(e,bR){return by(e,null,null,bR)};bY.matchesSelector=function(e,bR){return by(bR,null,null,[e]).length>0};bY.find=function(bX,e,bY){var bW,bS,bU,bT,bV,bR;if(!bX){return[]}}for(bS=0,bU=bE.order.length;bS< bU;bS++)bV=bE.order[bS];if((bT=bE.leftMatch[bV]).exec("")){bT[1]||"").replace(bK,"");bW=bE.find[bV](bT,e,bY);if(bW!=null){bX=bX.replace(bE.match[bV],"");break}}}}if(!bW){bW=type.getElementsByTagName!="undefined"?e.getElementsByTagName("*"):[]};return{set:bW,expr:bX}};bY.filter=function(b1,b0,bW,e,bZ,b6,b3,bR,bT,b2,bS=b1[],bY=b0,&b0[0]&&e.isXML(b0[0]);while(b1&&b0.length){for(bZ in bE.filter){if((bW=bE.leftMatch[bZ]).exec(b1))!=null&&bW[2])bR=bE.filter[bZ];bT=bW[1];e=false;bW.splice(1,1);if(bT.substring){continue}}if(bY==b5){b5=[]}if(bE.preFilter[bZ](bW,bY,b4,b5,bU,bX);if(!bW){e=b6=true}else{if(bW==true){continue}}if(bW){for(bV=0;(b3=bY[bV])!=null;bV++){if(b3){b6=bR(b3,bW,bV,bY);b2=bU^b6;if(b4&&b6!=null){if(b2){e=true}else{bY[bV]=false}}}}else{if(b2){b5.push(b3);e=true}}}}if(b6==L){if(!b4){bY=b5}b1=b1.replace(bE.match[bZ],"");if(!e){return[]}}break}}}}if(Error("Syntax error, unrecognized expression: "+e));var bw=by.getText=function(bU){var bS,bT,e=bU.nodeType,bR="";if(e){if(e==1||e==9){if(typeof bU.textContent=="string"){return bU.textContent}else{if(typeof bU.innerText=="string"){return bU.innerText.replace(b0,"")}}else{for(bU=bU.firstChild;bU;bU=bU.nextSibling){bR+=bw(bU)}}}}else{if(e==3||e==4){return bU.nodeValue}}else{for(bS=0;(bT=bU[bS]);bS++){if(bT.nodeType!=8){bR+=bw(bT)}}}var bE=by.selectors={order:().+},CLASS:/\.\.(?:[\w\u00c0-\uFFFF]-|\.\.)+/,NAME:/\[name=['"]*(?:[\w\u00c0-\uFFFF]-|\.\.)['"]\]/,ATTR:/\[s*\:(?:[\w\u00c0-\uFFFF]-|\.\.)+/s*(?:(\?S?)|\$)*(?:(["])(.*?\)\3|(?:(?:[\w\u00c0-\uFFFF]-|\.\.)*)+)\)\)|\s*/],TAG:/^(?:[\w\u00c0-\uFFFF]*|-|\.\.)+/,CHILD:(only|nth|last|first)-child:@\s*(even|odd|:|(+|-)?d+|(?:+|-)?d+|(?:-|-)?d+)?n\s*(?:[+-]\s*(s+d)?))\s*\))/?,POS:(nth|eq|gt|lt|first|last|even|odd|(?:(\d*))?)?(?:[-+]|\$)/,PSEUDO:(?:([\w\u00c0-\uFFFF]-|\.\.)+)(?:\((?:['"])?((?:\([^\)]+\)|[^(\)]*)+)\)\2\))?,leftMatch:{},attrMap:{"class":"className","for":"htmlFor"},attrHandle:{href:function(e){return e.getAttribute("href")},type:function(e){return e.getAttribute("type")}},relative:{"+":function(bW,bR){var bT=typeof bR==="string",bV=bT&&!bQ.test(bR),bX=bT&&!bV;if(bV){bR=bR.toLowerCase()}for(var bS=0,e=bW.length;bS<e;bS++){if((bU=bW[bS])){while(bU.previousSibling)&&bU.nodeType==1}{bW[bS]=bX||bU&&bU.nodeName.toLowerCase()===bR?bU||false:bU==bR}}if(bX){by(bS,e=bW[e],bR);bS=0,e=bW.length;if(bU&&bQ.test(bR)){bR=bR.toLowerCase();for(;bS<e;bS++){bV=bW[bS];if(bV){var bT=bV.parentNode;bW[bS]=bT.nodeName.toLowerCaseCase()}}}}else{for(;bS<e;bS++){bV=bW[bS];if(bV){bR=bR.toLowerCase();bS=0,e=bW.length;var bU,bS=bI+,e=bN;if(typeof bR=="string"&&!bQ.test(bR)){bR=bR.toLowerCase();bU=bR;bE=e("previousSibling",bR,bS,bT,bU)}},find:{ID:function(bR,bs,bT){if(typeof bs.getelementById=="undefined"&&!bT){var e=bs.getElementById(bR[1]);return e&&e.parentNode?e:[],NAME:function(bs,bV){if(typeof bV.getelementsByName!="undefined")bR=[],bU=bV.getelementsByName(bs[1]);for(var bT=0,e=bu.length;bT<e;bT++)if(bU[bT].getattribute("name")===bS[1])bR.push(bU[bT])},TAG:function(e,bR){if(typeof bR.getelementsByName!="undefined")bR.getelementsByName(e[1])},prefilter:{CLASS:function(bT,bR,bs,e,bW,bX){bT=" "+bT[1].replace(bK,"")+" ";if(bX){return bT}for(var bU=0,bV;(bV=bR[bU])!=null;bU++){if(bV){if(bW^(bV.classname&&"#"+bV.classname==" ")).replace(/[\t\n\r]/g,"").indexof(bT)>0){if(!bS){e.push(bV)}}}}else{if(bS){bR[bU]=false}}}}},ID:function(e){return e[1].replace(bK,toLowerCase()),CHILD:function(e){if(e[1]=="nth"){if(e[2])by.error(e[0]);e[2]=e[2].replace(/\+|\$*/g,"");var bR=/(-?)(\d*)(?:n(+|-)?d*)?/.exec(e[2])=="even"+"&"2n"||e[2]=="odd"+"&"2n+1"||!/\D/.test(e[2])&&"On"+e[2]||e[2];e[2]=(bR[1]+(bR[2]-1))-o;e[3]=bR[3]-o}else{if(e[2])by.error(e[0])}}e[0]=bI++;return e},ATTR:function(bU,bR,bS,e,bV,bW){var bT=bU[b1]=bU[1].replace(bK,"");if(bU[2]==="~="){bU[4]=" "+bU[4]+bU},PSEUDO:function(bU,bR,bs,e,bV){if(bU[1]==="not"){if((bH.exec(bU[3])||"").length>1||/\^/.test(bU[3])){bU[3]=by(bU[3],null,null,bR)}else{var bT=by.filter(bU[3],bR,bs,true^bV);if(!bS){e.push.apply(e,bT)}}return false}}else{if(bE.match.POS.test(bU[0])||bE.match.CHILD.test(bU[0])){return true}}},POS:function(e){e.unshift(e)},filters:{enabled:function(e){return e.disabled==false&&e.type!="hidden"},disabled:function(e){return e.disabled==true},checked:function(e){return e.checked==true},selected:function(e){if(e.parentNode){e.parentNode.selectedIndex}return e.selected==true},parent:func(i).test(e.nodeName),text:function(bS){var e=bS.getAttribute("type"),bR=bS.type;return bS.nodeName.toLowerCase()==="input"||e=="radio"||e=="checkbox"},radio:function(e){return e.nodeName.toLowerCase()==="input"+"&"radio"},checkbox:function(e){return e.nodeName.toLowerCase()==="input"+"&"checkbox"},file:function(e){return e.nodeName.toLowerCase()==="input"+"&"file"==e.type},password:function(e){return e.nodeName.toLowerCase()==="input"+"&"password"==e.type},submit:function(bR){var e=bR.nodeName.toLowerCase();return(e=="button"||e=="submit"||e=="reset"||e=="button")},button:function(bR){var e=bR.nodeName.toLowerCase();return e=="input"+"&"button"==bR.type||e=="button"},input:function(e){return /input|select|textarea|button/i.test(e.nodeName)},focus:function(e){return e==e.ownerDocument.activeElement},setFilters:{first:function(bR,e){return e==0},last:function(bS,bR,e,bT){return bR==bT.length-1},even:function(bR,e){return e%2==0},odd:function(bR,e){return e%2==1}},lt:function(bS,bR,e){return bR<e[3]-0},gt:function(bS,bR,e){return bR>e[3]-0},nth:function(bS,bR,e){return e[3]-0==bR},eq:function(bS,bR,e){return e[3]-0==bR},filter:{PSEUDO:function e=bX[1],bR=bE.filters[e];if(bR){return bR(bS,bW,bX,bY)}else{if(e=="contains"){(return(bS.textContent||bS.innerHTML||"").indexof(bX[3])>0}else{if(e=="not"){var bT=bX[3];for(var bV=0,bU=bT.length;bV<bU;bV++){if(bT[bV]==bS){return false}}return true}}else{by.error(e)}}},CHILD:function(bS,bU){(var bT,b0,bW,bZ,e,bV,bY,bX=bU[1],bR=bS;switch(bX){case"only":case"first":while((bR=bR.previousSibling)){if(bR.nodeType==1){return false}}if(bX=="first"){return true}bR=bS;case"last":while((bR=bR.nextSibling)){if(bR.nodeType==1){return true}}bW=bU[0];bZ=bS.parentNode;if(bZ&&(bZ[bC]==bW||!bS.nodeType)){(bV=0;for(bR=bZ.firstChild;bR;bR=bR.nextSibling){if(bR.nodeType==1){bR=nodeIndex++}}bZ[bC]=bW;bY==0){else{return(bY%bT==0&&bY/bT==0)}}},ID:function(bR,e){return bR.nodeType==1&&bR.getAttribute("id")==e},TAG:function(bR,e){return(" "+(bR.className||bR.getAttribut

```

```

"class"))+"").indexOf(e)>-1},ATTR:function(bV,bT){var
bS=bT[1],e=by.attr?by.attr(bV,bS):bE.getAttributeHandle[bS](bV):bV[bS]!=null?bV[bS]:bV.getAttribute(bS),bW=e
!="!:bU&&by.attr?e!=null:bU=="?"bW==bR:bU=="?"bW.indexOf(bR)>0:bU=="?"?(" "+bW+" "
).indexOf(bR)>0:!bR2bW&&e!=="false":bU=="!"|"?"bW==bR|bW.substr(0,bR.length+1)=="bR+"-":false},POS:function(bU,bR,bs,
e=bR[2],bT=bE.setFilters[e];if(bT){return bT(bU,bs,bR,bV)}},var bD=bE.match.POS,bx=function(bR,e){return"\\"+
+(e+0+1)};for(var bz in bE.match){bE.match[bz]=new RegExp(bE.match[bz].source+(/\?![^\[]*\])/)?![^\[]*\)
/.source});bE.leftMatch[bz]=new RegExp(/(^?:|\[\|\n)*?)/.source+bE.match[bz].source.replace(/\((\d+)/g,bx))var
bF=function(bR,e){bR=Array.prototype.slice.call(bR,0);if(e){e.push.apply(e,bR);return e}return
bR};try{Array.prototype.slice.call(av.documentElement.childNodes,0)[0].nodeType}catch(bP){bF=function(bU,bT){var
bS=0,br=bT||[];if(bL.call(bU)===[object Array])Array.prototype.push.apply(br,bU) else{if(typeof bU.length===""
number"){for(var e=bU.length;bs<e;bs++)br.push(bU[bs])}else{for(var bU[bs];bs++)(br.push(bU[bs]))}return
br}}var bJ,bG;if(av.documentElement.compareDocumentPosition){bJ=function(bR,e){if(bR==e){bB=true;return
0}if(!bR.compareDocumentPosition||!e.compareDocumentPosition){return bR.compareDocumentPosition?-1:1}return
bR.compareDocumentPosition(e)&4?-1:1}else{bJ=function(bY,bX){if(bY==bX){bB=true;return
0}else{if(bY.sourceIndex&&bX.sourceIndex){return bY.sourceIndex-bX.sourceIndex}var
bV,bR,bS=[],e[],bU=bY.parentNode,bW=bX.parentNode,bZ=bU;if(bU==bW){return bG(bY,bX)}else{if(!bU){return -1}else{if(!b
1)}while(bZ){bS.unshift(bZ);bZ=bZ.parentNode}bZ=bW;while(bZ){e.unshift(bZ);bZ=bZ.parentNode}bV=bS.length;bR=e.length;
bT=0;bt<bV&&bt<bR;bT++){if(bS[bT]===e[bT]){return bG(bS[bT],e[bT])}}return
bT==bV?bG(bY,e[bT],-1):bG(bS[bT],bX,1);bG=function(bR,e,bS){if(bR==e){return bS}var bT=bR.nextSibling;while(bT){if(-1)bT=bT.nextSibling}return 1}}(function(){var br=av.createElement("div"),bS="script"+(new
Date()).getTime(),e=av.documentElement;bR.innerHTML=<a name='"+bS+"' />"e.insertBefore(br,e.firstChild);if(av.getElementById(bS)){bE.find.ID=function(bU,bV,bW){if(typeof bV.getElementById!==
bT?bT.id==bU[1]||typeof bT.getAttributeNode!="undefined"&&bT.getAttributeNode("id"
).nodeValue==bU[1]?[bT]:L:[]);bE.filter.ID=function(bV,bT){var bU=typeof bV.getAttributeNode!="undefined"&&!bV.getAttribute
};return bV.nodeType==1&&bU&&bU.nodeType==bT}e.removeChild(bR);e=bR=null}});(function(){var
e=av.createElement("div");e.appendChild(av.createComment(""));if(e.getElementsByTagName("*"
).length>0){bE.find.TAG=function(bR,bV){var bU=bV.getElementsByTagName(bR[1]);if(bR[1]==="#"){var bT=[];for(var
bS=0;bu[bS];bS++){if(bU[bS].nodeType==1){bT.push(bU[bS])}}bU=bT}return bU}e.innerHTML=<a href="#">/</a>;if(e.firstChild
e.firstChild.getAttribute!="undefined"&&!e.firstChild.getAttribute("href")!=""
){bE.getAttributeHandle.href=function(bR){return bR.getAttribute("href",2)};e=null}});if(av.querySelectorAll){(function(){var
e=by,bT=av.createElement("div"),bS="__sizzle__";bT.innerHTML=<p class='TEST'>/<p>;
if(bT.querySelectorAll&&bT.querySelectorAll(".TEST").length==0){return}by=function(b4,bV,bZ,b3){bV=bV||av;if(!b3&&by
([\w-]+$)|^#([\w-]+$)/.exec(b4);if(b2&&(bV.nodeType==1||bV.nodeType==9)){if(b2[1]){return
bF(bV.getElementsByTagName(b4),bZ)}else{if(b2[2]&&bE.find.CLASS&&bV.getElementsByClassName){return
bF(bV.getElementsByClassName(b2[2]),bZ)}}if(bV.nodeType==9){if(b4=="body"&&!bV.body){return
bF([bV.body],bZ)}else{if(b2&&b2[3]){var bY=bV.getElementById(b2[3]);if(bY&&bY.parentNode){if(bY.id==b2[3]){return bF(
bF([],bZ)}}try{return
bF(bV.querySelectorAll(b4),bZ)}catch(b0){}else{if(bV.nodeType==1&&bV.nodeName.toLowerCase()!=="object"){var bW=bV,bX
* [+]/.test(b4);if(!bX){bV.setAttribute("id",bU);else{bU=bU.replace('/"/g,"\\$&");if(b5&&b6){bV=bV.parentNode}try{if(!b5
bF(bV.querySelectorAllAll("id='"+bU+" "+b4),bZ)}catch(b1){}finally{if(!bX){bW.removeAttribute("id"
)}}}}}return e(b4,bV,bZ,b3)};for(var bR in e){by[bR]=e[bR];bT=null}}})(function(){var
e=av.documentElement,bS=e.matchesSelector||e.webkitMatchesSelector||e.msMatchesSelector;if(bS){v
bU=!bS.call(av.createElement("div","div"),bR=false);try{bS.call(av.documentElement,[test:='']:sizzle"
})catch(bT){bR=true}by.matchesSelector=function(bW,bY){bY=bY.replace(/\=\s*([^\"]+)\*\s*\|\g,="$'\")";if(!bY.isXML(bW)
||!bE.match.PSEUDO.test(bY)&&!/.test(bY)){var bV=bS.call(bW,bY);if(bV||!bU||bW.document&&bW.document.
nodeType==11){return bV}};catch(bX){}return by(bY,null,null,[bW]).length>0}}));(function(){var e=av.
createElement("div");e.innerHTML=<div class='test e'>/</div><div class='test'>/</div>;if(!e.getElementsByClassName||e
.getElementsByClassName("e").length==0){return}e.lastChild.className="e";if(e.getElementsByClassName("e").
length==1){return}bE.order.splice(1,0,"CLASS");bE.find.CLASS=function(bR,bS,bT){if(typeof bS.
getElementsByClassName!="undefined"&&!bT){return bS.getElementsByClassName(bR[1])};e=null}});function bv(bR,bW,bV,
bY){for(var bT=0,bs=bZ.length;bT<bS;bT++){var e=bZ[bT];if(e){var bu=false;e=e[bR];while(e){if(e[bC]===bV){bU
=bZ[e.sizset];break}if(e.nodeType==1&&e[bC]==bV){e.e.sizeSet=bT}if(e.nodeName.toLowerCase()===bW){bU=e;
break}e=e[bR];bZ[bT]=bU}}function bN(bR,bW,bV,bZ,bX,bY){for(var bT=0,bs=bZ.length;bT<bS;bT++){var e=bZ[bT];if(e
){var bu=false;e=e[bR];while(e){if(e[bC]===bV){bU=bZ[e.sizset];break}if(e.nodeType==1){if(!bY){e[bC]=bV;e.
sizeSet=bT}if(typeof bW=="string"){if(e==bW){bu=true;break}else{if(by.filter(bW,[e]).length>0){bu=true;break}}
}e=e[bR];bZ[bT]=bU}}if(av.documentElement.contains){by.contains=function(bR,e){return bR==e&&(bR.contains?
bR.contains(e):true)};else{if(av.documentElement.compareDocumentPosition){by.contains=function(bR,e){return
!(!bR.compareDocumentPosition(e)&16)};else{by.contains=function(){return false}}}};by.isXML=function(e){var br
=(e?e.ownerDocument||e:0).documentElement;return br?br.nodeName!=="HTML":false};var bM=function(bS,e,bW){var
bV,bX=[],bY=e.nodeType?e:e;while((bV=bE.match.PSEUDO.exec(bS))[bU=bV[0]];bS=bS.replace(bE.match.
PSEUDO,""));bS=bE.relative[bS]?bS+"*":bS;for(var bT=0;br=bY.length;bT<br;bT++){by(bS,bY[bT],bX,bW)}return by.
filter(bU,bX);by.attr=b.attr;by.selectors.attrMap={};b.find=by;b.expr=by.selectors;
b.expr+":b".expr.filters;b.unique=by.uniqueDoc;b.text=by.getText;b.isXMLDoc=by.isXML;
b.contains=by.contains();var ab=/Until/,aq=/^(?:parents|prevUntil|prevAll)/,a9=/_,/bp=/^.[:#\[\.,]*$/;
P=Array.prototype.slice,H=b.expr.match.POS,ay=[children:true,contents:true,next:true,prev:true];
b.fn.extend({find:function(e){var bw=this,by,bV;if(typeof e!=="string"){return b(e).filter(function(){for
by=0,bw=bw.length;by<bV;by++)if(b.contains(bw[bV],this)){return true}})}var bx=this.pushStack("",find,e),
bA,bB,bZ;for(by=0,by=this.length;by<bV;by++)bA=bx.length;bx.find(e,this[bV],bx);if(by>0){for(bB=bA;bB<bx.
length;bB++){for(bz=0;bz<bA;bz++)if(bx[bz]===bx[bB])bx.splice(bB--,1);break}}return bx},has:function(bv){
var e=b(bV);return this.filter(function(){for(var bx=0,bw=e.length;bx<bw;bx++){if(b.contains(this,e[bx])){ret
urn true}}}),not:function(e){return this.pushStack(aG(this,e,false),"not",e)},filter:function(e){return
this.pushStack(aG(this,e,true),"filter",e),is:function(e){return !e&&(typeof e=="string"?H.test(e):b
(e,this.context).index(this[0])>0:b.filter(e,this).length>0):this.filter(e).length>0},closest:function(by
,bx){var bv=[],bw,e,bz=this[0];if(b.isArray(by)){var bB=1;while(bz&&bz.ownerDocument&&bz!=bx){for(bw=0;bw<
by.length;bw++){if(b(bz).is(by[bw])){bv.push({selector:by[bw],elem:bx,level:bB})}}bz=bz.parentNode;bB++}
return bv};var bA=H.test(by)||typeof e!=="string"?b(by,bx||this.context):0;for(bw=0,e=this.length;bw<e;bw++)bz=
this[bw];while(bz){if(bAbA.index(bz)-1;bA.find.matchesSelector(bz,by)){bv.push(bz);break}else{bz=bz.
parentNode;if(!bz||!bz.ownerDocument||bz==bx||bz.nodeType==11){break}}};bv.length>1?b.unique(bv):bv;
return this.pushStack(bv,"closest",by)},index:function(e){if(!e){return this[0]&&this[0].
parentNode?this.prevAll().length:-1}if(typeof e==="string"){return b.inArray(this[0],
b(e))}return b.inArray(e.jquery?e[0]:e,this)},add:function(e,bV){var bx=typeof e==="string"?
b(e,bV):b.makeArray(e&&e.nodeType?e:e),bw=b.merge(this.get(),bx);return this.pushStack(C(bx[0])||C(bw[0])
?bw:bw.unique(bw)),andSelf:function(){return this.add(this.prevObject)}},function C(e){return !e||!e.
parentNode||e.parentNode.nodeType==11};b.each({parent:function(bv){var e=bv.parentNode;return e&&e.nodeType!=11?e:
null},parents:function(e){return b.dir(e,"parentNode")},parentsUntil:function(bv,e,bW){return
b.dir(bv,"parentNode",bW)},next:function(e){return b.nth(e,2,"nextSibling")},prev:function(e){return

```

```

b.nth(e,2,"previousSibling")),nextAll:function(e){return b.dir(e,"nextSibling")},prevAll:function(e){return
b.dir(e,"previousSibling")},nextUntil:function(bv,e,bw){return b.dir(bv,"nextSibling",bw)},prevUntil:
function(bv,e,bw){return b.dir(bv,"previousSibling",bw)},siblings:function(e){return b.sibling(e.parentNode,
firstChild,e)},children:function(e){return b.sibling(e.firstChild)},contents:function(e){return
b.nodeName(e,"iframe")?e.contentDocument||e.contentWindow.document:b.makeArray(e.childNodes)},function(e,
bv){b.fn[e]=function(by,bw){var bx=b.map(this,bv,by);if(!ab.test(e)){bw=by}if(bw&&typeof bw=="string"){bx=
b.filter(bw,bx)}bx=this.length>1&&!ay[e]?b.unique(bx):bx;if((this.length>1||a9.test(bw))&&aq.test(e)){bx=bx
.reverse()}return this.pushStack(bx,e,P.call(arguments).join(""))}};b.extend({filter:function(bw,e,bv){if(
bw){bw!="not("+bw+")"}return e.length==1?b.find.matchesSelector(e[0],bw)?[e[0]]:[];
b.find.matches(bw,e)},dir:function(bw,bv,by){var e=[],bx=bw[bv];while(bx&&bx.nodeType!=9&&(by===
L||bx.nodeType!=1||!bx.is(by)))if(bx.nodeType==1){e.push(bx)}bx=bw[bv]};nth:function(by,e,bw,
bx){e=e||1;var bv=0;for(;by;by=bw[bv+1])if(by.nodeType==1&&+bv==e){break}};sibling:function(bw,
bv){var e=[];for(;bw;bw=bw.nextSibling){if(bw.nodeType==1&&bw!=bv){e.push(bw)}}return e}};function aG(bx,
bw,e){bw=bw[0];if(b.isFunction(bw)){return b.grep(bx,function(bz,by){var ba!=!bw.call(bz,by,bz);return ba==
e})}else{if(bw.nodeType){return b.grep(bx,function(bz,by){return(bz==bw)==e})}else{if(typeof bw=="string"
){var bv=b.grep(bx,function(bz,by){return by.nodeType==1});if(bp.test(bw)){return b.filter(bw,bv,!e)}else{bw=
b.filter(bw,bv)}}}return b.grep(bx,function(bz,by){return(b.inArray(bz,bw)>0)==e})}}function a(e){var bw=
aR.split(" "),bv=e.createDocumentFragment();if(bv.createElement){while(bw.length){bv.createElement(bw.pop())}}
}return bv}var ar="";
abbr|article|aside|audio|canvas|datalist|details|figcaption|figure|footer|header|hgroup|mark|meter|nav|output|progress|
area|br|col|embed|hr|img|input|link|meta|param)(([w:]+[^>]*)|/|>/ig,d=/<([w:]+)/,w=<tbody/i,W=</&#?w+/
,ae=/^(?:script|style)/i,O=<(?:script|object|embed|option|style)/i,ah=new RegExp("<(:?"+aR+"")","i"),o=
checked\s(?:[^=|=|=s*.checked)/i,bm=/^(javalecmascript/i,an="\`s*!?:?(\?)[CDATA\[|\|-\\\)/,ax=[option:[1,
<select multiple="multiple">,"</select>"],legend:[1,<fieldset>,"</fieldset>"],thead:[1,<table>,"</table>"],tr
:[2,<table><tbody>,"</tbody></table>"],td:[3,<table><tbody><tr>,"</tr></tbody></table>"],col:[2,
<table><tbody></tbody><colgroup>,"</colgroup></table>"],area:[1,<map>,"</map>"],_default:[0,""],ac=a(av);
ax.optgroup=ax.option;ax.tbody=ax.tfoot=ax.colgroup=ax.caption=ax.thead;ax.th=ax.td;if(
b.support.htmlSerialize)(ax._default=[1,"div<div>","</div>"]);b.fn.extend({text:function(e){if(
b.isFunction(e)){return this.each(function(bw){var bv=b(this);bv.text(e.call(this,bw,bv.text()))})}if(
typeof e=="object"&&!e==L){return this.empty().append(this[0]&&this[0].ownerDocument||av).createTextNode(e)}}
return b.text(this)),wrapAll:function(e){if(b.isFunction(e)){return this.each(function(bw){
b(this).wrapAll(e.call(this,bw)))}if(this[0]){var bv=b(e,this[0].ownerDocument).eq(0).clone(true);if(this[0].parentNode
){bv.insertBefore(this[0])}bv.map(function(){var bw=bv;while(bw.firstChild&&bw.firstChild.nodeType==1){bw=bw.firstChild}return bw}).append(this)}},wrapInner:function(e){if(
b.isFunction(e)){return this.each(function(bv){b(v).wrapInner(e.call(this,bv)))}return this.
each(function(){var bv=b(this),bw=bv.contents();if(bw.length){bw.wrapAll(e)}else{bv.append(e)}})},wrap:
function(e){var bv=b.isFunction(e);return this.each(function(bw){b(w).wrapAll(bv?e.call(this,bw):e)}),unwrap
:function(){return this.parent().each(function(){if(!b.nodeName(this,"body")){b(this).replaceWith(this.
childNodes)}}).end()},append:function(){return this.domManip(arguments,true,function(e){if(this.nodeType==1){this.appendChild(e)}},prepend:function(){return this.domManip(arguments,true,function(e){if(this.nodeType==1){this.insertBefore(e,this.firstChild)}},before:function(){if(this[0]&&this[0].parentNode){return this.
domManip(arguments,false,function(bv){this.parentNode.insertBefore(bv,this))}else{if(arguments.length){var e=
b.clean(arguments);e.push.apply(e,this.toArray());return this.pushStack(e,"before",arguments)}},after:
function(){if(this[0]&&this[0].parentNode){return this.domManip(arguments,false,function(bv){this.parentNode.
insertBefore(bv,this.nextSibling))}else{if(arguments.length){var e=this.pushStack(this,"after",arguments);e.
push.apply(e,b.clean(arguments));return e}}},remove:function(e,bx){for(var bv=0,bw;(bw=this[bv])!=null;bv++){if(!e||b.filter(e,[bw]).length){if(!bx&&bw.nodeType==1){b.cleanData(bw.getElementsByTagName("*"));
b.cleanData([bw])}if(bw.parentNode){bw.parentNode.removeChild(bw)}}return this}},empty:function(){for(var e
=0,bv;(bv=this[e])!=null;e++)if(bv.nodeType==1){b.cleanData(bv.getElementsByTagName("*"))}while(bv.
firstChild){bv.removeChild(bv.firstChild)}}return this},clone:function(bv,e){bv=bv==null?false: bv;e=e==null?bv:e;
return this.map(function(){return b.clone(this,bv,e)}),html:function(bx){if(bx==L){return this[0]&&this[0].
nodeType==1?this[0].innerHTML.replace(ag,""):null}else{if(typeof bx=="string"&&!ae.test(bx)&&b.support.
leadingWhitespace||!ar.test(bx))&&!ax[[d.exec(bx)||[" ","]][1].toLowerCase()])bx=bx.replace(R,
<$1></$2>);try{for(var bw=0,bv=this.length;bw<bv;bw++){if(this[bw].nodeType==1){
b.cleanData(this[bw].getElementsByTagName("*"));this[bw].innerHTML=bx}}catch(by){this.empty().append(bx)}}
else{if(b.isFunction(bx)){this.each(function(bz){var e=b(this);e.html(bx.call(this,bz,e.html()))})}else{
this.empty().append(bx)}}return this},replaceWith:function(e){if(this[0]&&this[0].parentNode){if(
b.isFunction(e)){return this.each(function(bx){var bw=b(this),bv=bw.html();bw.replaceWith(e.call(this,bx,bv))})}if(
typeof e!="string"){e=b(e).detach();return this.each(function(){var bw=this.nextSibling,bv=this.
parentNode;b(this).remove();if(bw){b(bw).before(e)}else{b(bw).append(e)}})}else{return this.length?this.
pushStack(b(b.isFunction(e)?e:e),"replaceWith",e:this)},detach:function(e){return this.remove(e,true)},domManip:
function(bB,bF,bE){var bx,by,bA,bD=b[0],bv=[];if(!b.support.checkClone&&arguments.length==3&&typeof bC
=="string"&&o.test(bC)){return this.each(function(){b(this).domManip(bB,bF,bE,true)})}if(
b.isFunction(bC)){return this.each(function(bH){var bg=b(this);bB[0]=bC.call(this,bH,bF?bg.html():
L);bG.domManip(bB,bF,BE)});if(this[0]{bD=bC&&C.parentNode;if(b.support.parentNode&&bD.nodeType==11&&
bD.childNodes.length==this.length){bx=[fragment:bD]}else{bx=b.buildFragment(bB,this,bv)}bA=bx.fragment;if(
bA.childNodes.length==1){by=bA.firstChild}else{by=bA.firstChild;if(by){bF=bF&&b.nodeName(by,"tr");
for(var bw=0,e=this.length,bz=-1;bw<e;bw++){bE.call(bF?ba(this[bw]),by):this[bw],bx.
cacheable||(e>1&&bw>1)?b.clone(bA,true,true):bE}if(bv.length){b.each(bv,bo){return this}}};function ba(e,bv
){return b.nodeName(e,"table")?e.getElementsByTagName("tbody")[0]:e.append(ba(e.ownerDocument.
createElement("tbody")));e.function t(bB,bv){if(bv.nodeType!=1||!b.hasData(bB)){return}var by,bx,e,bA=
b._data(bB),bz=b._data(bv,bA),bw=bA.events;if(bw){delete bz.handle;bw.events={};for(by in bw){for(bx=0,e=bx
[by].length;bx<e;bx++){b.event.add(bv,by+(bw[by][bx]).namespace?"."+":")"+bw[by][bx].namespace,bw[by][bx],bw
[j][bx].data)}}}if(bz.data){bz.data=b.extend({},bz.data))}function ai(bv,e){var bw;if(e.nodeType!=1){return
if(e.clearAttributes){e.clearAttributes()}if(e.mergeAttributes){e.mergeAttributes(bv)}bw=e.nodeName.
toLowerCase();if(bw=="object"){e.outerHTML=bv.outerHTML}else{if(bw=="input"||bv.type=="checkbox"||bv.type=="radio")
{if(bv.checked){e.defaultChecked=e.checked}if(e.value!=bv.value){e.value=bv.value}else{if(
bw=="option"){e.selected=bv.defaultSelected}else{if(bw=="input"||bw=="textarea"){e.defaultValue=bv.
defaultValue}}}}e.removeAttribute(b.expand);b.buildFragment=function(bz,bx,bv){var by,e,bw,bA,bB=b[0];
if(bx&&bx[0])bA=bx[0].ownerDocument||bx[0]};if(!bA.createDocumentFragment){bA=av}if(bz.length==1&&typeof bB=="string"
&&bB.length<512&&bA==av&&bB.charAt(0)=="<"&&!0.test(bB)&&(b.support.checkClone||!o.test(bB))&&
b.support.html5Clone||!ah.test(bB)){e=true;bw=b.fragments[b];if(bw&&bw!=1){by=bw}if(!by){by=bA.
createDocumentFragment();b.clean(bz,bA,by,bv)}if(e){b.fragments[bB]=bw?by:1}return{fragment:by,cacheable:e}};
b.fragments={};b.each({appendTo:"append"},prependTo:"prepend",insertBefore:"before",insertAfter:"after",
replaceAll:"replaceWith"},function(e,bv){b.fn[e]=function(bw){var bz[],bC=b(bw),bw=bthis.length==1&&this[0].
parentNode;if(bB&&bB.nodeType==11&&bB.childNodes.length==1&&bC.length==1){bC[bv](this[0]);return this}else{
for(var bA=0,bx=bC.length;bA<bx;bA++){var by=(bA>0?this.clone(true):this).get();b(bC[bA])[bv](by);bz=bz.
}}}
```

```

concat(by) }return this.pushStack(bz,e,bC.selector))});function bg(e){if(typeof e.getElementsByTagName!=="undefined") {return e.
querySelectorAll("*") }else{if(typeof e.querySelectorAll!=="undefined") {return e.
checked}}function E(e){var bv=(e.nodeName||"").toLowerCase();if(bv==="input") {az(e)}else{if(bv==="script"&&
typeof e.getElementsByTagName!=="undefined") {b.grep(e.getElementsByTagName("input"),az)}}}function al(e){var bv=
av.createElement("div");ac.appendChild(bv);bv.innerHTML=e.outerHTML;return bv.firstChild}
b.extend({clone:function(by,ba,bw){var e,bv,bx,bz=b.support.html5Clone||!ah.test("<"+by.nodeName)?by.
cloneNode(true):al(by);if(!b.support.noCloneEvent||!b.support.noCloneChecked)&&(by.nodeType==!=1||by.nodeType==!=11
)&&!b.isXMLDoc(by)){ai(by,bz);e=bg(by);bv=bg(bz);for(bx=0;e[bx];++bx){if(bv[bx]) {ai(e[bx],bv[bx])}}if(bA){t
(by,bz);if(bw){e=bg(by);bv=bg(bz);for(bx=0;e[bx];++bx){t(e[bx],bv[bx])}}e=null;return bz},clean:function
(bw,bz,bA){var bF;by=by||av;if(typeof by.createElement=="undefined") {by=by.ownerDocument||by[0]&&by[0].
ownerDocument||av}var bI=[],bB;for(var bE=0,bz;(bz=bw[bE])!=null;bE++){if(typeof bz=="number"){bz+=""}if(!bz
){continue}if(typeof bz=="string"){if(!W.test(bz)){bz=by.createTextNode(bz)}else{bz=bz.replace(R,"<$1>/<$2>
");}}var bK=(d.exec(bz)||["","",""])[1].toLowerCase(),bx=ax[bK]||ax._default,bD=bx[0],bv=by.createElement("div");
if(by==av){ac.appendChild(bv)}else{a(by).appendChild(bv)}bv.innerHTML=bx[1]+bz+bx[2];while(bD--) {bv=bv.
lastChild}if(!b.support.tbody){var e=w.test(bz),bc=bK==="table"&&!e?bv.firstChild&&bv.firstChild.childNodes:bx[1]
===<table>"&&!e?bv.childNodes:[];for(bB=bC.length-1;bB>0;--bB){if(b.nodeName(bC[bB],"tbody")&&!bC[bB].
childNodes.length){bC[bB].parentNode.removeChild(bC[bB])}}}if(!b.support.leadingWhitespace&&ar.test(bz)){bv.
insertBefore(by.createTextNode(ar.exec(bz)[0]),bv.firstChild)}bz=bv.childNodes}var bG;if(!
b.support.appendChecked){if(bz[0]&&typeof(bG=bz.length)==="number"){for(bB=0;bB<bG;bB++){E(bz[bB])}}else{E(
bz)}}if(bz.nodeType){bI.push(bz)}else{bI=b.merge(bI,bz)}if(bH){bF=function(bL){return !bL.type||bm.test(bL.
type)};for(bE=0;bI[bE];bE++){if(bA&&b.nodeName(bI[bE],"script")&&(!bI[bE].type||bI[bE].type.toLowerCase()===
"text/javascript")){bA.push(bI[bE].parentNode?bI[bE].parentNode.removeChild(bI[bE]):bI[bE])}else{if(bI[bE].
nodeType==!=1){var bJ=b.grep(bI[bE].getElementsByTagName("script"),bF);bI.splice.apply(bI,[bE+1,0].concat(bJ))
}bH.appendChild(bI[bE])}}}return bI},cleanData:function(bv){var by,bw,e=b.cache,bB=
b.event.special,bA=b.support.deleteExpando;for(var bz=0,bx;(bx=bv[bz])!=null;bz++){if(bx.nodeName&&
b.noData[bx.nodeName.toLowerCase()]) {continue}bw=bx[b.expando];if(bw){by=e[bw];if(by&&by.events){for(var bC
in by.events){if(bB[bC]){b.event.remove(bx,bC)}else{b.removeEvent(bx,bC,by.handle)}}}if(by.handle){by.handle(
.elem=null)}if(bA){delete bx[b.expando]}else{if(bx.removeAttribute){bx.removeAttribute(
b.expando)}}}delete e[bw]}));function bo(e,bv){if(bv.src){b.ajax({url:bv.src,async:false,dataType:"script"
})}else{b.globalEval((bv.text||bv.textContent||bv.innerHTML||"").replace(aN,"/*$0*/"))}if(bv.parentNode){bv.
parentNode.removeChild(bv)}var ak=/alpha\(([^)]*)\)/i

```

Definition at line 16 of file jquery.js.

14.18.2.9 function bb

Definition at line 16 of file jquery.js.

14.18.2.10 var bq =/#.*\$/

Definition at line 29 of file jquery.js.

14.18.2.11 var bs =/\r?\n/g

Definition at line 29 of file jquery.js.

14.18.2.12 var c

Initial value:

```

=/^\/\
{}))}var Q={},a8,m,aB=/^(?:toggle|show|hide)$/,aT=/^([+\-]=)?([\d+\.\-]+)([a-z%]*$)/i,a3,aH=[["height",
"marginTop","marginBottom","paddingTop","paddingBottom"],["width","marginLeft","marginRight","paddingLeft",
"paddingRight"],["opacity"]],a4

```

Definition at line 29 of file jquery.js.

```
14.18.2.13 b fn css =function(e,bv){if(arguments.length==2&&bv==L){return this}return
```

```
    b.access(this,e,bv,true,function(bx,bw,by){return by!=L?b.style(bx,bw,by):b.css(bx,bw)}))}
```

Definition at line 28 of file jquery.js.

14.18.2.14 b curCSS =b.css

Definition at line 28 of file jquery.js.

```
14.18.2.15 else {b.fn.offset=function(bF){var bz=this[0];if(bF){return this.each(function(bG){b.offset.setOffset(this,bF,bG))});if(!bz||!bz.ownerDocument){return null}if(bz==bz.ownerDocument.body){return b.offset.bodyOffset(bz)}var bC,bw=bz.offsetTop,bv=bz,bE=bz.ownerDocument,bx=bE.documentElement,Element,bA=bE.body,bB=bE.defaultView,e=bB?bB.getComputedStyle(bz,null):bz.currentStyle,bD=bz.offsetTop,by=bz.offsetTopLeft;while((bz=bz.parentNode)&&bz!=bA&&bz!=bx){if(b.support.fixedPosition&&e.position=="fixed"){break}bC=bB?bB.getComputedStyle(bz,null):bz.currentStyle;bD-=bz.scrollTop;by-=bz.scrollLeft;if(bz==bw){bD+=bz.offsetTop;by+=bz.offsetTopLeft;if(b.support.doesNotAddBorder&&!b.support.doesAddBorderForTableAndCells&&V.test(bz.nodeName)){bD+=parseFloat(bC.borderTopWidth)||0;by+=parseFloat(bC.borderLeftWidth)||0}bv=bw;bw=bz.offsetTopParent;if(b.support.subtractsBorderForOverflowNotVisible&&bC.overflow!="visible"){bD+=parseFloat(bC.borderTopWidth)||0;by+=parseFloat(bC.borderLeftWidth)||0}e=bC;if(e.position=="relative"||e.position=="static"){bD+=bA.offsetTop;by+=bA.offsetTopLeft;if(b.support.fixedPosition&&e.position=="fixed"){bD+=Math.max(bx.scrollTop,bA.scrollTop);by+=Math.max(bx.scrollLeft,bA.scrollLeft)}return{top:bD,left:by}}};b.offset={bodyOffset:function(e){var bw=e.offsetTop,bv=e.offsetLeft;if(b.support.doesNotIncludeMarginInBodyOffset){bw+=parseFloat(b.css(e,"marginTop"))||0;bv+=parseFloat(b.css(e,"marginLeft"))||0}return{top:bw,left: bv}},setOffset:function(bx,bG,bA){var bB=b.css(bx,"position");if(bB=="static"){bx.style.position="relative"}var bz=b(bx),bw=bz.offsetTop,e=b.css(bx,"top"),bE=b.css(bx,"left"),bF=(bB=="absolute"||bB=="fixed")&&b.inArray("auto",[e,bE])>-1,bD={},bC={},bw,by;if(bF){bC=bz.position();bw=bC.top;by=bC.left}else{bw=parseFloat(e)||0;by=parseFloat(bE)||0}if(b.isFunction(bG)){bG=bG.call(bx,bA,bv)}if(b.G.top!=null){bD.top=(bG.top-bv.top)+bw}if(bG.left!=null){bD.left=(bG.left-bv.left)+by}if("using" in bG){bG.using.call(bx,bD)}else{bz.css(bD)}}}}
```

Definition at line 30 of file jquery.js.

14.18.2.16 bb jQuery =bb.\$=b

Definition at line 30 of file jquery.js.

14.18.2.17 var k =/%20/g

Definition at line 29 of file jquery.js.

14.18.2.18 function L {var av=bb.document,bu=bb.navigator,bl=bb.location

Definition at line 16 of file jquery.js.

```
14.18.2.19 b fx prototype ={update:function(){if(this.options.step){this.options.step.call(this.elem,this.now,this)}(b.←
fx.step[this.prop]||b.fx.step._default)(this)},cur:function(){if(this.elem[this.prop]!=null&&(!this.elem.←
style||this.elem.style[this.prop]==null)){return this.elem[this.prop]}var e,bv=b.css(this.elem,this.prop);return
isNaN(e=parseFloat(bv))?!bv||bv==="auto"?0:bv:e},custom:function(bz,by,bx){var
e=this,bw=b.fx;this.startTime=a4||bh();this.end=by;this.now=this.start=bz;this.pos=this.←
state=0;this.unit=bx||this.unit||(b.cssNumber[this.prop]?"" :"px");function bv(bA){return
e.step(bA)}bv.queue=this.options.queue;bv.elem=this.elem;bv.saveState=function(){if(e.←
options.hide&&b._data(e.elem,"fxshow"+e.prop)===L){b._data(e.elem,"fxshow"+e.prop,e.←
start)}};if(bv()&&b.timers.push(bv)&&!a3){a3=setInterval(bw.tick,bw.interval)}},show:function(){var
e=b._data(this.elem,"fxshow"+this.prop);this.options.orig[this.prop]=e||b.style(this.elem,this.prop);this.options.←
show=true;if(e==L){this.custom(this.cur(),e)}else{this.custom(this.prop==="width"||this.prop==="height"?1←
:0,this.cur())}b(this.elem).show(),hide:function(){this.options.orig[this.prop]=b._data(this.elem,"fxshow"+this.←
prop)||b.style(this.elem,this.prop);this.options.hide=true;this.custom(this.cur(),0)},step:function(by){var
bA,bB,bv,bx=a4||bh(),e=true,bz=this.elem,bw=this.options;if(by||bx>=bw.duration+this.start←
Time){this.now=this.end;this.pos=this.state=1;this.update();bw.animatedProperties[this.prop]=true;for(bA
in bw.animatedProperties){if(bw.animatedProperties[bA]!==true){e=false}}if(e){if(bw.←
overflow!=null&&!b.support.shrinkWrapBlocks){b.each(["","X","Y"],function(bC,bD){bz.←
style["overflow"+bD]=bw.overflow[bC]})}if(bw.hide){b(bz).hide()}if(bw.hide||bw.show){for(bA
in bw.animatedProperties){b.style(bz,bA,bw.orig[bA]);b.removeData(bz,"fxshow"+bA,true);b.←
removeData(bz,"toggle"+bA,true)}}}bv=bw.complete;if(bv){bw.complete=false;bv.call(bz)}return
false}else{if(bw.duration==Infinity){this.now=bx}else{bB=bx-this.startTime;this.state=bB/bw.duration;this.pos=b.←
easing[bw.animatedProperties[this.prop]](this.state,bB,0,1,bw.duration);this.now=this.start+((this.end-this.←
start)*this.pos)}this.update()}return true}}
```

Definition at line 30 of file jquery.js.

```
14.18.2.20 var V =/^t(?:able|d|h)$/i
```

Definition at line 30 of file jquery.js.

```
14.18.2.21 window
```

Definition at line 31 of file jquery.js.

```
14.18.2.22 Z =aI|aX
```

Definition at line 28 of file jquery.js.

14.19 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_ieaphsp_source/docs/output/html _0.js File Reference

Variables

- var [searchData](#)

14.19.1.1 var searchData

Initial value:

```
=  
[  
  ['count', ['count', ['../classEB__IAEASource.html#a59b8aff93bc2a44c9332251a39e03b2d', 1, 'EB_IAEASource']]  
]
```

Definition at line 1 of file all_0.js.

14.20 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_ieaphsp_source/docs/output/html/_1.js File Reference

Variables

- var [searchData](#)

14.20.1 Variable Documentation

14.20.1.1 var searchData

Initial value:

```
=  
[  
  ['eb_5fiaeaphsp_5fsource_2eh', ['eb_ieaphsp_source.h', ['../eb_ieaphsp_source_8h.html', 1, '' ]],  
  ['eb_5fiaeasource', ['EB_IAEASource', ['../classEB__IAEASource.html', 1, 'EB_IAEASource']],  
   ['../classEB__IAEASource.html#a5bf2bf03f93fc7087cd4f8d70f5510f2', 1, 'EB_IAEASource::EB_IAEASource()' ]],  
  ['emax', ['Emax', ['../classEB__IAEASource.html#a085ddd3e29afb1705532e4d7f98f5e6d', 1, 'EB_IAEASource']]],  
  ['emin', ['Emin', ['../classEB__IAEASource.html#acc52ee4da87b7a324436a5b400d6d635', 1, 'EB_IAEASource']]]  
]
```

Definition at line 1 of file all_1.js.

14.21 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_ieaphsp_source/docs/output/html/_2.js File Reference

Variables

- var [searchData](#)

14.21.1 Variable Documentation

14.21.1.1 var searchData

Initial value:

```
=
[
  ['nfirst', ['Nfirst', ['../classEB__IAEASource.html#a1e8b0e2d9508a824b64cf5760c5bbe9', 1, 'EB__IAEASource']]],
  ['nincident', ['Nincident', ['../classEB__IAEASource.html#a481aba1172d6618b31c7bbb7079f27f0', 1, 'EB__IAEASource']]],
  ['nlast', ['Nlast', ['../classEB__IAEASource.html#a5622aaa2e72c01a870c3368233db7d22', 1, 'EB__IAEASource']]],
  ['nparticle', ['Nparticle', ['../classEB__IAEASource.html#a5d88acc7dde735592b5fd4838f924485', 1, 'EB__IAEASource']]],
  ['nphoton', ['Nphoton', ['../classEB__IAEASource.html#a23605d1c842fa0b0c74214e78913f512', 1, 'EB__IAEASource']]],
  ['npos', ['Npos', ['../classEB__IAEASource.html#a5f4212bfae2ec3a680cf45733077f7d9', 1, 'EB__IAEASource']]],
  ['nread', ['Nread', ['../classEB__IAEASource.html#aa8775c096863828b09f3c3f177597786', 1, 'EB__IAEASource']]],
  ['nused', ['Nused', ['../classEB__IAEASource.html#abd7f7c192839e8af9b4cd69617f528e8', 1, 'EB__IAEASource']]]
]
```

Definition at line 1 of file all_2.js.

14.22 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_ieaphsp_source/docs/output/html _3.js File Reference

Variables

- var `searchData`

14.22.1 Variable Documentation

14.22.1.1 var searchData

Initial value:

```
=
[
  ['phsp_5ffile', ['phsp_file', ['../classEB__IAEASource.html#af46258bcd9e3d0cf7a9962212f04c84f', 1, 'EB__IAEASource']]],
  ['phsp_5ffile_5fname', ['phsp_file_name', ['../classEB__IAEASource.html#a14c4912c7ce7ce4bc716f713b541acab', 1, 'EB__IAEASource']]]
]
```

Definition at line 1 of file all_3.js.

14.23 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_ieaphsp_source/docs/output/html _0.js File Reference

Variables

- var `searchData`

14.23.1.1 var searchData

Initial value:

```
=  
[  
  ['eb_5fiaeasource', ['EB_IAEASource', ['../classEB__IAEASource.html', 1, '' ]]]  
]
```

Definition at line 1 of file classes_0.js.

14.24 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_ieaphsp_source/docs/output/html/files_0.js File Reference

Variables

- var [searchData](#)

14.24.1 Variable Documentation

14.24.1.1 var searchData

Initial value:

```
=  
[  
  ['eb_5fiaeaphsp_5fsource_2eh', ['eb_ieaphsp_source.h', ['../eb_ieaphsp_source_8h.html', 1, '' ]]]  
]
```

Definition at line 1 of file files_0.js.

14.25 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_ieaphsp_source/docs/output/html/files_0.js File Reference

Variables

- var [searchData](#)

14.25.1 Variable Documentation

14.25.1.1 var searchData

Initial value:

```
=  
[  
  ['eb_5fiaeasource', ['EB_IAEASource', ['.../classEB__IAEASource.html#a5bf2bf03f93fc7087cd4f8d70f5510f2', 1,  
    'EB_IAEASource']]  
]
```

Definition at line 1 of file functions_0.js.

14.26 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_ieaphsp_source/docs/output/html File Reference

Functions

- function `convertTold` (`search`)
- function `getXPos` (`item`)
- function `getYPos` (`item`)
- function `SearchBox` (`name, resultsPath, inFrame, label`)
- function `SearchResults` (`name`)
- function `setKeyActions` (`elem, action`)
- function `setClassAttr` (`elem, attr`)
- function `createResults` ()

Variables

- var `indexSectionsWithContent`
- var `indexSectionNames`

14.26.1 Function Documentation

14.26.1.1 function convertTold (`search`)

Definition at line 26 of file search.js.

14.26.1.2 function createResults ()

Definition at line 747 of file search.js.

14.26.1.3 function getXPos (`item`)

Definition at line 49 of file search.js.

Reference

14.26.1.4 `function getYPos (item)`

Definition at line 63 of file search.js.

14.26.1.5 `function SearchBox (name, resultsPath, inFrame, label)`

Definition at line 84 of file search.js.

14.26.1.6 `function SearchResults (name)`

Definition at line 429 of file search.js.

14.26.1.7 `function setClassAttr (elem, attr)`

Definition at line 741 of file search.js.

14.26.1.8 `function setKeyActions (elem, action)`

Definition at line 734 of file search.js.

14.26.2 Variable Documentation

14.26.2.1 `var indexSectionNames`

Initial value:

```
=  
{  
  0: "all",  
  1: "classes",  
  2: "files",  
  3: "functions",  
  4: "variables"  
}
```

Definition at line 17 of file search.js.

14.26.2.2 `var indexSectionsWithContent`

Initial value:

```
=  
{  
  0: "cencp",  
  1: "e",  
  2: "e",  
  3: "e",  
  4: "cencp"  
}
```

Definition at line 8 of file search.js.

14.27 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_ieaphsp_source/docs/output/html/_0.js File Reference

Variables

- var `searchData`

14.27.1 Variable Documentation

14.27.1.1 var searchData

Initial value:

```
=  
[  
  ['count', ['count', ['.../classEB__IAEASource.html#a59b8aff93bc2a44c9332251a39e03b2d', 1, 'EB__IAEASource']]  
]
```

Definition at line 1 of file variables_0.js.

14.28 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_ieaphsp_source/docs/output/html/_1.js File Reference

Variables

- var `searchData`

14.28.1 Variable Documentation

14.28.1.1 var searchData

Initial value:

```
=  
[  
  ['emax', ['Emax', ['.../classEB__IAEASource.html#a085ddd3e29afb1705532e4d7f98f5e6d', 1, 'EB__IAEASource']]],  
  ['emin', ['Emin', ['.../classEB__IAEASource.html#acc52ee4da87b7a324436a5b400d6d635', 1, 'EB__IAEASource']]]  
]
```

Definition at line 1 of file variables_1.js.

14.29 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_ieaphsp_source/docs/output/html/_2.js File Reference

Variables

- var `searchData`

14.29.1.1 var searchData

Initial value:

```
=  
[  
  ['nfirst', ['Nfirst', ['../classEB__IAEASource.html#a1e8b0e2d9508a824b64cf5760c5bbe9', 1, 'EB_IAEASource']]],  
  ['nincident', ['Nincident', ['../classEB__IAEASource.html#a481aba1172d6618b31c7bbb7079f27f0', 1, 'EB_IAEASource']]],  
  ['nlast', ['Nlast', ['../classEB__IAEASource.html#a5622aaa2e72c01a870c3368233db7d22', 1, 'EB_IAEASource']]],  
  ['nparticle', ['Nparticle', ['../classEB__IAEASource.html#a5d88acc7dde735592b5fd4838f924485', 1, 'EB_IAEASource']]],  
  ['nphoton', ['Nphoton', ['../classEB__IAEASource.html#a23605d1c842fa0b0c74214e78913f512', 1, 'EB_IAEASource']]],  
  ['npos', ['Npos', ['../classEB__IAEASource.html#a5f4212bfae2ec3a680cf45733077f7d9', 1, 'EB_IAEASource']]],  
  ['nread', ['Nread', ['../classEB__IAEASource.html#aa8775c096863828b09f3c3f177597786', 1, 'EB_IAEASource']]],  
  ['nused', ['Nused', ['../classEB__IAEASource.html#abd7f7c192839e8af9b4cd69617f528e8', 1, 'EB_IAEASource']]])
```

Definition at line 1 of file variables_2.js.

14.30 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_ieaphsp_source/docs/output/html/variables_3.js File Reference

Variables

- var searchData

14.30.1 Variable Documentation

14.30.1.1 var searchData

Initial value:

```
=  
[  
  ['phsp_5ffile', ['phsp_file', ['../classEB__IAEASource.html#af46258bcd9e3d0cf7a9962212f04c84f', 1, 'EB_IAEASource']]],  
  ['phsp_5ffile_5fname', ['phsp_file_name', ['../classEB__IAEASource.html#a14c4912c7ce7ce4bc716f713b541acab', 1, 'EB_IAEASource']]])
```

Definition at line 1 of file variables_3.js.

14.31 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_ieaphsp_source/eb_ieaphsp_source.cpp File Reference

```
#include <iostream>  
#include "eb_ieaphsp_source.h"  
#include "egs_application.h"  
#include "egs_input.h"  
#include "egs_functions.h"  
Include dependency graph for eb_ieaphsp_source.cpp:
```

14.32 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_ieaphsp_source/eb_ieaphsp_source.h File Reference

a minimal IAEA phase space source for egs_brachy

```
#include "egs_config1.h"
#include "egs_vector.h"
#include "egs_base_source.h"
#include "egs_rndm.h"
#include "egs_alias_table.h"
#include "../iaea_phsp/iaea_phsp.h"
#include <fstream>
```

Include dependency graph for eb_ieaphsp_source.h: This graph shows which files directly or indirectly include this file:

Classes

- class [EB_IAEASource](#)
A phase space file source for egs_brachy.

Macros

- `#define EB_IAEA_SOURCE_EXPORT`
- `#define EB_IAEA_SOURCE_LOCAL`

14.32.1 Detailed Description

a minimal IAEA phase space source for egs_brachy

A minimal IAEA phsp source for use with egs_brachy.

See the [EB_IAEASource](#) page for input details.

14.32.2 Macro Definition Documentation

14.32.2.1 #define EB_IAEA_SOURCE_EXPORT

Definition at line 75 of file eb_ieaphsp_source.h.

14.32.2.2 #define EB_IAEA_SOURCE_LOCAL

Definition at line 76 of file eb_ieaphsp_source.h.

14.33 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/_init__.py File Reference**Namespaces**

- [eb_tests](#)

14.34 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/brem_cyl/_init__.py File Reference**Namespaces**

- [eb_tests.brem_cyl](#)

14.35 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/flu_cutoff/_init__.py File Reference**Namespaces**

- [eb_tests.flu_cutoff](#)

14.36 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/phsp_run/_init__.py File Reference**Namespaces**

- [eb_tests.phsp_run](#)

14.37 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/phsp_scoring/_init__.py File Reference**Namespaces**

- [eb_tests.phsp_scoring](#)

14.38 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/recycling/_init__.py File Reference**Namespaces**

- [eb_tests.recycling](#)

14.39 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/scatter/__init__.py File Reference

Namespaces

- [eb_tests.scatter](#)

14.40 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/seeds_in_xyz/__init__.py File Reference

Namespaces

- [eb_tests.seeds_in_xyz](#)

14.41 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/seeds_in_xyz_genvelope/__init__.py File Reference

Namespaces

- [eb_tests.seeds_in_xyz_genvelope](#)

14.42 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/simple_dose_sph/__init__.py File Reference

Namespaces

- [eb_tests.simple_dose_sph](#)

14.43 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/single_generator/__init__.py File Reference

Namespaces

- [eb_tests.single_generator](#)

14.44 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/source_energies/__init__.py File Reference

Namespaces

- [eb_tests.source_energies](#)

14.45 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/spec_absolute/__init__.py File Reference

Namespaces

- [eb_tests.spec_absolute](#)

14.46 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/spec_eflu/__init__.py File Reference

Namespaces

- [eb_tests.spec_eflu](#)

14.47 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/spec_vox/__init__.py File Reference

Namespaces

- [eb_tests.spec_vox](#)

14.48 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/stepped_source/__init__.py File Reference

Namespaces

- [eb_tests.stepped_source](#)

14.49 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/tg43mode/__init__.py File Reference

Namespaces

- [eb_tests.tg43mode](#)

14.50 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/tg43mode_recycle/__init__.py File Reference

Namespaces

- [eb_tests.tg43mode_recycle](#)

14.51 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/tg43mode_←
zeroweight/_init__.py File Reference

Namespaces

- [eb_tests.tg43mode_zeroweight](#)

14.52 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/variable_←
activity/_init__.py File Reference

Namespaces

- [eb_tests.variable_activity](#)

14.53 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/variable_w_←
recycling/_init__.py File Reference

Namespaces

- [eb_tests.variable_w_recycling](#)

14.54 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/volume_←
correction/_init__.py File Reference

Namespaces

- [eb_tests.volume_correction](#)

14.55 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/brem_cyl/test.py
File Reference

Namespaces

- [eb_tests.brem_cyl.test](#)

Functions

- def [eb_tests.brem_cyl.test.compare_results](#) (egslst, inp_name)

Variables

- string `eb_tests.brem_cyl.test.EGSINP` = "brem_cyl.egsinp"
- int `eb_tests.brem_cyl.test.TIME_LIMIT_S_PER_MHZ` = 20
- list `eb_tests.brem_cyl.test.DOSRZ_NRC_DOSES`
- dictionary `eb_tests.brem_cyl.test.expected_doses`

14.56 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/flu_cutoff/test.py File Reference

Namespaces

- `eb_tests.flu_cutoff.test`

Functions

- def `eb_tests.flu_cutoff.test.compare_results` (egslst, inp_name)

Variables

- string `eb_tests.flu_cutoff.test.EGSINP` = "flu_cutoff.egsinp"
- int `eb_tests.flu_cutoff.test.TIME_LIMIT_S_PER_MHZ` = 2

14.57 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/phsp_run/test.py File Reference

Namespaces

- `eb_tests.phsp_run.test`

Functions

- def `eb_tests.phsp_run.test.compare_results` (egslst, inp_name)

Variables

- string `eb_tests.phsp_run.test.EGSINP` = "phsp_run.egsinp"
- int `eb_tests.phsp_run.test.TIME_LIMIT_S_PER_MHZ` = 80

14.58 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/phsp_scoring/test.py File Reference

Namespaces

- `eb_tests.phsp_scoring.test`

Functions

- def `eb_tests.phsp_scoring.test.compare_results` (egslst, inp_name)

Variables

- string `eb_tests.phsp_scoring.test.EGSINP` = "phsp_score.egsinp"
- int `eb_tests.phsp_scoring.test.TIME_LIMIT_S_PER_MHZ` = 10
- tuple `eb_tests.phsp_scoring.test.SOURCE_WEIGHTS` = (1., 9.)
- tuple `eb_tests.phsp_scoring.test.MAX_E` = (0.05, 0.025,)
- int `eb_tests.phsp_scoring.test.NHIST` = 1000
- float `eb_tests.phsp_scoring.test.RM` = 0.511
- dictionary `eb_tests.phsp_scoring.test.EXPECTED`

14.59 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/recycling/test.py File Reference

Namespaces

- `eb_tests.recycling.test`

Functions

- def `eb_tests.recycling.test.compare_results` (egslst, inp_name)

Variables

- string `eb_tests.recycling.test.EGSINP` = "recycling.egsinp"
- int `eb_tests.recycling.test.TIME_LIMIT_S_PER_MHZ` = 16

14.60 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/scatter/test.py File Reference

Namespaces

- `eb_tests.scatter.test`

Functions

- def `eb_tests.scatter.test.get_n_highest_doses` (doses, uncs, n=NCOMPARE)
- def `eb_tests.scatter.test.compare_results` (egslst, inp_name)

Variables

- string `eb_tests.scatter.test.EGSINP` = "scatter.egsinp"
- int `eb_tests.scatter.test.TIME_LIMIT_S_PER_MHZ` = 65
- int `eb_tests.scatter.test.NCOMPARE` = 10

14.61 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/seeds_in_xyz/test.py File Reference

Namespaces

- `eb_tests.seeds_in_xyz.test`

Functions

- def `eb_tests.seeds_in_xyz.test.compare_results(egslst, inp_name)`

Variables

- string `eb_tests.seeds_in_xyz.test.EGSINP` = "seeds_in_xyz.egsinp"
- int `eb_tests.seeds_in_xyz.test.TIME_LIMIT_S_PER_MHZ` = 25

14.62 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/seeds_in_xyz_genvelope/test.py File Reference

Namespaces

- `eb_tests.seeds_in_xyz_genvelope.test`

Functions

- def `eb_tests.seeds_in_xyz_genvelope.test.compare_results(egslst, inp_name)`

Variables

- string `eb_tests.seeds_in_xyz_genvelope.test.EGSINP` = "seeds_in_xyz_genvelope.egsinp"
- int `eb_tests.seeds_in_xyz_genvelope.test.TIME_LIMIT_S_PER_MHZ` = 25

14.63 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/simple_dose_sph/test.py File Reference

Namespaces

- `eb_tests.simple_dose_sph.test`

Functions

- def `eb_tests.simple_dose_sph.test.compare_results` (egslst, inp_name)

Variables

- string `eb_tests.simple_dose_sph.test.EGSINP` = "simple_dose_sph.egsinp"
- int `eb_tests.simple_dose_sph.test.TIME_LIMIT_S_PER_MHZ` = 22
- dictionary `eb_tests.simple_dose_sph.test.expected_doses`

14.64 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/single_generator/test.py File Reference

Namespaces

- `eb_tests.single_generator.test`

Functions

- def `eb_tests.single_generator.test.compare_results` (egslst, inp_name)

Variables

- string `eb_tests.single_generator.test.EGSINP` = "single_generator.egsinp"
- int `eb_tests.single_generator.test.TIME_LIMIT_S_PER_MHZ` = 25

14.65 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/source_energies/test.py File Reference

Namespaces

- `eb_tests.source_energies.test`

Functions

- def `eb_tests.source_energies.test.compare_results` (egslst, inp_name)

Variables

- string `eb_tests.source_energies.test.EGSINP` = "source_energies.egsinp"
- int `eb_tests.source_energies.test.TIME_LIMIT_S_PER_MHZ` = 2
- dictionary `eb_tests.source_energies.test.expected_results`

14.66 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/spec_absolute/test.py File Reference

Namespaces

- [eb_tests.spec_absolute.test](#)

Functions

- def [eb_tests.spec_absolute.test.expected](#) (e)
- def [eb_tests.spec_absolute.test.compare_results](#) (egslst, inp_name)

Variables

- string [eb_tests.spec_absolute.test.EGSINP](#) = "spec_absolute.egsinp"
- int [eb_tests.spec_absolute.test.TIME_LIMIT_S_PER_MHZ](#) = 6
- [eb_tests.spec_absolute.test.EMIN](#)
- [eb_tests.spec_absolute.test.EMAX](#)

14.67 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/spec_eflu/test.py File Reference

Namespaces

- [eb_tests.spec_eflu.test](#)

Functions

- def [eb_tests.spec_eflu.test.expected](#) (e)
- def [eb_tests.spec_eflu.test.compare_results](#) (egslst, inp_name)

Variables

- string [eb_tests.spec_eflu.test.EGSINP](#) = "spec_eflu.egsinp"
- int [eb_tests.spec_eflu.test.TIME_LIMIT_S_PER_MHZ](#) = 6
- [eb_tests.spec_eflu.test.EMIN](#)
- [eb_tests.spec_eflu.test.EMAX](#)
- int [eb_tests.spec_eflu.test.NHIST](#) = 1
- float [eb_tests.spec_eflu.test.BIN_WIDTH](#) = 0.001
- int [eb_tests.spec_eflu.test.AVG_E](#) = (EMAX+EMIN)/2
- [eb_tests.spec_eflu.test.TOTAL_E](#) = AVG_E*NHIST
- tuple [eb_tests.spec_eflu.test.N_BINS_IN_RANGE](#) = (EMAX-EMIN)/BIN_WIDTH
- [eb_tests.spec_eflu.test.SCORED_IN_BIN](#) = NHIST/N_BINS_IN_RANGE
- [eb_tests.spec_eflu.test.SCORED_IN_BIN_PER_MEV](#) = SCORED_IN_BIN/BIN_WIDTH

14.68 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/spec_vox/test.py

File Reference

Namespaces

- `eb_tests.spec_vox.test`

Functions

- def `eb_tests.spec_vox.test.expected` (`e`)
- def `eb_tests.spec_vox.test.compare_results` (`egslst, inp_name`)

Variables

- string `eb_tests.spec_vox.test.EGSINP` = "spec_vox.egsinp"
- int `eb_tests.spec_vox.test.TIME_LIMIT_S_PER_MHZ` = 7
- float `eb_tests.spec_vox.test.BIN_WIDTH` = 0.001
- `eb_tests.spec_vox.test.EMIN`
- `eb_tests.spec_vox.test.EMAX`
- `eb_tests.spec_vox.test.R1`
- `eb_tests.spec_vox.test.R2`
- `eb_tests.spec_vox.test.TRACK_LENGTH` = R2-R1
- tuple `eb_tests.spec_vox.test.N_BINS_IN_RANGE` = (EMAX-EMIN)/BIN_WIDTH
- `eb_tests.spec_vox.test.SCORED_IN_BIN` = TRACK_LENGTH/N_BINS_IN_RANGE
- int `eb_tests.spec_vox.test.VOLUME` = 4

14.69 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/stepped_source/test.py

File Reference

Namespaces

- `eb_tests.stepped_source.test`

Functions

- def `eb_tests.stepped_source.test.get_n_highest_dose_pairs` (`dose1, dose2, n=NCOMPARE`)
- def `eb_tests.stepped_source.test.compare_results` (`egslst, inp_name`)

Variables

- string `eb_tests.stepped_source.test.EGSINP` = "stepped.egsinp"
- int `eb_tests.stepped_source.test.TIME_LIMIT_S_PER_MHZ` = 1000
- int `eb_tests.stepped_source.test.NCOMPARE` = 20

14.70 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/tg43mode/test.py File Reference

Namespaces

- [eb_tests.tg43mode.test](#)

Functions

- def [eb_tests.tg43mode.test.get_n_highest_dose_pairs](#)(dose1, dose2, n=NCOMPARE)
- def [eb_tests.tg43mode.test.compare_results](#)(egslst, inp_name)

Variables

- string [eb_tests.tg43mode.test.EGSINP](#) = "tg43mode.egsinp"
- int [eb_tests.tg43mode.test.TIME_LIMIT_S_PER_MHZ](#) = 2000
- int [eb_tests.tg43mode.test.NCOMPARE](#) = 100

14.71 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/tg43mode_recycle/test.py File Reference

Namespaces

- [eb_tests.tg43mode.recycle.test](#)

Functions

- def [eb_tests.tg43mode_recycle.test.get_n_highest_dose_pairs](#)(dose1, dose2, n=NCOMPARE)
- def [eb_tests.tg43mode_recycle.test.compare_results](#)(egslst, inp_name)

Variables

- string [eb_tests.tg43mode_recycle.test.EGSINP](#) = "tg43mode_recycling.egsinp"
- int [eb_tests.tg43mode_recycle.test.TIME_LIMIT_S_PER_MHZ](#) = 1000
- int [eb_tests.tg43mode_recycle.test.NCOMPARE](#) = 50

14.72 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/tg43mode_zeroweight/test.py File Reference

Namespaces

- [eb_tests.tg43mode_zeroweight.test](#)

Functions

- def `eb_tests.tg43mode_zeroweight.test.get_n_highest_dose_pairs`(dose1, dose2, n=NCOMPARE)
- def `eb_tests.tg43mode_zeroweight.test.compare_results`(egslst, inp_name)

Variables

- string `eb_tests.tg43mode_zeroweight.test.EGSINP` = "tg43mode_zeroweight.egsinp"
- int `eb_tests.tg43mode_zeroweight.test.TIME_LIMIT_S_PER_MHZ` = 2000
- int `eb_tests.tg43mode_zeroweight.test.NCOMPARE` = 10

14.73 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/variable_activity/test.py File Reference

Namespaces

- `eb_tests.variable_activity.test`

Functions

- def `eb_tests.variable_activity.test.compare_results`(egslst, inp_name)

Variables

- string `eb_tests.variable_activity.test.EGSINP` = "variable.egsinp"
- int `eb_tests.variable_activity.test.TIME_LIMIT_S_PER_MHZ` = 100

14.74 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/variable_w_recycling/test.py File Reference

Namespaces

- `eb_tests.variable_w_recycling.test`

Functions

- def `eb_tests.variable_w_recycling.test.compare_results`(egslst, inp_name)

Variables

- string `eb_tests.variable_w_recycling.test.EGSINP` = "variable_w_recycling.egsinp"
- int `eb_tests.variable_w_recycling.test.TIME_LIMIT_S_PER_MHZ` = 15
- list `eb_tests.variable_w_recycling.test.BENCHMARK_DOSES` = [(1.061E-13, 0.0001), (1.644E-13, 0.0001)]

14.75 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/volume_correction/test.py File Reference

Namespaces

- [eb_tests.volume_correction.test](#)

Functions

- def [eb_tests.volume_correction.test.approx_equal](#) (a, b, eps=0.001)
- def [eb_tests.volume_correction.test.read_vols](#) (phant, inp_name)
- def [eb_tests.volume_correction.test.compare_results](#) (egslst, inp_name)

Variables

- string [eb_tests.volume_correction.test.EGSINP](#) = "vc.egsinp"
- int [eb_tests.volume_correction.test.TIME_LIMIT_S_PER_MHZ](#) = 1
- dictionary [eb_tests.volume_correction.test.expected_volumes](#)

14.76 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/iaea.py File Reference

Classes

- class [eb_tests.iaea.IAEAPhaseSpace](#)

Namespaces

- [eb_tests.iaea](#)

Variables

- [eb_tests.iaea.HEN_HOUSE](#) = os.getenv("HEN_HOUSE")
- [eb_tests.iaea.IAEA_DLL](#) = glob.glob([os.path.join](#)(HEN_HOUSE,"egs++/dso/*/", "[libiaea_phsp.so](#)"))[0]
- [eb_tests.iaea.iaeadll](#) = [ctypes.CDLL](#)(IAEA_DLL)

14.77 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/iaea_errors.py File Reference

Classes

- class [eb_tests.iaea_errors.IAEAPhaseSpaceSetupError](#)
- class [eb_tests.iaea_errors.IAEAPhaseSpaceError](#)

Namespaces

- [eb_tests.iaea_errors](#)

Variables

- dictionary [eb_tests.iaea_errors.error_messages](#) = {}
- tuple [eb_tests.iaea_errors.new_source_errors](#)

14.78 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/iaea_types.py File Reference

Namespaces

- [eb_tests.iaea_types](#)

Variables

- [eb_tests.iaea_types.IAEA_Float](#) = ctypes.c_float
- [eb_tests.iaea_types.PIAEA_Float](#) = ctypes.POINTER(IAEA_Float)
- [eb_tests.iaea_types.IAEA_I16](#) = ctypes.c_short
- [eb_tests.iaea_types.PIAEA_I16](#) = ctypes.POINTER(IAEA_I16)
- [eb_tests.iaea_types.IAEA_I32](#) = ctypes.c_int
- [eb_tests.iaea_types.PIAEA_I32](#) = ctypes.POINTER(IAEA_I32)
- [eb_tests.iaea_types.IAEA_I64](#) = ctypes.c_longlong
- [eb_tests.iaea_types.PIAEA_I64](#) = ctypes.POINTER(IAEA_I64)
- dictionary [eb_tests.iaea_types.iaea_file_modes](#)
- int [eb_tests.iaea_types.all_particles](#) = -1
- int [eb_tests.iaea_types.photons](#) = 1
- int [eb_tests.iaea_types.electrons](#) = 2
- int [eb_tests.iaea_types.positrons](#) = 3
- int [eb_tests.iaea_types.neutrons](#) = 4
- int [eb_tests.iaea_types.protons](#) = 5
- dictionary [eb_tests.iaea_types.particle_types](#)
- int [eb_tests.iaea_types.max_sources](#) = 30

14.79 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/utils.py File Reference

Namespaces

- [eb_tests.utils](#)

Functions

- def `eb_tests.utils.extract_all_doses` (`egslist`)
- def `eb_tests.utils.values_close` (`a, b`, `max_percent_diff=0.001`)
- def `eb_tests.utils.values_close_abs` (`a, b`, `max_diff=0.001`)
- def `eb_tests.utils.read_csv_spectrum` (`fname`)
- def `eb_tests.utils.doses_approx_equal` (`d1, d1_unc, d2, d2_unc, max_percent_diff=None, compare_<unc=True, max_unc_percent_diff=None`)
- def `eb_tests.utils.read3ddose` (`fname`)
- def `eb_tests.utils.compare_3ddose_files` (`f1, f2, max_percent_diff=None`)

Variables

- string `eb_tests.utils.REG_DOSE_UNC_RE` = "`\s+(\d)+\s+\d+\s+\d+\.?\s+(.*?)\s+|/-\s+(.*?)%\s+(.*?)\s+|/-\s+(.*?)%`"

14.80 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_volcor.cpp File Reference

Main implementation of volume correction routines.

```
#include <eb_volcor.h>
#include <iostream>
#include <fstream>
#include "gzstream.h"
Include dependency graph for eb_volcor.cpp:
```

Namespaces

- `ebvolcor`

Functions

- bool `ebvolcor::isGZip` (`istream &vfile`)
- EGS_Float `ebvolcor::getShapeVolume` (`EGS_Input *shape_inp`)
- void `ebvolcor::readVolumes` (`istream &vfile, vector< RegVolume > ®_volumes`)
- int `ebvolcor::loadVolumes` (`string fname, vector< RegVolume > ®_volumes`)

14.80.1 Detailed Description

Main implementation of volume correction routines.

Author

Randle Taylor (randle.taylor@gmail.com)

14.81 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_volcor.h File Reference

Volume correction routines for egs_brachy.

```
#include <map>
#include <set>
#include <cstdlib>
#include "egs_functions.h"
#include "egs_input.h"
#include "egs_rndm.h"
#include "egs_shapes.h"
#include "phantom.h"
#include "ginfo.h"
#include "timing.h"
#include "egs_autoenvelope/egs_sobol.h"
```

Include dependency graph for eb_volcor.h: This graph shows which files directly or indirectly include this file:

Classes

- class [ebvolcor::Options](#)
Volume correction initialization helper class.
- struct [ebvolcor::Results](#)
Struct used to collect and output results about a volume correction run.
- struct [ebvolcor::FileResults](#)
- class [ebvolcor::VolumeCorrector](#)
An object for controlling the volume correction routine.

Namespaces

- [ebvolcor](#)

Typedefs

- typedef pair< int, int > [ebvolcor::PhantRegT](#)
PhantRegT is a pair of the form (PhantomNumber, PhantomRegion) e.g. a pair of (2, 12) would represent region 12 (i.e. the 13th region) of phantom 2 (i.e. the 3rd phantom)
- typedef pair< int, EGS_Float > [ebvolcor::RegVolume](#)
RegVolumeT is a pair of the form (RegionNumber, Volume)
- typedef std::map< PhantRegT, EGS_I64 > [ebvolcor::HitCounterT](#)
HitCounterT is used for counting how many random points land in a given phantoms region.

Enumerations

- enum [ebvolcor::VolCorMode](#) { [ebvolcor::NO_CORRECTION](#), [ebvolcor::ZERO_DOSE](#), [ebvolcor::CORRECT_VOLUME](#) }

14.81.1 Detailed Description

Volume correction routines for egs_brachy.

Author

Randle Taylor (randle.taylor@gmail.com)

Version

0.1

The source specific volume correction here is identical to the one used by the egs_autoenvelope geometry. There is also an additional general purpose volume correction routine to allow for correcting volumes of multiple overlapping phantoms.

egs_brachy uses its own volume correction routines to allow for correction of arbitrary phantom types (rather than just auto_envelopes). In practice this may not be required and the autoenvelope volume corrections and the egs←_brachy volume correction routines(eb_volcor) can be factored out and combined into a single general purpose MC volume correction library.

14.82 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy.cpp File Reference

the main egs_brachy application implementation file

```
#include <algorithm>
#include <fstream>
#include <string>
#include <iomanip>
#include <assert.h>
#include "gzstream.h"
#include "zlib.h"
#include "egs_brachy.h"
#include "egs_ausgab_object.h"
#include "egs_rndm.h"
#include "egs_run_control.h"
Include dependency graph for egs_brachy.cpp:
```

Macros

- #define egsGetRNGPointers F77_OBJ_(egs_get_rng_pointers,EGS_GET_RNG_POINTERS)
- #define egsGetRNGArray F77_OBJ_(egs_get_rng_array,EGS_GET_RNG_ARRAY)
- #define egsSetRNGState F77_OBJ_(egs_set_rng_state,EGS_SET_RNG_STATE)
- #define egsGetSteps F77_OBJ_(egs_get_steps,EGS_GET_STEPS)
- #define egsSetSteps F77_OBJ_(egs_set_steps,EGS_SET_STEPS)
- #define egsOpenUnits F77_OBJ_(egs_open_units,EGS_OPEN_UNITS)
- #define egsGetElectronData F77_OBJ_(egs_get_electron_data,EGS_GET_ELECTRON_DATA)
- #define egsGetPhotonData F77_OBJ_(egs_get_photon_data,EGS_GET_PHOTON_DATA)

Functions

- `__extc__ void egsGetRNGPointers (EGS_I32 *, EGS_I32 *)`
- `__extc__ void egsGetRNGArray (EGS_Float *)`
- `__extc__ void egsSetRNGState (const EGS_I32 *, const EGS_Float *)`
- `__extc__ void egsGetSteps (double *, double *)`
- `__extc__ void egsSetSteps (const double *, const double *)`
- `__extc__ void egsOpenUnits (const EGS_I32 *)`
- `__extc__ void egsGetElectronData (void(*func)(EGS_I32 *, EGS_Float *, EGS_Float *, EGS_Float *, EGS_Float *, EGS_Float *), const EGS_I32 *, const EGS_I32 *)`
- `__extc__ void egsGetPhotonData (void(*func)(EGS_I32 *, EGS_Float *, EGS_Float *, EGS_Float *, EGS_Float *, EGS_Float *), const EGS_I32 *, const EGS_I32 *)`
- `void F77_OBJ_(egs_scale_xcc, EGS_SCALE_XCC)(const int *`
- `void const EGS_Float *void F77_OBJ_(egs_scale_bc, EGS_SCALE_BC)(const int *`
- `void const EGS_Float *void const EGS_Float *void F77_OBJ_(egs_bcse, EGS_BCSE)(const int *`
- `void const EGS_Float *void const EGS_Float *void const EGS_Float *void F77_OBJ_(egs_uniform_photons, EGS_UNIFORM_PHOTONS)(const int *`
- `void const EGS_Float *void const EGS_Float *void const EGS_Float *void const EGS_Float *void printParticleWithSpherical (EGS_Particle p)`
- `bool containsInclude (string str)`
- `map< string, string > getMuenForMedia (EGS_Input *scoring_options)`
- `APP_MAIN (EB_Application)`

14.82.1 Detailed Description

the main egs_brachy application implementation file

Author

Randle Taylor (randle.taylor@gmail.com)

14.82.2 Macro Definition Documentation

14.82.2.1 `#define egsGetElectronData F77_OBJ_(egs_get_electron_data,EGS_GET_ELECTRON_DATA)`

Definition at line 73 of file egs_brachy.cpp.

14.82.2.2 `#define egsGetPhotonData F77_OBJ_(egs_get_photon_data,EGS_GET_PHOTON_DATA)`

Definition at line 76 of file egs_brachy.cpp.

14.82.2.3 `#define egsGetRNGArray F77_OBJ_(egs_get_rng_array,EGS_GET_RNG_ARRAY)`

Definition at line 63 of file egs_brachy.cpp.

14.82.2.4 `#define egsGetRNGPointers F77_OBJ_(egs_get_rng_pointers,EGS_GET_RNG_POINTERS)`

Definition at line 61 of file egs_brachy.cpp.

14.82.2.5 #define egsGetSteps F77_OBJ_(egs_get_steps,EGS_GET_STEPS)

Definition at line 67 of file egs_brachy.cpp.

14.82.2.6 #define egsOpenUnits F77_OBJ_(egs_open_units,EGS_OPEN_UNITS)

Definition at line 71 of file egs_brachy.cpp.

14.82.2.7 #define egsSetRNGState F77_OBJ_(egs_set_rng_state,EGS_SET RNG STATE)

Definition at line 65 of file egs_brachy.cpp.

14.82.2.8 #define egsSetSteps F77_OBJ_(egs_set_steps,EGS_SET_STEPS)

Definition at line 69 of file egs_brachy.cpp.

14.82.3 Function Documentation

14.82.3.1 APP_MAIN(EB_Application)

14.82.3.2 bool containsInclude(string str)

Definition at line 287 of file egs_brachy.cpp.

14.82.3.3 __extc__ void egsGetElectronData(void(*)(EGS_I32 *, EGS_Float *, EGS_Float *, EGS_Float *, EGS_Float *) func, const EGS_I32 * , const EGS_I32 *)

14.82.3.4 __extc__ void egsGetPhotonData(void(*)(EGS_I32 *, EGS_Float *, EGS_Float *, EGS_Float *, EGS_Float *) func, const EGS_I32 * , const EGS_I32 *)

14.82.3.5 __extc__ void egsGetRNGArray(EGS_Float *)

14.82.3.6 __extc__ void egsGetRNGPointers(EGS_I32 * , EGS_I32 *)

14.82.3.7 __extc__ void egsGetSteps(double * , double *)

14.82.3.8 __extc__ void egsOpenUnits(const EGS_I32 *)

14.82.3.9 __extc__ void egsSetRNGState(const EGS_I32 * , const EGS_Float *)

14.82.3.10 __extc__ void egsSetSteps(const double * , const double *)

14.82.3.11 void F77_OBJ_(egs_scale_xcc , EGS_SCALE_XCC) const

14.82.3.12 void const EGS_Float* void F77_OBJ_(egs_scale_bc , EGS_SCALE_BC) const

14.82.3.13 void const EGS_Float* void const EGS_Float* void F77_OBJ_(egs_bcse , EGS_BCSE) const

14.82.3.14 void const EGS_Float* void const EGS_Float* void const EGS_Float* void F77_OBJ_(egs_uniform_photons , EGS_UNIFORM_PHOTONS) const

14.82.3.15 map<string, string> getMuenForMedia(EGS_Input * scoring_options)

Definition at line 1125 of file egs_brachy.cpp.

```
14.82.3.16 void const EGS_Float* void const EGS_Float* void const EGS_Float* void const EGS_Float* void
printParticleWithSpherical ( EGS_Particle p )
```

Definition at line 86 of file egs_brachy.cpp.

14.83 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/egs_brachy.h File Reference

the main egs_brachy application header file

```
#include <map>
#include <set>
#include <stack>
#include <cstdlib>
#include "egs_advanced_application.h"
#include "egs_functions.h"
#include "egs_input.h"
#include "egs_interface2.h"
#include "egs_interpolator.h"
#include "egs_alias_table.h"
#include "egs_rndm.h"
#include "egs_scoring.h"
#include "egs_transformations.h"
#include "egs_autoenvelope/egs_autoenvelope.h"
#include "egs_rz/egs_rz.h"
#include "egs_spheres/egs_spheres.h"
#include "pubsub.h"
#include "ginfo.h"
#include "muen.h"
#include "phantom.h"
#include "eb_volcor.h"
#include "spec_scoring.h"
#include "recycle.h"
#include "latch.h"
#include "phsp.h"
#include "timing.h"
```

Include dependency graph for egs_brachy.h: This graph shows which files directly or indirectly include this file:

Classes

- class [EB_Application](#)

The main egs_brachy application class. See the [Main Page](#) for full documentation.

Macros

- #define [PRINT_PARTICLE\(P\)](#) cout << "\nParticle in reg "<<P.ir << " at "<<P.x.x << " <<P.x.y<<
 " <<P.x.z << " wt "<<P.wt << " E "<<P.E << " q "<<P.q << " latch "<<P.latch <<endl;
- #define [PRINT_PARTICLE_WITH_DIR\(P\)](#) cout << "\nParticle in reg "<<P.ir << " at "<<P.x.x <<
 " <<P.x.y << " <<P.x.z << " dir "<<P.u.x << " <<P.u.y << " <<P.u.z << " wt "<<P.wt << " E "<<P.E
 << " q "<<P.q << " latch "<<P.latch <<endl;
- #define [NUM_STUCK_STEPS](#) 1000
- #define [SAME_POSITION_TOLERANCE](#) 1E-10
- #define [EB_EPSILON](#) 1E-10

14.83.1 Detailed Description

the main egs_brachy application header file

Author

Randle Taylor (randle.taylor@gmail.com)

14.83.2 Macro Definition Documentation

14.83.2.1 #define EB_EPSILON 1E-10

Definition at line 84 of file egs_brachy.h.

14.83.2.2 #define NUM_STUCK_STEPS 1000

Definition at line 82 of file egs_brachy.h.

14.83.2.3 #define PRINT_PARTICLE(P) cout << "\nParticle in reg "<<P.ir << " at "<<P.x.x << " "<<P.x.y << " <<P.x.z << " wt "<<P.wt<< " E "<<P.E << " q "<<P.q << " latch "<<P.latch<<endl;

Definition at line 80 of file egs_brachy.h.

14.83.2.4 #define PRINT_PARTICLE_WITH_DIR(P) cout << "\nParticle in reg "<<P.ir << " at "<<P.x.x << " "<<P.x.y << " <<P.x.z << " dir "<<P.u.x << " "<<P.u.y << " "<<P.u.z << " wt "<<P.wt<< " E "<<P.E << " q "<<P.q << " latch "<<P.latch<<endl;

Definition at line 81 of file egs_brachy.h.

14.83.2.5 #define SAME_POSITION_TOLERANCE 1E-10

Definition at line 83 of file egs_brachy.h.

14.84 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/ginfo.cpp File Reference

implementation of Geometry Info class.

```
#include "ginfo.h"
#include <limits>
#include <algorithm>
#include <iostream>
Include dependency graph for ginfo.cpp:
```

TypeDefs

- `typedef pair< string, vector< int > > CDGeomRegType`

Functions

- `bool pairCompare (const CDGeomRegType &firstElem, const CDGeomRegType &secondElem)`
- `string join (const vector< string > &v, string delim)`
- `size_t countAutoEnvelopeInscribed (EGS_Input *input)`
- `string getGeomBaseName (EGS_Input *input)`
- `vector< string > getAutoEnvelopeChildren (EGS_Input *input)`
- `vector< string > getGEnvelopeChildren (EGS_Input *input)`
- `vector< string > getCDChildren (EGS_Input *input)`
- `vector< string > getNDChildren (EGS_Input *input)`
- `vector< string > getUnionChildren (EGS_Input *input)`
- `vector< string > getGStackChildren (EGS_Input *input)`
- `int findGeomInVec (EGS_BaseGeometry *geom, vector< string > geoms)`
- `int maxNRegOfGeoms (vector< string > gnames, int start)`
- `int nregForSubDiv (GeomRegionInfo gri, int idx)`

14.84.1 Detailed Description

implementation of Geometry Info class.

14.84.2 Typedef Documentation

14.84.2.1 `typedef pair<string, vector<int> > CDGeomRegType`

Definition at line 48 of file ginfo.cpp.

14.84.3 Function Documentation

14.84.3.1 `size_t countAutoEnvelopeInscribed (EGS_Input * input)`

Definition at line 150 of file ginfo.cpp.

14.84.3.2 `int findGeomInVec (EGS_BaseGeometry * geom, vector< string > geoms)`

Definition at line 345 of file ginfo.cpp.

14.84.3.3 `vector<string> getAutoEnvelopeChildren (EGS_Input * input)`

Definition at line 190 of file ginfo.cpp.

14.84.3.4 `vector<string> getCDChildren (EGS_Input * input)`

Definition at line 222 of file ginfo.cpp.

14.84.3.5 `vector<string> getGEnvelopeChildren (EGS_Input * input)`

Definition at line 213 of file ginfo.cpp.

14.84.3.6 `string getGeomBaseName (EGS_Input * input)`

Definition at line 182 of file ginfo.cpp.

14.84.3.7 `vector<string> getGStackChildren (EGS_Input * input)`

Definition at line 306 of file ginfo.cpp.

14.84.3.8 `vector<string> getNDChildren (EGS_Input * input)`

Definition at line 281 of file ginfo.cpp.

14.84.3.9 `vector<string> getUnionChildren (EGS_Input * input)`

Definition at line 298 of file ginfo.cpp.

14.84.3.10 `string join (const vector< string > & v, string delim)`

Definition at line 56 of file ginfo.cpp.

14.84.3.11 `int maxNRegOfGeoms (vector< string > gnames, int start)`

Definition at line 357 of file ginfo.cpp.

14.84.3.12 `int nregForSubDiv (GeomRegionInfo gri, int idx)`

Definition at line 368 of file ginfo.cpp.

14.84.3.13 `bool pairCompare (const CDGeomRegType & firstElem, const CDGeomRegType & secondElem)`

Definition at line 51 of file ginfo.cpp.

14.85 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/ginfo.h File Reference

ginfo contains classes for organizing information about the geometries present in an egs_brachy simulation.

```
#include <map>
#include <set>
#include <cstdlib>
#include <algorithm>
#include "egs_functions.h"
#include "egs_input.h"
#include "phantom.h"
```

Include dependency graph for ginfo.h: This graph shows which files directly or indirectly include this file:

Classes

- class [Node](#)
- struct [GeomRegionInfo](#)
a struct to contain elementary information about a geometry
- class [GeomInfo](#)
a container for organizing meta data about the geometries

TypeDefs

- typedef pair< EGS_BaseGeometry *, int > [GeomRegT](#)
pair of geometry and local region number
- typedef map< string, [GeomRegionInfo](#) > [GeomRegionInfoMapT](#)
a mapping from geometry name to information about that geometry

14.85.1 Detailed Description

ginfo contains classes for organizing information about the geometries present in an egs_brachy simulation.

14.85.2 Typedef Documentation

14.85.2.1 `typedef map<string, GeomRegionInfo> GeomRegionInfoMapT`

a mapping from geometry name to information about that geometry

Definition at line 95 of file ginfo.h.

14.85.2.2 `typedef pair<EGS_BaseGeometry *, int> GeomRegT`

pair of geometry and local region number

Definition at line 79 of file ginfo.h.

14.86 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/gzstream/gzstream.C File Reference

```
#include <gzstream.h>
#include <iostream>
#include <string.h>
Include dependency graph for gzstream.C:
```

14.87 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/gzstream/gzstream.h File Reference

```
#include <iostream>
#include <fstream>
#include <zlib.h>
```

Include dependency graph for gzstream.h: This graph shows which files directly or indirectly include this file:

Classes

- class [gzstreambuf](#)
- class [gzstreambase](#)
- class [igzstream](#)
- class [ogzstream](#)

14.88 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/gzstream/LICENSE.txt File Reference

Functions

- GNU LESSER GENERAL PUBLIC LICENSE February Copyright (C) 1991
- GNU LESSER GENERAL PUBLIC LICENSE February Free Software Inc Temple MA USA Everyone is permitted to copy and distribute verbatim copies of this license but changing it is not allowed [This is the first released version of the Lesser GPL. It also counts as the successor of the GNU Library Public License, version 2, hence the version number 2.1.] Preamble The licenses for most software are designed to take away your freedom to share and change it. By the GNU General Public Licenses are intended to guarantee your freedom to share and change free software to make sure the software is free for all its users. This the Lesser General Public applies to some specially designated software packages typically libraries of the Free Software Foundation and other authors who decide to use it. You can use it but we suggest you first think carefully about whether this license or the ordinary General Public License is the better strategy to use in any particular based on the explanations below. When we speak of free we are referring to freedom of not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for this service if you wish)
- and that you are informed that you can do these things To protect your we need to make restrictions that forbid distributors to deny you these rights or to ask you to surrender these rights These restrictions translate to certain responsibilities for you if you distribute copies of the library or if you modify it For if you distribute copies of the whether gratis or for a you must give the recipients all the rights that we gave you You must make sure that receive or can get the source code If you link other code with the you must provide complete object files to the so that they can relink them with the library after making changes to the library and recompiling it And you must show them these terms so they know their rights We protect your rights with a two step and (2) we offer you this license

- and distribute a copy of this License along with the Library You may charge a fee for the physical act of transferring a and you may at your option offer warranty protection in exchange for a fee You may modify your copy or copies of the Library or any portion of thus forming a work based on the and copy and distribute such modifications or work under the terms of Section provided that you also meet all of these other than as an argument passed when the facility is then you must make a good faith effort to ensure in the event an application does not supply such function or the facility still and performs whatever part of its purpose remains meaningful (For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.) These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library
- the intent is to exercise the right to control the distribution of derivative or collective works based on the Library In mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.3. You may opt to apply the terms of the ordinary GNU General Public License instead of this License to a given copy of the Library. To do this
- the intent is to exercise the right to control the distribution of derivative or collective works based on the Library In mere aggregation of another work not based on the Library with the you must alter all the notices that refer to this so that they refer to the ordinary GNU General Public instead of to this License (If a newer version than version 2 of the ordinary GNU General Public License has appeared, then you can specify that version instead if you wish.) Do not make any other change in these notices. Once this change is made in a given copy
- the intent is to exercise the right to control the distribution of derivative or collective works based on the Library In mere aggregation of another work not based on the Library with the you must alter all the notices that refer to this so that they refer to the ordinary GNU General Public instead of to this it is irreversible for that so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy This option is useful when you wish to copy part of the code of the Library into a program that is not a library You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code
- the intent is to exercise the right to control the distribution of derivative or collective works based on the Library In mere aggregation of another work not based on the Library with the you must alter all the notices that refer to this so that they refer to the ordinary GNU General Public instead of to this it is irreversible for that so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy This option is useful when you wish to copy part of the code of the Library into a program that is not a library You may copy and distribute the which must be distributed under the terms of Sections and above on a medium customarily used for software interchange If distribution of object code is made by offering access to copy from a designated then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source even though third parties are not compelled to copy the source along with the object code A program that contains no derivative of any portion of the but is designed to work with the Library by being compiled or linked with is called a work that uses the Library Such a in is not a derivative work of the and therefore falls outside the scope of this License linking a work that uses the Library with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library)
- the intent is to exercise the right to control the distribution of derivative or collective works based on the Library In mere aggregation of another work not based on the Library with the you must alter all the notices that refer to this so that they refer to the ordinary GNU General Public instead of to this it is irreversible for that so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy This option is useful when you wish to copy part of the code of the Library into a program that is not a library You may copy and distribute the which must be distributed under the terms of Sections and above on a medium customarily used for software interchange If distribution of object code is made by offering access to copy from a designated then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source even though third parties are not compelled to copy the source along with the object code A program that contains no derivative of any portion of the but is designed to work with the Library by being compiled or linked with is called a work that uses the Library Such a in is not a derivative work of the and therefore falls outside the scope of this License linking a work that uses the Library with the Library creates an executable that is a derivative of the rather than a work that uses the library The executable is therefore covered by this License Section states terms for distribution of such executables When a work that uses the Library uses material from a header file that is part of the the object code for the work may be a

derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the or if the work is itself a library. The threshold for this to be true is not precisely defined by law. If such an object file uses only numerical data structure layouts and small macros and small functions (ten lines or less in length)

- the intent is to exercise the right to control the distribution of derivative or collective works based on the Library. In mere aggregation of another work not based on the Library with the you must alter all the notices that refer to this so that they refer to the ordinary GNU General Public instead of to this it is irreversible for that so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy. This option is useful when you wish to copy part of the code of the Library into a program that is not a library. You may copy and distribute the which must be distributed under the terms of Sections and above on a medium customarily used for software interchange. If distribution of object code is made by offering access to copy from a designated then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source even though third parties are not compelled to copy the source along with the object code. A program that contains no derivative of any portion of the but is designed to work with the Library by being compiled or linked with is called a work that uses the Library. Such a in is not a derivative work of the and therefore falls outside the scope of this License linking a work that uses the Library with the Library creates an executable that is a derivative of the rather than a work that uses the library. The executable is therefore covered by this License Section states terms for distribution of such executables. When a work that uses the Library uses material from a header file that is part of the the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the or if the work is itself a library. The threshold for this to be true is not precisely defined by law. If such an object file uses only numerical data structure layouts and small macros and small then the use of the object file is regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.) Otherwise
 - if the work is an executable linked with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.) b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that(1) uses at run time a copy of the library already present on the user's computer system
 - if the work is an executable linked with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c) Accompany the work with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d) If distribution of the work is made by offering access to copy from a designated offer equivalent access to copy the above specified materials from the same place e) Verify that the user has already received a copy of these materials or that you have already sent this user a copy. For an the required form of the work that uses the Library must include any data and utility programs needed for reproducing the executable from it as a special the materials to be distributed need not include anything that is normally distributed (in either source or binary form) with the major components(compiler)
 - if the work is an executable linked with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c) Accompany the work with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d) If distribution of the work is made by offering access to copy from a designated offer equivalent access to copy the above specified materials from the same place e) Verify that the user has already received a copy of these materials or that you have already sent this user a copy. For an the required form of the work that uses the Library must include any data and utility programs needed for reproducing the executable from it as a special the materials to be distributed need not include anything that is normally and so on of the operating system on which the executable unless that component itself accompanies the executable. It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system. Such a contradiction means you cannot use both them and the Library together in an executable that you distribute. You may place library facilities that are a work based on the Library side by side in a single library together with other library facilities not covered by this and distribute such a combined provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise and provided that you do these two

uncombined [with any other library](#) facilities This must be [distributed](#) under the [terms](#) of the Sections [above b](#) Give prominent notice [with](#) the combined [library](#) of the fact [that](#) part of [it](#) is a [work](#) based [on](#) the [and](#) explaining where to find the accompanying uncombined form of the same [work](#) You may [not link or distribute](#) the [Library](#) except as expressly provided under this [License](#) Any attempt otherwise to link [or distribute](#) the [Library](#) is [and](#) will automatically terminate your [rights](#) under this [License](#) parties who have received [or](#) from [you](#) under this [License](#) [will not](#) have their licenses terminated [so long as](#) such parties remain in full compliance You are [not](#) required to accept this since [you](#) have [not signed it](#) nothing [else grants you](#) permission to [modify or distribute](#) the [Library](#) [or](#) its derivative works These actions are prohibited by law if [you do not accept this License](#) by modifying [or distributing the Library \(or any work based on the Library\)](#)

- if the [work](#) is an [executable](#) linked [with](#) the complete machine readable [work that](#) uses the as object [code and or source so that](#) the user can [modify](#) the [Library](#) [and](#) then relink to produce a modified [executable](#) containing the modified [rather than copying library functions](#) into the [if](#) the user installs as long as the modified [version](#) is interface compatible [with](#) the [version](#) that the [work](#) was made [with c](#) Accompany the [work with](#) a written valid for [at least three](#) to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the [work](#) is made by offering access to [copy](#) from a designated [offer](#) equivalent access to [copy](#) the [above](#) specified materials from the same [place e](#) Verify that the user has already received a [copy](#) of [these](#) materials [or that you](#) have already sent this user a [copy](#) For an the required form of the [work that](#) uses the [Library](#) must include [any data and utility programs](#) needed for reproducing the [executable](#) from [it](#) as a special the materials to be [distributed](#) need [not](#) include anything [that is normally and so on](#) of the operating [system on](#) which the [executable](#) unless [that component itself](#) accompanies the [executable](#) It may happen [that](#) this requirement contradicts the [license](#) restrictions of other proprietary [libraries](#) that do [not](#) normally accompany the operating [system](#) Such a contradiction means [you](#) cannot [use](#) both them [and](#) the [Library](#) together in an [executable that you distribute](#) You may [place](#) library facilities [that are a work based on the Library](#) side by side in a single [library](#) together [with](#) other library facilities [not covered by this and distribute](#) such a combined provided [that](#) the separate distribution of the [work based on the Library and of the other library facilities](#) is otherwise [and](#) provided [that you do these two uncombined with any other library facilities](#) This must be [distributed](#) under the [terms](#) of the Sections [above b](#) Give prominent notice [with](#) the combined [library](#) of the fact [that](#) part of [it](#) is a [work](#) based [on](#) the [and](#) explaining where to find the accompanying uncombined form of the same [work](#) You may [not link or distribute](#) the [Library](#) except as expressly provided under this [License](#) Any attempt otherwise to link [or distribute](#) the [Library](#) is [and](#) will automatically terminate your [rights](#) under this [License](#) parties who have received [or](#) from [you](#) under this [License](#) [will not](#) have their licenses terminated [so long as](#) such parties remain in full compliance You are [not](#) required to accept this since [you](#) have [not signed it](#) nothing [else grants you](#) permission to [modify or distribute](#) the [Library](#) [or](#) its derivative works These actions are prohibited by law if [you do not accept this License](#) by modifying [or distributing the you indicate your acceptance of this License to do and all its terms and conditions for distributing or modifying the Library or works based on it](#) Each time [you redistribute the the recipient automatically receives a license from the original licensor to link with or modify the Library subject to these terms and conditions](#) You may [not impose any further restrictions on the recipients exercise of the rights granted herein](#) You are [not responsible for enforcing compliance by third parties with this License as a consequence of a court judgment or allegation of patent infringement or for any other reason \(not limited to patent issues\)](#)
- if the [work](#) is an [executable](#) linked [with](#) the complete machine readable [work that](#) uses the as object [code and or source so that](#) the user can [modify](#) the [Library](#) [and](#) then relink to produce a modified [executable](#) containing the modified [rather than copying library functions](#) into the [if](#) the user installs as long as the modified [version](#) is interface compatible [with](#) the [version](#) that the [work](#) was made [with c](#) Accompany the [work with](#) a written valid for [at least three](#) to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the [work](#) is made by offering access to [copy](#) from a designated [offer](#) equivalent access to [copy](#) the [above](#) specified materials from the same [place e](#) Verify that the user has already received a [copy](#) of [these](#) materials [or that you](#) have already sent this user a [copy](#) For an the required form of the [work that](#) uses the [Library](#) must include [any data and utility programs](#) needed for reproducing the [executable](#) from [it](#) as a special the materials to be [distributed](#) need [not](#) include anything [that is normally and so on](#) of the operating [system on](#) which the [executable](#) unless [that component itself](#) accompanies the [executable](#) It may happen [that](#) this requirement contradicts the [license](#) restrictions of other proprietary [libraries](#) that do [not](#) normally accompany the operating [system](#) Such a contradiction means [you](#) cannot [use](#) both them [and](#) the [Library](#) together in an [executable that you distribute](#) You may [place](#) library facilities [that are a work based on the Library](#) side by side in a single [library](#) together [with](#) other library facilities [not covered by this and distribute](#) such a combined provided [that](#) the separate distribution of the [work based on the Library and of the other library facilities](#) is otherwise [and](#) provided [that you do these two uncombined with any other library facilities](#) This must be [distributed](#) under the [terms](#) of the Sections [above b](#) Give prominent notice [with](#) the combined [library](#) of the fact [that](#) part of [it](#) is a [work](#) based [on](#) the [and](#) explaining where to find the accompanying uncombined form of the same [work](#) You may [not link or distribute](#) the [Library](#) except as expressly provided under this [License](#) Any attempt otherwise to link [or distribute](#) the [Library](#) is [and](#) will automatically terminate your [rights](#) under this [License](#) parties who have received [or](#) from [you](#) under this [License](#) [will not](#) have their licenses terminated [so long as](#) such parties remain in full compliance You are [not](#) required to accept this since [you](#) have [not signed it](#) nothing [else grants you](#) permission to [modify or distribute](#) the [Library](#) [or](#) its derivative works These actions are prohibited by law if [you do not accept this License](#) by modifying [or distributing the you indicate your acceptance of this License to do and all its terms and conditions for distributing or modifying the Library or works based on it](#) Each time [you redistribute the the recipient automatically receives a license from the original licensor to link with or modify the Library subject to these terms and conditions](#) You may [not impose any further restrictions on the recipients exercise of the rights granted herein](#) You are [not responsible for enforcing compliance by third parties with this License as a consequence of a court judgment or allegation of patent infringement or for any other reason \(not limited to patent issues\)](#)

uncombined with any other library facilities This must be distributed under the terms of the Sections above b Give prominent notice with the combined library of the fact that part of it is a work based on the and explaining where to find the accompanying uncombined form of the same work You may not link or distribute the Library except as expressly provided under this License Any attempt otherwise to link or distribute the Library is and will automatically terminate your rights under this License parties who have received or from you under this License will not have their licenses terminated so long as such parties remain in full compliance You are not required to accept this since you have not signed it nothing else grants you permission to modify or distribute the Library or its derivative works These actions are prohibited by law if you do not accept this License by modifying or distributing the you indicate your acceptance of this License to do and all its terms and conditions for distributing or modifying the Library or works based on it Each time you redistribute the the recipient automatically receives a license from the original licensor to link with or modify the Library subject to these terms and conditions You may not impose any further restrictions on the recipients exercise of the rights granted herein You are not responsible for enforcing compliance by third parties with this License as a consequence of a court judgment or allegation of patent infringement or for any other conditions are imposed on you (whether by court order, agreement or otherwise) that contradict the conditions of this License

- we sometimes make exceptions for this Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally NO WARRANTY BECAUSE THE LIBRARY IS LICENSED FREE OF THERE IS NO WARRANTY FOR THE TO THE EXTENT PERMITTED BY APPLICABLE LAW EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND OR OTHER PARTIES PROVIDE THE LIBRARY AS IS WITH OUT WARRANTY OF ANY EITHER EXPRESSED OR BUT NOT LIMITED THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE LIBRARY IS WITH YOU SHOULD THE LIBRARY PROVE YOU ASSUME THE COST OF ALL NECESSARY REPAIR OR CORRECTION IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT OR ANY OTHER PARTY WHO MAY MODIFY AND OR REDISTRIBUTE THE LIBRARY AS PERMITTED BE LIABLE TO YOU FOR INCLUDING ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE LIBRARY (INCLUDING BUT NOT LIMITED TO LOSS OF DATA OR DATA BEING RENDERED INACCURATE OR LOSSES SUSTAINED BY YOU OR THIRD PARTIES OR A FAILURE OF THE LIBRARY TO OPERATE WITH ANY OTHER SOFTWARE)
- we sometimes make exceptions for this Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally NO WARRANTY BECAUSE THE LIBRARY IS LICENSED FREE OF THERE IS NO WARRANTY FOR THE TO THE EXTENT PERMITTED BY APPLICABLE LAW EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND OR OTHER PARTIES PROVIDE THE LIBRARY AS IS WITH OUT WARRANTY OF ANY EITHER EXPRESSED OR BUT NOT LIMITED THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE LIBRARY IS WITH YOU SHOULD THE LIBRARY PROVE YOU ASSUME THE COST OF ALL NECESSARY REPAIR OR CORRECTION IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT OR ANY OTHER PARTY WHO MAY MODIFY AND OR REDISTRIBUTE THE LIBRARY AS PERMITTED BE LIABLE TO YOU FOR INCLUDING ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE EVEN IF SUCH HOLDER OR OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES END OF TERMS AND CONDITIONS How to Apply These Terms to Your New Libraries If you develop a new and you want it to be of the greatest possible use to the we recommend making it free software that everyone can redistribute and change You can do so by permitting redistribution under these terms (or, alternatively, under the terms of the ordinary General Public License).To apply these terms
 - either version of the or (at your option) any later version.This library is distributed in the hope that it will be useful
 - if write to the Free Software Temple MA USA Also add information on how to contact you by electronic and paper mail You should also get your employer (if you work as a programmer) or your school
 - alter the hereby disclaims all copyright interest in the library Frob (a library for tweaking knobs) written by James Random Hacker.< signature of Ty Coon >

Variables

- GNU LESSER GENERAL PUBLIC LICENSE Version

- GNU LESSER GENERAL PUBLIC LICENSE February Free Software Foundation
- GNU LESSER GENERAL PUBLIC LICENSE February Free Software Inc Temple Place
- GNU LESSER GENERAL PUBLIC LICENSE February Free Software Inc Temple Suite
- GNU LESSER GENERAL PUBLIC LICENSE February Free Software Inc Temple Boston
- GNU LESSER GENERAL PUBLIC LICENSE February Free Software Inc Temple MA USA Everyone is permitted to copy and distribute verbatim copies of this license document
- GNU LESSER GENERAL PUBLIC LICENSE February Free Software Inc Temple MA USA Everyone is permitted to copy and distribute verbatim copies of this license but changing it is not allowed[This is the first released version of the Lesser GPL.It also counts as the successor of the GNU Library Public License, version 2, hence the version number 2.1.] Preamble The licenses for most software are designed to take away your freedom to share and change it By contrast
- GNU LESSER GENERAL PUBLIC LICENSE February Free Software Inc Temple MA USA Everyone is permitted to copy and distribute verbatim copies of this license but changing it is not allowed[This is the first released version of the Lesser GPL.It also counts as the successor of the GNU Library Public License, version 2, hence the version number 2.1.] Preamble The licenses for most software are designed to take away your freedom to share and change it By the GNU General Public Licenses are intended to guarantee your freedom to share and change free software to make sure the software is free for all its users This license
- GNU LESSER GENERAL PUBLIC LICENSE February Free Software Inc Temple MA USA Everyone is permitted to copy and distribute verbatim copies of this license but changing it is not allowed[This is the first released version of the Lesser GPL.It also counts as the successor of the GNU Library Public License, version 2, hence the version number 2.1.] Preamble The licenses for most software are designed to take away your freedom to share and change it By the GNU General Public Licenses are intended to guarantee your freedom to share and change free software to make sure the software is free for all its users This the Lesser General Public License
- GNU LESSER GENERAL PUBLIC LICENSE February Free Software Inc Temple MA USA Everyone is permitted to copy and distribute verbatim copies of this license but changing it is not allowed[This is the first released version of the Lesser GPL.It also counts as the successor of the GNU Library Public License, version 2, hence the version number 2.1.] Preamble The licenses for most software are designed to take away your freedom to share and change it By the GNU General Public Licenses are intended to guarantee your freedom to share and change free software to make sure the software is free for all its users This the Lesser General Public applies to some specially designated software packages typically libraries of the Free Software Foundation and other authors who decide to use it You can use it too
- GNU LESSER GENERAL PUBLIC LICENSE February Free Software Inc Temple MA USA Everyone is permitted to copy and distribute verbatim copies of this license but changing it is not allowed[This is the first released version of the Lesser GPL.It also counts as the successor of the GNU Library Public License, version 2, hence the version number 2.1.] Preamble The licenses for most software are designed to take away your freedom to share and change it By the GNU General Public Licenses are intended to guarantee your freedom to share and change free software to make sure the software is free for all its users This the Lesser General Public applies to some specially designated software packages typically libraries of the Free Software Foundation and other authors who decide to use it You can use it but we suggest you first think carefully about whether this license or the ordinary General Public License is the better strategy to use in any particular case
- GNU LESSER GENERAL PUBLIC LICENSE February Free Software Inc Temple MA USA Everyone is permitted to copy and distribute verbatim copies of this license but changing it is not allowed[This is the first released version of the Lesser GPL.It also counts as the successor of the GNU Library Public License, version 2, hence the version number 2.1.] Preamble The licenses for most software are designed to take away your freedom to share and change it By the GNU General Public Licenses are intended to guarantee your freedom to share and change free software to make sure the software is free for all its users This the Lesser General Public applies to some specially designated software packages typically libraries of the Free Software Foundation and other authors who decide to use it You can use it but we suggest you first think carefully about whether this license or the ordinary General Public License is the better strategy to use in any particular based on the explanations below When we speak of free software
- GNU LESSER GENERAL PUBLIC LICENSE February Free Software Inc Temple MA USA Everyone is permitted to copy and distribute verbatim copies of this license but changing it is not allowed[This is the first released version of the Lesser GPL.It also counts as the successor of the GNU Library Public License, version 2, hence the version number 2.1.] Preamble The licenses for most software are designed to take away your freedom to share and change it By the GNU General Public Licenses are intended to guarantee your freedom to share and change free software to make sure the software is free for all its users This the

Lesser General Public applies to some specially designated software packages typically libraries of the Free Software Foundation and other authors who decide to use it You can use it but we suggest you first think carefully about whether this license or the ordinary General Public License is the better strategy to use in any particular based on the explanations below When we speak of free we are referring to freedom of use

- that you receive source code or can get it if you want it
- that you can change the software and use pieces of it in new free programs
- and that you are informed that you can do these things To protect your rights
- and that you are informed that you can do these things To protect your we need to make restrictions that forbid distributors to deny you these rights or to ask you to surrender these rights These restrictions translate to certain responsibilities for you if you distribute copies of the library or if you modify it For example
- and that you are informed that you can do these things To protect your we need to make restrictions that forbid distributors to deny you these rights or to ask you to surrender these rights These restrictions translate to certain responsibilities for you if you distribute copies of the library or if you modify it For if you distribute copies of the library
- and that you are informed that you can do these things To protect your we need to make restrictions that forbid distributors to deny you these rights or to ask you to surrender these rights These restrictions translate to certain responsibilities for you if you distribute copies of the library or if you modify it For if you distribute copies of the whether gratis or for a fee
- and that you are informed that you can do these things To protect your we need to make restrictions that forbid distributors to deny you these rights or to ask you to surrender these rights These restrictions translate to certain responsibilities for you if you distribute copies of the library or if you modify it For if you distribute copies of the whether gratis or for a you must give the recipients all the rights that we gave you You must make sure that they
- and that you are informed that you can do these things To protect your we need to make restrictions that forbid distributors to deny you these rights or to ask you to surrender these rights These restrictions translate to certain responsibilities for you if you distribute copies of the library or if you modify it For if you distribute copies of the whether gratis or for a you must give the recipients all the rights that we gave you You must make sure that receive or can get the source code If you link other code with the you must provide complete object files to the recipients
- and that you are informed that you can do these things To protect your we need to make restrictions that forbid distributors to deny you these rights or to ask you to surrender these rights These restrictions translate to certain responsibilities for you if you distribute copies of the library or if you modify it For if you distribute copies of the whether gratis or for a you must give the recipients all the rights that we gave you You must make sure that receive or can get the source code If you link other code with the you must provide complete object files to the so that they can relink them with the library after making changes to the library and recompiling it And you must show them these terms so they know their rights We protect your rights with a two step method
- and that you are informed that you can do these things To protect your we need to make restrictions that forbid distributors to deny you these rights or to ask you to surrender these rights These restrictions translate to certain responsibilities for you if you distribute copies of the library or if you modify it For if you distribute copies of the whether gratis or for a you must give the recipients all the rights that we gave you You must make sure that receive or can get the source code If you link other code with the you must provide complete object files to the so that they can relink them with the library after making changes to the library and recompiling it And you must show them these terms so they know their rights We protect your rights with a two step which gives you legal permission to copy
- and that you are informed that you can do these things To protect your we need to make restrictions that forbid distributors to deny you these rights or to ask you to surrender these rights These restrictions translate to certain responsibilities for you if you distribute copies of the library or if you modify it For if you distribute copies of the whether gratis or for a you must give the recipients all the rights that we gave you You must make sure that receive or can get the source code If you link other code with the you must provide complete object files to the so that they can relink them with the library after making changes to the library and recompiling it And you must show them these terms so they know their rights We protect your rights with a two step which gives you legal permission to distribute and or modify the library To protect each distributor
- and that you are informed that you can do these things To protect your we need to make restrictions that forbid distributors to deny you these rights or to ask you to surrender these rights These restrictions translate to certain responsibilities for you if you distribute copies of the library or if you modify it For if you distribute copies of the whether gratis or for a you must give the recipients all the rights that we gave you You must make sure that receive or can get the source code If you link other code with the you must provide complete object files to the so that they can relink them with the library after making changes to the library and recompiling it

And you must show them these terms so they know their rights We protect your rights with a two step which gives you legal permission to distribute and or modify the library To protect each we want to make it very clear that there is no warranty for the free library Also

- and that you are informed that you can do these things To protect your we need to make restrictions that forbid distributors to deny you these rights or to ask you to surrender these rights These restrictions translate to certain responsibilities for you if you distribute copies of the library or if you modify it For if you distribute copies of the whether gratis or for a you must give the recipients all the rights that we gave you You must make sure that receive or can get the source code If you link other code with the you must provide complete object files to the so that they can relink them with the library after making changes to the library and recompiling it And you must show them these terms so they know their rights We protect your rights with a two step which gives you legal permission to distribute and or modify the library To protect each we want to make it very clear that there is no warranty for the free library if the library is modified by someone else and passed on
- and that you are informed that you can do these things To protect your we need to make restrictions that forbid distributors to deny you these rights or to ask you to surrender these rights These restrictions translate to certain responsibilities for you if you distribute copies of the library or if you modify it For if you distribute copies of the whether gratis or for a you must give the recipients all the rights that we gave you You must make sure that receive or can get the source code If you link other code with the you must provide complete object files to the so that they can relink them with the library after making changes to the library and recompiling it And you must show them these terms so they know their rights We protect your rights with a two step which gives you legal permission to distribute and or modify the library To protect each we want to make it very clear that there is no warranty for the free library if the library is modified by someone else and passed the recipients should know that what they have is not the original version
- and that you are informed that you can do these things To protect your we need to make restrictions that forbid distributors to deny you these rights or to ask you to surrender these rights These restrictions translate to certain responsibilities for you if you distribute copies of the library or if you modify it For if you distribute copies of the whether gratis or for a you must give the recipients all the rights that we gave you You must make sure that receive or can get the source code If you link other code with the you must provide complete object files to the so that they can relink them with the library after making changes to the library and recompiling it And you must show them these terms so they know their rights We protect your rights with a two step which gives you legal permission to distribute and or modify the library To protect each we want to make it very clear that there is no warranty for the free library if the library is modified by someone else and passed the recipients should know that what they have is not the original so that the original author s reputation will not be affected by problems that might be introduced by others Finally
- and that you are informed that you can do these things To protect your we need to make restrictions that forbid distributors to deny you these rights or to ask you to surrender these rights These restrictions translate to certain responsibilities for you if you distribute copies of the library or if you modify it For if you distribute copies of the whether gratis or for a you must give the recipients all the rights that we gave you You must make sure that receive or can get the source code If you link other code with the you must provide complete object files to the so that they can relink them with the library after making changes to the library and recompiling it And you must show them these terms so they know their rights We protect your rights with a two step which gives you legal permission to distribute and or modify the library To protect each we want to make it very clear that there is no warranty for the free library if the library is modified by someone else and passed the recipients should know that what they have is not the original so that the original author s reputation will not be affected by problems that might be introduced by others software patents pose a constant threat to the existence of any free program We wish to make sure that a company cannot effectively restrict the users of a free program by obtaining a restrictive license from a patent holder Therefore
- and that you are informed that you can do these things To protect your we need to make restrictions that forbid distributors to deny you these rights or to ask you to surrender these rights These restrictions translate to certain responsibilities for you if you distribute copies of the library or if you modify it For if you distribute copies of the whether gratis or for a you must give the recipients all the rights that we gave you You must make sure that receive or can get the source code If you link other code with the you must provide complete object files to the so that they can relink them with the library after making changes to the library and recompiling it And you must show them these terms so they know their rights We protect your rights with a two step which gives you legal permission to distribute and or modify the library To protect each we want to make it very clear that there is no warranty for the free library if the library is modified by someone else and passed the recipients should know that what they have is not the original so that the original author s reputation will not be affected by problems that might be introduced by others software patents pose a constant threat to the existence of any free program We wish to make sure that a company cannot effectively restrict the users of a

free program by obtaining a restrictive license from a patent holder we insist that any patent license obtained for a version of the library must be consistent with the full freedom of use specified in this license Most GNU including some libraries

- keep intact all the notices that refer to this License and to the absence of any warranty
- and distribute a copy of this License along with the Library You may charge a fee for the physical act of transferring a and you may at your option offer warranty protection in exchange for a fee You may modify your copy or copies of the Library or any portion of thus forming a work based on the Library
- and distribute a copy of this License along with the Library You may charge a fee for the physical act of transferring a and you may at your option offer warranty protection in exchange for a fee You may modify your copy or copies of the Library or any portion of thus forming a work based on the and copy and distribute such modifications or work under the terms of Section above
- and distribute a copy of this License along with the Library You may charge a fee for the physical act of transferring a and you may at your option offer warranty protection in exchange for a fee You may modify your copy or copies of the Library or any portion of thus forming a work based on the and copy and distribute such modifications or work under the terms of Section provided that you also meet all of these conditions
- and distribute a copy of this License along with the Library You may charge a fee for the physical act of transferring a and you may at your option offer warranty protection in exchange for a fee You may modify your copy or copies of the Library or any portion of thus forming a work based on the and copy and distribute such modifications or work under the terms of Section provided that you also meet all of these other than as an argument passed when the facility is invoked
- and distribute a copy of this License along with the Library You may charge a fee for the physical act of transferring a and you may at your option offer warranty protection in exchange for a fee You may modify your copy or copies of the Library or any portion of thus forming a work based on the and copy and distribute such modifications or work under the terms of Section provided that you also meet all of these other than as an argument passed when the facility is then you must make a good faith effort to ensure that
- and distribute a copy of this License along with the Library You may charge a fee for the physical act of transferring a and you may at your option offer warranty protection in exchange for a fee You may modify your copy or copies of the Library or any portion of thus forming a work based on the and copy and distribute such modifications or work under the terms of Section provided that you also meet all of these other than as an argument passed when the facility is then you must make a good faith effort to ensure in the event an application does not supply such function or table
- and distribute a copy of this License along with the Library You may charge a fee for the physical act of transferring a and you may at your option offer warranty protection in exchange for a fee You may modify your copy or copies of the Library or any portion of thus forming a work based on the and copy and distribute such modifications or work under the terms of Section provided that you also meet all of these other than as an argument passed when the facility is then you must make a good faith effort to ensure in the event an application does not supply such function or the facility still operates
- and distribute a copy of this License along with the Library You may charge a fee for the physical act of transferring a and you may at your option offer warranty protection in exchange for a fee You may modify your copy or copies of the Library or any portion of thus forming a work based on the and copy and distribute such modifications or work under the terms of Section provided that you also meet all of these other than as an argument passed when the facility is then you must make a good faith effort to ensure in the event an application does not supply such function or the facility still and performs whatever part of its purpose remains and can be reasonably considered independent and separate works in themselves
- and distribute a copy of this License along with the Library You may charge a fee for the physical act of transferring a and you may at your option offer warranty protection in exchange for a fee You may modify your copy or copies of the Library or any portion of thus forming a work based on the and copy and distribute such modifications or work under the terms of Section provided that you also meet all of these other than as an argument passed when the facility is then you must make a good faith effort to ensure in the event an application does not supply such function or the facility still and performs whatever part of its purpose remains and can be reasonably considered independent and separate works in then this and its terms
- and distribute a copy of this License along with the Library You may charge a fee for the physical act of transferring a and you may at your option offer warranty protection in exchange for a fee You may modify your copy or copies of the Library or any portion of thus forming a work based on the and copy and distribute such modifications or work under the terms of Section provided that you also meet all of these other than as an argument passed when the facility is then you must make a good faith effort to ensure in the event an application does not supply such function or the facility still and performs whatever part of its purpose remains and can be reasonably considered independent and separate works in then this and its do not apply

to those sections when you distribute them as separate works But when you distribute the same sections as part of a whole which is a work based on the the distribution of the whole must be on the terms of this whose permissions for other licensees extend to the entire whole

- and distribute a copy of this License along with the Library You may charge a fee for the physical act of transferring a and you may at your option offer warranty protection in exchange for a fee You may modify your copy or copies of the Library or any portion of thus forming a work based on the and copy and distribute such modifications or work under the terms of Section provided that you also meet all of these other than as an argument passed when the facility is then you must make a good faith effort to ensure in the event an application does not supply such function or the facility still and performs whatever part of its purpose remains and can be reasonably considered independent and separate works in then this and its do not apply to those sections when you distribute them as separate works But when you distribute the same sections as part of a whole which is a work based on the the distribution of the whole must be on the terms of this whose permissions for other licensees extend to the entire and thus to each and every part regardless of who wrote it Thus
- and distribute a copy of this License along with the Library You may charge a fee for the physical act of transferring a and you may at your option offer warranty protection in exchange for a fee You may modify your copy or copies of the Library or any portion of thus forming a work based on the and copy and distribute such modifications or work under the terms of Section provided that you also meet all of these other than as an argument passed when the facility is then you must make a good faith effort to ensure in the event an application does not supply such function or the facility still and performs whatever part of its purpose remains and can be reasonably considered independent and separate works in then this and its do not apply to those sections when you distribute them as separate works But when you distribute the same sections as part of a whole which is a work based on the the distribution of the whole must be on the terms of this whose permissions for other licensees extend to the entire and thus to each and every part regardless of who wrote it it is not the intent of this section to claim rights or contest your rights to work written entirely by you
- rather
- the intent is to exercise the right to control the distribution of derivative or collective works based on the Library In addition
- the intent is to exercise the right to control the distribution of derivative or collective works based on the Library In mere aggregation of another work not based on the Library with the you must alter all the notices that refer to this so that they refer to the ordinary GNU General Public instead of to this it is irreversible for that so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy This option is useful when you wish to copy part of the code of the Library into a program that is not a library You may copy and distribute the which must be distributed under the terms of Sections and above on a medium customarily used for software interchange If distribution of object code is made by offering access to copy from a designated place
- the intent is to exercise the right to control the distribution of derivative or collective works based on the Library In mere aggregation of another work not based on the Library with the you must alter all the notices that refer to this so that they refer to the ordinary GNU General Public instead of to this it is irreversible for that so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy This option is useful when you wish to copy part of the code of the Library into a program that is not a library You may copy and distribute the which must be distributed under the terms of Sections and above on a medium customarily used for software interchange If distribution of object code is made by offering access to copy from a designated then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code
- the intent is to exercise the right to control the distribution of derivative or collective works based on the Library In mere aggregation of another work not based on the Library with the you must alter all the notices that refer to this so that they refer to the ordinary GNU General Public instead of to this it is irreversible for that so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy This option is useful when you wish to copy part of the code of the Library into a program that is not a library You may copy and distribute the which must be distributed under the terms of Sections and above on a medium customarily used for software interchange If distribution of object code is made by offering access to copy from a designated then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source even though third parties are not compelled to copy the source along with the object code A program that contains no derivative of any portion of the but is designed to work with the Library by being compiled or linked with is called a work that uses the Library Such a work
- the intent is to exercise the right to control the distribution of derivative or collective works based on the Library In mere aggregation of another work not based on the Library with the you must alter all the notices that refer

to this so that they refer to the ordinary GNU General Public instead of to this it is irreversible for that so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy This option is useful when you wish to copy part of the code of the Library into a program that is not a library You may copy and distribute the which must be distributed under the terms of Sections and above on a medium customarily used for software interchange If distribution of object code is made by offering access to copy from a designated then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source even though third parties are not compelled to copy the source along with the object code A program that contains no derivative of any portion of the but is designed to work with the Library by being compiled or linked with is called a work that uses the Library Such a in is in isolation

- the intent is to exercise the right to control the distribution of derivative or collective works based on the Library In mere aggregation of another work not based on the Library with the you must alter all the notices that refer to this so that they refer to the ordinary GNU General Public instead of to this it is irreversible for that so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy This option is useful when you wish to copy part of the code of the Library into a program that is not a library You may copy and distribute the which must be distributed under the terms of Sections and above on a medium customarily used for software interchange If distribution of object code is made by offering access to copy from a designated then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source even though third parties are not compelled to copy the source along with the object code A program that contains no derivative of any portion of the but is designed to work with the Library by being compiled or linked with is called a work that uses the Library Such a in is not a derivative work of the and therefore falls outside the scope of this License However
- the intent is to exercise the right to control the distribution of derivative or collective works based on the Library In mere aggregation of another work not based on the Library with the you must alter all the notices that refer to this so that they refer to the ordinary GNU General Public instead of to this it is irreversible for that so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy This option is useful when you wish to copy part of the code of the Library into a program that is not a library You may copy and distribute the which must be distributed under the terms of Sections and above on a medium customarily used for software interchange If distribution of object code is made by offering access to copy from a designated then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source even though third parties are not compelled to copy the source along with the object code A program that contains no derivative of any portion of the but is designed to work with the Library by being compiled or linked with is called a work that uses the Library Such a in is not a derivative work of the and therefore falls outside the scope of this License linking a work that uses the Library with the Library creates an executable that is a derivative of the rather than a work that uses the library The executable is therefore covered by this License Section states terms for distribution of such executables When a work that uses the Library uses material from a header file that is part of the the object code for the work may be a derivative work of the Library even though the source code is not Whether this is true is especially significant if the work can be linked without the or if the work is itself a library The threshold for this to be true is not precisely defined by law If such an object file uses only numerical parameters
- the intent is to exercise the right to control the distribution of derivative or collective works based on the Library In mere aggregation of another work not based on the Library with the you must alter all the notices that refer to this so that they refer to the ordinary GNU General Public instead of to this it is irreversible for that so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy This option is useful when you wish to copy part of the code of the Library into a program that is not a library You may copy and distribute the which must be distributed under the terms of Sections and above on a medium customarily used for software interchange If distribution of object code is made by offering access to copy from a designated then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source even though third parties are not compelled to copy the source along with the object code A program that contains no derivative of any portion of the but is designed to work with the Library by being compiled or linked with is called a work that uses the Library Such a in is not a derivative work of the and therefore falls outside the scope of this License linking a work that uses the Library with the Library creates an executable that is a derivative of the rather than a work that uses the library The executable is therefore covered by this License Section states terms for distribution of such executables When a work that uses the Library uses material from a header file that is part of the the object code for the work may be a derivative work of the Library even though the source code is not Whether this is true is especially significant if the work can be linked without the or if the work is itself a library The threshold for this to be true is not precisely defined by law If such an object file uses only numerical data structure layouts and accessors
- the intent is to exercise the right to control the distribution of derivative or collective works based on the Library

In mere aggregation of another **work not based on the Library with the you** must alter all the notices that refer to this **so that they** refer to the ordinary GNU General Public instead of to this **it** is irreversible for **that so** the ordinary GNU General Public **License** applies to all subsequent **copies and** derivative works made from **that copy** This option is useful when **you** wish to **copy** part of the **code** of the **Library** into a program **that is not a library** You may **copy and distribute** the which must be **distributed** under the **terms of Sections and above** on a medium customarily used for **software** interchange **If** distribution of object **code** is made by offering access to **copy** from a designated then offering equivalent access to **copy** the source **code** from the same **place** satisfies the requirement to **distribute** the source even though third parties are **not** compelled to **copy** the source along **with** the object **code** A program **that** contains no derivative of **any** portion of the **but** is designed to **work with** the **Library** by being compiled **or linked with** is called a **work that uses the Library** Such a **in** is **not** a derivative **work** of the **and** therefore falls outside the scope of this **License** linking a **work that uses the Library with the Library** creates an **executable that** is a derivative of the **rather than a work that uses the library** The **executable** is therefore covered by this **License Section** states **terms** for distribution of such **executables** When a **work that uses the Library** uses material from a header file **that** is part of the **the object code** for the **work** may be a derivative **work** of the **Library** even though the source **code** is **not** Whether this is true is especially significant if the **work** can be linked without the **or if the work is itself a library** The threshold for this to be true is **not** precisely defined by law **If** such an object file uses only numerical data structure layouts **and and** small macros **and small** then the **use** of the object file is **unrestricted**

- the intent is to exercise the right to control the distribution of derivative **or** collective works based **on** the **Library** In mere aggregation of another **work not based on the Library with the you** must alter all the notices that refer to this **so that they** refer to the ordinary GNU General Public instead of to this **it** is irreversible for **that so** the ordinary GNU General Public **License** applies to all subsequent **copies and** derivative works made from **that copy** This option is useful when **you** wish to **copy** part of the **code** of the **Library** into a program **that is not a library** You may **copy and distribute** the which must be **distributed** under the **terms of Sections and above** on a medium customarily used for **software** interchange **If** distribution of object **code** is made by offering access to **copy** from a designated then offering equivalent access to **copy** the source **code** from the same **place** satisfies the requirement to **distribute** the source even though third parties are **not** compelled to **copy** the source along **with** the object **code** A program **that** contains no derivative of **any** portion of the **but** is designed to **work with the Library** by being compiled **or linked with** is called a **work that uses the Library** Such a **in** is **not** a derivative **work** of the **and** therefore falls outside the scope of this **License** linking a **work that uses the Library with the Library** creates an **executable that** is a derivative of the **rather than a work that uses the library** The **executable** is therefore covered by this **License Section** states **terms** for distribution of such **executables** When a **work that uses the Library** uses material from a header file **that** is part of the **the object code** for the **work** may be a derivative **work** of the **Library** even though the source **code** is **not** Whether this is true is especially significant if the **work** can be linked without the **or if the work is itself a library** The threshold for this to be true is **not** precisely defined by law **If** such an object file uses only numerical data structure layouts **and and** small macros **and small** then the **use** of the object file is regardless of whether **it** is legally a derivative if the **work** is a derivative of the **you** may **distribute** the object **code** for the **work** under the **terms of Section** Any executables containing **that work** also fall under **Section**
 - **and**
 - if the **work** is an executable linked **with the with** the complete machine readable **work that uses the as object code and or source so that** the user can **modify** the **Library and** then relink to produce a modified executable containing the modified **rather than copying library functions** into the **executable**
 - if the **work** is an executable linked **with the with** the complete machine readable **work that uses the as object code and or source so that** the user can **modify** the **Library and** then relink to produce a modified **executable** containing the modified **rather than copying library functions** into the **if the user installs one**
 - if the **work** is an executable linked **with the with** the complete machine readable **work that uses the as object code and or source so that** the user can **modify** the **Library and** then relink to produce a modified **executable** containing the modified **rather than copying library functions** into the **if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written offer**
 - if the **work** is an executable linked **with the with** the complete machine readable **work that uses the as object code and or source so that** the user can **modify** the **Library and** then relink to produce a modified **executable** containing the modified **rather than copying library functions** into the **if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three years**
 - if the **work** is an executable linked **with the with** the complete machine readable **work that uses the as object code and or source so that** the user can **modify** the **Library and** then relink to produce a modified **executable**

containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three to give the same user the materials specified in Subsection

- if the work is an executable linked with the with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the work is made by offering access to copy from a designated offer equivalent access to copy the above specified materials from the same place e Verify that the user has already received a copy of these materials or that you have already sent this user a copy For an the required form of the work that uses the Library must include any data and utility programs needed for reproducing the executable from it as a special exception
- if the work is an executable linked with the with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the work is made by offering access to copy from a designated offer equivalent access to copy the above specified materials from the same place e Verify that the user has already received a copy of these materials or that you have already sent this user a copy For an the required form of the work that uses the Library must include any data and utility programs needed for reproducing the executable from it as a special the materials to be distributed need not include anything that is normally kernel
- if the work is an executable linked with the with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the work is made by offering access to copy from a designated offer equivalent access to copy the above specified materials from the same place e Verify that the user has already received a copy of these materials or that you have already sent this user a copy For an the required form of the work that uses the Library must include any data and utility programs needed for reproducing the executable from it as a special the materials to be distributed need not include anything that is normally and so on of the operating system on which the executable runs
- if the work is an executable linked with the with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the work is made by offering access to copy from a designated offer equivalent access to copy the above specified materials from the same place e Verify that the user has already received a copy of these materials or that you have already sent this user a copy For an the required form of the work that uses the Library must include any data and utility programs needed for reproducing the executable from it as a special the materials to be distributed need not include anything that is normally and so on of the operating system on which the executable unless that component itself accompanies the executable It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system Such a contradiction means you cannot use both them and the Library together in an executable that you distribute You may place library facilities that are a work based on the Library side by side in a single library together with other library facilities not covered by this and distribute such a combined provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise permitted
- if the work is an executable linked with the with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the work is made by offering access to copy from a

designated offer equivalent access to copy the above specified materials from the same place e Verify that the user has already received a copy of these materials or that you have already sent this user a copy For an the required form of the work that uses the Library must include any data and utility programs needed for reproducing the executable from it as a special the materials to be distributed need not include anything that is normally and so on of the operating system on which the executable unless that component itself accompanies the executable It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system Such a contradiction means you cannot use both them and the Library together in an executable that you distribute You may place library facilities that are a work based on the Library side by side in a single library together with other library facilities not covered by this and distribute such a combined provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise and provided that you do these two things

- if the work is an executable linked with the with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the work is made by offering access to copy from a designated offer equivalent access to copy the above specified materials from the same place e Verify that the user has already received a copy of these materials or that you have already sent this user a copy For an the required form of the work that uses the Library must include any data and utility programs needed for reproducing the executable from it as a special the materials to be distributed need not include anything that is normally and so on of the operating system on which the executable unless that component itself accompanies the executable It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system Such a contradiction means you cannot use both them and the Library together in an executable that you distribute You may place library facilities that are a work based on the Library side by side in a single library together with other library facilities not covered by this and distribute such a combined provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise and provided that you do these two uncombined with any other library facilities This must be distributed under the terms of the Sections above b Give prominent notice with the combined library of the fact that part of it is a work based on the and explaining where to find the accompanying uncombined form of the same work You may not modify
- if the work is an executable linked with the with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the work is made by offering access to copy from a designated offer equivalent access to copy the above specified materials from the same place e Verify that the user has already received a copy of these materials or that you have already sent this user a copy For an the required form of the work that uses the Library must include any data and utility programs needed for reproducing the executable from it as a special the materials to be distributed need not include anything that is normally and so on of the operating system on which the executable unless that component itself accompanies the executable It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system Such a contradiction means you cannot use both them and the Library together in an executable that you distribute You may place library facilities that are a work based on the Library side by side in a single library together with other library facilities not covered by this and distribute such a combined provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise and provided that you do these two uncombined with any other library facilities This must be distributed under the terms of the Sections above b Give prominent notice with the combined library of the fact that part of it is a work based on the and explaining where to find the accompanying uncombined form of the same work You may not sublicense
- if the work is an executable linked with the with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the work is made by offering access to copy from a designated offer equivalent access to copy the above specified materials from the same place e Verify that

the user has already received a **copy** of **these** materials or that you have already sent this user a **copy** For an the required form of the **work** that uses the **Library** must include **any** data and utility programs needed for reproducing the **executable** from it as a special the materials to be distributed need **not** include anything that is normally and so on of the operating **system** on which the **executable** unless that component itself accompanies the **executable** It may happen that this requirement contradicts the **license** restrictions of other proprietary **libraries** that do **not** normally accompany the operating **system** Such a contradiction means **you** cannot **use** both them and the **Library** together in an **executable** that you **distribute** You may **place** library facilities that are a **work** based on the **Library** side by side in a single **library** together with other **library** facilities **not** covered by this and **distribute** such a combined provided that the separate distribution of the **work** based on the **Library** and of the other **library** facilities is otherwise and provided that you do these two uncombined with **any other library** facilities This must be **distributed** under the **terms** of the Sections above b Give prominent notice with the combined **library** of the fact that part of it is a **work** based on the and explaining where to find the accompanying uncombined form of the same **work** You may not link with

- if the **work** is an **executable** linked with the with the complete machine readable **work** that uses the as object code and or source so that the user can modify the **Library** and then relink to produce a modified **executable** containing the modified rather than **copying library functions** into the if the user installs as long as the modified version is interface compatible with the version that the **work** was made with c Accompany the **work** with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the **work** is made by offering access to **copy** from a designated offer equivalent access to **copy** the above specified materials from the same place e Verify that the user has already received a **copy** of **these** materials or that you have already sent this user a **copy** For an the required form of the **work** that uses the **Library** must include **any** data and utility programs needed for reproducing the **executable** from it as a special the materials to be distributed need **not** include anything that is normally and so on of the operating **system** on which the **executable** unless that component itself accompanies the **executable** It may happen that this requirement contradicts the **license** restrictions of other proprietary **libraries** that do **not** normally accompany the operating **system** Such a contradiction means **you** cannot **use** both them and the **Library** together in an **executable** that you **distribute** You may **place** library facilities that are a **work** based on the **Library** side by side in a single **library** together with other **library** facilities **not** covered by this and **distribute** such a combined provided that the separate distribution of the **work** based on the **Library** and of the other **library** facilities is otherwise and provided that you do these two uncombined with **any other library** facilities This must be **distributed** under the **terms** of the Sections above b Give prominent notice with the combined **library** of the fact that part of it is a **work** based on the and explaining where to find the accompanying uncombined form of the same **work** You may not link or distribute the **Library** except as expressly provided under this **License** Any attempt otherwise to link or distribute the **Library** is void
- if the **work** is an **executable** linked with the with the complete machine readable **work** that uses the as object code and or source so that the user can modify the **Library** and then relink to produce a modified **executable** containing the modified rather than **copying library functions** into the if the user installs as long as the modified version is interface compatible with the version that the **work** was made with c Accompany the **work** with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the **work** is made by offering access to **copy** from a designated offer equivalent access to **copy** the above specified materials from the same place e Verify that the user has already received a **copy** of **these** materials or that you have already sent this user a **copy** For an the required form of the **work** that uses the **Library** must include **any** data and utility programs needed for reproducing the **executable** from it as a special the materials to be distributed need **not** include anything that is normally and so on of the operating **system** on which the **executable** unless that component itself accompanies the **executable** It may happen that this requirement contradicts the **license** restrictions of other proprietary **libraries** that do **not** normally accompany the operating **system** Such a contradiction means **you** cannot **use** both them and the **Library** together in an **executable** that you **distribute** You may **place** library facilities that are a **work** based on the **Library** side by side in a single **library** together with other **library** facilities **not** covered by this and **distribute** such a combined provided that the separate distribution of the **work** based on the **Library** and of the other **library** facilities is otherwise and provided that you do these two uncombined with **any other library** facilities This must be **distributed** under the **terms** of the Sections above b Give prominent notice with the combined **library** of the fact that part of it is a **work** based on the and explaining where to find the accompanying uncombined form of the same **work** You may not link or distribute the **Library** except as expressly provided under this **License** Any attempt otherwise to link or distribute the **Library** is and will automatically terminate your rights under this **License** parties who have received copies
- if the **work** is an **executable** linked with the with the complete machine readable **work** that uses the as object code and or source so that the user can modify the **Library** and then relink to produce a modified **executable**

containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the work is made by offering access to copy from a designated offer equivalent access to copy the above specified materials from the same place e Verify that the user has already received a copy of these materials or that you have already sent this user a copy For an the required form of the work that uses the Library must include any data and utility programs needed for reproducing the executable from it as a special the materials to be distributed need not include anything that is normally and so on of the operating system on which the executable unless that component itself accompanies the executable It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system Such a contradiction means you cannot use both them and the Library together in an executable that you distribute You may place library facilities that are a work based on the Library side by side in a single library together with other library facilities not covered by this and distribute such a combined provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise and provided that you do these two uncombined with any other library facilities This must be distributed under the terms of the Sections above b Give prominent notice with the combined library of the fact that part of it is a work based on the and explaining where to find the accompanying uncombined form of the same work You may not link or distribute the Library except as expressly provided under this License Any attempt otherwise to link or distribute the Library is and will automatically terminate your rights under this License parties who have received or from you under this License will not have their licenses terminated so long as such parties remain in full compliance You are not required to accept this since you have not signed it nothing else grants you permission to modify or distribute the Library or its derivative works These actions are prohibited by law if you do not accept this License by modifying or distributing the you indicate your acceptance of this License to do so

- if the work is an executable linked with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the work is made by offering access to copy from a designated offer equivalent access to copy the above specified materials from the same place e Verify that the user has already received a copy of these materials or that you have already sent this user a copy For an the required form of the work that uses the Library must include any data and utility programs needed for reproducing the executable from it as a special the materials to be distributed need not include anything that is normally and so on of the operating system on which the executable unless that component itself accompanies the executable It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system Such a contradiction means you cannot use both them and the Library together in an executable that you distribute You may place library facilities that are a work based on the Library side by side in a single library together with other library facilities not covered by this and distribute such a combined provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise and provided that you do these two uncombined with any other library facilities This must be distributed under the terms of the Sections above b Give prominent notice with the combined library of the fact that part of it is a work based on the and explaining where to find the accompanying uncombined form of the same work You may not link or distribute the Library except as expressly provided under this License Any attempt otherwise to link or distribute the Library is and will automatically terminate your rights under this License parties who have received or from you under this License will not have their licenses terminated so long as such parties remain in full compliance You are not required to accept this since you have not signed it nothing else grants you permission to modify or distribute the Library or its derivative works These actions are prohibited by law if you do not accept this License by modifying or distributing the you indicate your acceptance of this License to do and all its terms and conditions for copying
- if the work is an executable linked with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the work is made by offering access to copy from a designated offer equivalent access to copy the above specified materials from the same place e Verify that

the user has already received a **copy** of **these** materials or that you have already sent this user a **copy** For an the required form of the **work** that uses the **Library** must include **any** data and utility programs needed for reproducing the **executable** from it as a special the materials to be distributed need **not** include anything that is normally and so on of the operating **system** on which the **executable** unless that component itself accompanies the **executable** It may happen that this requirement contradicts the **license** restrictions of other proprietary **libraries** that do **not** normally accompany the operating **system** Such a contradiction means you cannot use both them and the **Library** together in an **executable** that you distribute You may place library facilities that are a **work** based on the **Library** side by side in a single **library** together with other library facilities not covered by this and distribute such a combined provided that the separate distribution of the **work** based on the **Library** and of the other **library** facilities is otherwise and provided that you do these two uncombined with any other **library** facilities This must be distributed under the terms of the Sections above b Give prominent notice with the combined **library** of the fact that part of it is a **work** based on the and explaining where to find the accompanying uncombined form of the same **work** You may not link or distribute the **Library** except as expressly provided under this **License** Any attempt otherwise to link or distribute the **Library** is and will automatically terminate your **rights** under this **License** parties who have received or from you under this **License** will not have their licenses terminated so long as such parties remain in full compliance You are not required to accept this since you have not signed it nothing else grants you permission to modify or distribute the **Library** or its derivative works These actions are prohibited by law if you do not accept this **License** by modifying or distributing the you indicate your acceptance of this **License** to do and all its terms and conditions for distributing or modifying the **Library** or works based on it Each time you redistribute the the recipient automatically receives a **license** from the original licensor to distribute

- if the **work** is an **executable** linked with the complete machine readable **work** that uses the as object code and or source so that the user can modify the **Library** and then relink to produce a modified **executable** containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the **work** was made with c Accompany the **work** with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the **work** is made by offering access to **copy** from a designated offer equivalent access to **copy** the above specified materials from the same place e Verify that the user has already received a **copy** of **these** materials or that you have already sent this user a **copy** For an the required form of the **work** that uses the **Library** must include **any** data and utility programs needed for reproducing the **executable** from it as a special the materials to be distributed need **not** include anything that is normally and so on of the operating **system** on which the **executable** unless that component itself accompanies the **executable** It may happen that this requirement contradicts the **license** restrictions of other proprietary **libraries** that do **not** normally accompany the operating **system** Such a contradiction means you cannot use both them and the **Library** together in an **executable** that you distribute You may place library facilities that are a **work** based on the **Library** side by side in a single **library** together with other library facilities not covered by this and distribute such a combined provided that the separate distribution of the **work** based on the **Library** and of the other **library** facilities is otherwise and provided that you do these two uncombined with any other **library** facilities This must be distributed under the terms of the Sections above b Give prominent notice with the combined **library** of the fact that part of it is a **work** based on the and explaining where to find the accompanying uncombined form of the same **work** You may not link or distribute the **Library** except as expressly provided under this **License** Any attempt otherwise to link or distribute the **Library** is and will automatically terminate your **rights** under this **License** parties who have received or from you under this **License** will not have their licenses terminated so long as such parties remain in full compliance You are not required to accept this since you have not signed it nothing else grants you permission to modify or distribute the **Library** or its derivative works These actions are prohibited by law if you do not accept this **License** by modifying or distributing the you indicate your acceptance of this **License** to do and all its terms and conditions for distributing or modifying the **Library** or works based on it Each time you redistribute the the recipient automatically receives a **license** from the original licensor to link with or modify the **Library** subject to these terms and conditions You may not impose any further restrictions on the recipients exercise of the rights granted herein You are not responsible for enforcing compliance by third parties with this **License** If
- if the **work** is an **executable** linked with the complete machine readable **work** that uses the as object code and or source so that the user can modify the **Library** and then relink to produce a modified **executable** containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the **work** was made with c Accompany the **work** with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the **work** is made by offering access to **copy** from a designated offer equivalent access to **copy** the above specified materials from the same place e Verify that

the user has already received a **copy** of **these** materials or that you have already sent this user a **copy** For an the required form of the **work** that uses the **Library** must include **any** data and utility programs needed for reproducing the **executable** from it as a special the materials to be distributed need **not** include anything that is normally and so on of the operating **system** on which the **executable** unless that component itself accompanies the **executable** It may happen that this requirement contradicts the **license** restrictions of other proprietary **libraries** that do **not** normally accompany the operating **system** Such a contradiction means you cannot use both them and the **Library** together in an **executable** that you **distribute** You may place library facilities that are a **work** based on the **Library** side by side in a single **library** together with other library facilities not covered by this and distribute such a combined provided that the separate distribution of the **work** based on the **Library** and of the other **library** facilities is otherwise and provided that you do these two uncombined with any other **library** facilities This must be **distributed** under the **terms** of the Sections above b Give prominent notice with the combined **library** of the fact that part of it is a **work** based on the and explaining where to find the accompanying uncombined form of the same **work** You may not link or distribute the **Library** except as expressly provided under this **License** Any attempt otherwise to link or distribute the **Library** is and will automatically terminate your **rights** under this **License** parties who have received or from you under this **License** will not have their licenses terminated so long as such parties remain in full compliance You are not required to accept this since you have not signed it nothing else grants you permission to modify or distribute the **Library** or its derivative works These actions are prohibited by law if you do not accept this **License** by modifying or distributing the **you** indicate your acceptance of this **License** to do and all its terms and conditions for distributing or modifying the **Library** or works based on it Each time you redistribute the the recipient automatically receives a **license** from the original licensor to link with or modify the **Library** subject to these terms and conditions You may not impose any further restrictions on the recipients exercise of the **rights** granted herein You are not responsible for enforcing compliance by third parties with this **License** as a consequence of a court judgment or allegation of patent infringement or for any other conditions are imposed on they do not excuse you from the conditions of this **License** If you cannot distribute so as to satisfy simultaneously your obligations under this **License** and any other pertinent obligations

- if the **work** is an **executable** linked with the with the complete machine readable **work** that uses the as object code and or source so that the user can modify the **Library** and then relink to produce a modified **executable** containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the **work** was made with c Accompany the **work** with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the **work** is made by offering access to **copy** from a designated offer equivalent access to **copy** the above specified materials from the same place e Verify that the user has already received a **copy** of **these** materials or that you have already sent this user a **copy** For an the required form of the **work** that uses the **Library** must include **any** data and utility programs needed for reproducing the **executable** from it as a special the materials to be distributed need **not** include anything that is normally and so on of the operating **system** on which the **executable** unless that component itself accompanies the **executable** It may happen that this requirement contradicts the **license** restrictions of other proprietary **libraries** that do **not** normally accompany the operating **system** Such a contradiction means you cannot use both them and the **Library** together in an **executable** that you **distribute** You may place library facilities that are a **work** based on the **Library** side by side in a single **library** together with other library facilities not covered by this and distribute such a combined provided that the separate distribution of the **work** based on the **Library** and of the other **library** facilities is otherwise and provided that you do these two uncombined with any other **library** facilities This must be **distributed** under the **terms** of the Sections above b Give prominent notice with the combined **library** of the fact that part of it is a **work** based on the and explaining where to find the accompanying uncombined form of the same **work** You may not link or distribute the **Library** except as expressly provided under this **License** Any attempt otherwise to link or distribute the **Library** is and will automatically terminate your **rights** under this **License** parties who have received or from you under this **License** will not have their licenses terminated so long as such parties remain in full compliance You are not required to accept this since you have not signed it nothing else grants you permission to modify or distribute the **Library** or its derivative works These actions are prohibited by law if you do not accept this **License** by modifying or distributing the **you** indicate your acceptance of this **License** to do and all its terms and conditions for distributing or modifying the **Library** or works based on it Each time you redistribute the the recipient automatically receives a **license** from the original licensor to link with or modify the **Library** subject to these terms and conditions You may not impose any further restrictions on the recipients exercise of the **rights** granted herein You are not responsible for enforcing compliance by third parties with this **License** as a consequence of a court judgment or allegation of patent infringement or for any other conditions are imposed on they do not excuse you from the conditions of this **License** If you cannot distribute so as to satisfy simultaneously your obligations under this **License** and any other pertinent obligations

simultaneously your **obligations** under this **License** and any other pertinent then as a consequence **you** may not distribute the **Library** at all For if a patent license would not permit royalty free redistribution of the **Library** by all those who receive **copies** directly or indirectly through then the only way **you** could satisfy both it and this **License** would be to refrain entirely from distribution of the **Library** If any portion of this section is held invalid or unenforceable under any particular circumstance

- if the **work** is an **executable** linked with the **with** the complete machine readable **work that** uses the as object code and or source so that the user can modify the **Library** and then relink to produce a modified **executable** containing the modified rather than **copying library functions** into the if the user installs as long as the modified version is interface compatible with the **version** that the **work** was made with c Accompany the **work** with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the **work** is made by offering access to **copy** from a designated offer equivalent access to **copy** the above specified materials from the same place e Verify that the user has already received a **copy** of these materials or that you have already sent this user a **copy** For an the required form of the **work** that uses the **Library** must include any data and utility programs needed for reproducing the **executable** from it as a special the materials to be distributed need not include anything that is normally and so on of the operating system on which the **executable** unless that component itself accompanies the **executable** It may happen that this requirement contradicts the **license** restrictions of other proprietary **libraries** that do not normally accompany the operating system Such a contradiction means you cannot use both them and the **Library** together in an **executable** that you distribute You may place library facilities that are a **work** based on the **Library** side by side in a single library together with other library facilities not covered by this and distribute such a combined provided that the separate distribution of the **work** based on the **Library** and of the other library facilities is otherwise and provided that you do these two uncombined with any other library facilities This must be distributed under the terms of the Sections above b Give prominent notice with the combined library of the fact that part of it is a **work** based on the and explaining where to find the accompanying uncombined form of the same **work** You may not link or distribute the **Library** except as expressly provided under this **License** Any attempt otherwise to link or distribute the **Library** is and will automatically terminate your rights under this **License** parties who have received or from you under this **License** will not have their licenses terminated so long as such parties remain in full compliance You are not required to accept this since you have not signed it nothing else grants you permission to modify or distribute the **Library** or its derivative works These actions are prohibited by law if you do not accept this **License** by modifying or distributing the you indicate your acceptance of this **License** to do and all its terms and conditions for distributing or modifying the **Library** or works based on it Each time you redistribute the the recipient automatically receives a **license** from the original licensor to link with or modify the **Library** subject to these terms and conditions You may not impose any further restrictions on the recipients exercise of the rights granted herein You are not responsible for enforcing compliance by third parties with this **License** as a consequence of a court judgment or allegation of patent infringement or for any other conditions are imposed on they do not excuse you from the conditions of this **License** If you cannot distribute so as to satisfy simultaneously your **obligations** under this **License** and any other pertinent then as a consequence you may not distribute the **Library** at all For if a patent license would not permit royalty free redistribution of the **Library** by all those who receive **copies** directly or indirectly through then the only way **you** could satisfy both it and this **License** would be to refrain entirely from distribution of the **Library** If any portion of this section is held invalid or unenforceable under any particular the balance of the section is intended to apply
- if the **work** is an **executable** linked with the **with** the complete machine readable **work that** uses the as object code and or source so that the user can modify the **Library** and then relink to produce a modified **executable** containing the modified rather than **copying library functions** into the if the user installs as long as the modified version is interface compatible with the **version** that the **work** was made with c Accompany the **work** with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the **work** is made by offering access to **copy** from a designated offer equivalent access to **copy** the above specified materials from the same place e Verify that the user has already received a **copy** of these materials or that you have already sent this user a **copy** For an the required form of the **work** that uses the **Library** must include any data and utility programs needed for reproducing the **executable** from it as a special the materials to be distributed need not include anything that is normally and so on of the operating system on which the **executable** unless that component itself accompanies the **executable** It may happen that this requirement contradicts the **license** restrictions of other proprietary **libraries** that do not normally accompany the operating system Such a contradiction means you cannot use both them and the **Library** together in an **executable** that you distribute You may place library facilities that are a **work** based on the **Library** side by side in a single library together with other library facilities not covered by this and distribute such a combined provided that the separate distribution of the

work based on the Library and of the other library facilities is otherwise and provided that you do these two uncombined with any other library facilities This must be distributed under the terms of the Sections above b Give prominent notice with the combined library of the fact that part of it is a work based on the and explaining where to find the accompanying uncombined form of the same work You may not link or distribute the Library except as expressly provided under this License Any attempt otherwise to link or distribute the Library is and will automatically terminate your rights under this License parties who have received or from you under this License will not have their licenses terminated so long as such parties remain in full compliance You are not required to accept this since you have not signed it nothing else grants you permission to modify or distribute the Library or its derivative works These actions are prohibited by law if you do not accept this License by modifying or distributing the you indicate your acceptance of this License to do and all its terms and conditions for distributing or modifying the Library or works based on it Each time you redistribute the the recipient automatically receives a license from the original licensor to link with or modify the Library subject to these terms and conditions You may not impose any further restrictions on the recipients exercise of the rights granted herein You are not responsible for enforcing compliance by third parties with this License as a consequence of a court judgment or allegation of patent infringement or for any other conditions are imposed on they do not excuse you from the conditions of this License If you cannot distribute so as to satisfy simultaneously your obligations under this License and any other pertinent then as a consequence you may not distribute the Library at all For if a patent license would not permit royalty free redistribution of the Library by all those who receive copies directly or indirectly through then the only way you could satisfy both it and this License would be to refrain entirely from distribution of the Library If any portion of this section is held invalid or unenforceable under any particular the balance of the section is intended to and the section as a whole is intended to apply in other circumstances It is not the purpose of this section to induce you to infringe any patents or other property right claims or to contest validity of any such claims

- this section has the sole purpose of protecting the integrity of the free software distribution system which is implemented by public license practices Many people have made generous contributions to the wide range of software distributed through that system in reliance on consistent application of that system
- it is up to the author donor to decide if he or she is willing to distribute software through any other system and a licensee cannot impose that choice This section is intended to make thoroughly clear what is believed to be a consequence of the rest of this License If the distribution and or use of the Library is restricted in certain countries either by patents or by copyrighted interfaces
- it is up to the author donor to decide if he or she is willing to distribute software through any other system and a licensee cannot impose that choice This section is intended to make thoroughly clear what is believed to be a consequence of the rest of this License If the distribution and or use of the Library is restricted in certain countries either by patents or by copyrighted the original copyright holder who places the Library under this License may add an geographical distribution limitation excluding those countries
- it is up to the author donor to decide if he or she is willing to distribute software through any other system and a licensee cannot impose that choice This section is intended to make thoroughly clear what is believed to be a consequence of the rest of this License If the distribution and or use of the Library is restricted in certain countries either by patents or by copyrighted the original copyright holder who places the Library under this License may add an geographical distribution limitation excluding those so that distribution is permitted only in or among countries not thus excluded In such this License incorporates the limitation as if written in the body of this License The Free Software Foundation may publish revised and or new versions of the Lesser General Public License from time to time Such new versions will be similar in spirit to the present but may differ in detail to address new problems or concerns Each version is given a distinguishing version number If the Library specifies a version number of this License which applies to it and any later you have the option of following the terms and conditions either of that version or of any later version published by the Free Software Foundation If the Library does not specify a license version number
- it is up to the author donor to decide if he or she is willing to distribute software through any other system and a licensee cannot impose that choice This section is intended to make thoroughly clear what is believed to be a consequence of the rest of this License If the distribution and or use of the Library is restricted in certain countries either by patents or by copyrighted the original copyright holder who places the Library under this License may add an geographical distribution limitation excluding those so that distribution is permitted only in or among countries not thus excluded In such this License incorporates the limitation as if written in the body of this License The Free Software Foundation may publish revised and or new versions of the Lesser General Public License from time to time Such new versions will be similar in spirit to the present but may differ in detail to address new problems or concerns Each version is given a distinguishing version number If the Library specifies a version number of this License which applies to it and any later you have the option of following the terms and conditions either of that version or of any later version published by the Free Software

Foundation If the Library does not specify a license version you may choose any version ever published by the Free Software Foundation If you wish to incorporate parts of the Library into other free programs whose distribution conditions are incompatible with these

- we sometimes make exceptions for this Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally NO WARRANTY BECAUSE THE LIBRARY IS LICENSED FREE OF CHARGE
- we sometimes make exceptions for this Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally NO WARRANTY BECAUSE THE LIBRARY IS LICENSED FREE OF THERE IS NO WARRANTY FOR THE LIBRARY
- we sometimes make exceptions for this Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally NO WARRANTY BECAUSE THE LIBRARY IS LICENSED FREE OF THERE IS NO WARRANTY FOR THE TO THE EXTENT PERMITTED BY APPLICABLE LAW EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND OR OTHER PARTIES PROVIDE THE LIBRARY AS IS WITHOUT WARRANTY OF ANY KIND
- we sometimes make exceptions for this Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally NO WARRANTY BECAUSE THE LIBRARY IS LICENSED FREE OF THERE IS NO WARRANTY FOR THE TO THE EXTENT PERMITTED BY APPLICABLE LAW EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND OR OTHER PARTIES PROVIDE THE LIBRARY AS IS WITHOUT WARRANTY OF ANY EITHER EXPRESSED OR IMPLIED
- we sometimes make exceptions for this Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally NO WARRANTY BECAUSE THE LIBRARY IS LICENSED FREE OF THERE IS NO WARRANTY FOR THE TO THE EXTENT PERMITTED BY APPLICABLE LAW EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND OR OTHER PARTIES PROVIDE THE LIBRARY AS IS WITHOUT WARRANTY OF ANY EITHER EXPRESSED OR INCLUDING
- we sometimes make exceptions for this Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally NO WARRANTY BECAUSE THE LIBRARY IS LICENSED FREE OF THERE IS NO WARRANTY FOR THE TO THE EXTENT PERMITTED BY APPLICABLE LAW EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND OR OTHER PARTIES PROVIDE THE LIBRARY AS IS WITHOUT WARRANTY OF ANY EITHER EXPRESSED OR BUT NOT LIMITED TO
- we sometimes make exceptions for this Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally NO WARRANTY BECAUSE THE LIBRARY IS LICENSED FREE OF THERE IS NO WARRANTY FOR THE TO THE EXTENT PERMITTED BY APPLICABLE LAW EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND OR OTHER PARTIES PROVIDE THE LIBRARY AS IS WITHOUT WARRANTY OF ANY EITHER EXPRESSED OR BUT NOT LIMITED THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE LIBRARY IS WITH YOU SHOULD THE LIBRARY PROVE DEFECTIVE
- we sometimes make exceptions for this Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally NO WARRANTY BECAUSE THE LIBRARY IS LICENSED FREE OF THERE IS NO WARRANTY FOR THE TO THE EXTENT PERMITTED BY APPLICABLE LAW EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND OR OTHER PARTIES PROVIDE THE LIBRARY AS IS WITHOUT WARRANTY OF ANY EITHER EXPRESSED OR BUT NOT LIMITED THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE LIBRARY IS WITH YOU SHOULD THE LIBRARY PROVE YOU ASSUME THE COST OF ALL NECESSARY SERVICING
- we sometimes make exceptions for this Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally NO WARRANTY BECAUSE THE LIBRARY IS LICENSED FREE OF THERE IS NO WARRANTY FOR THE TO THE EXTENT PERMITTED BY APPLICABLE LAW EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND OR OTHER PARTIES PROVIDE THE LIBRARY AS IS WITHOUT WARRANTY OF ANY EITHER EXPRESSED OR BUT NOT LIMITED THE IMPLIED WARRANTIES

OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE LIBRARY IS WITH YOU SHOULD THE LIBRARY PROVE YOU ASSUME THE COST OF ALL NECESSARY REPAIR OR CORRECTION IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT HOLDER

- we sometimes make exceptions for this Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally NO WARRANTY BECAUSE THE LIBRARY IS LICENSED FREE OF THERE IS NO WARRANTY FOR THE TO THE EXTENT PERMITTED BY APPLICABLE LAW EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND OR OTHER PARTIES PROVIDE THE LIBRARY AS IS WITH OUT WARRANTY OF ANY EITHER EXPRESSED OR BUT NOT LIMITED THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE LIBRARY IS WITH YOU SHOULD THE LIBRARY PROVE YOU ASSUME THE COST OF ALL NECESSARY REPAIR OR CORRECTION IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT OR ANY OTHER PARTY WHO MAY MODIFY AND OR REDISTRIBUTE THE LIBRARY AS PERMITTED ABOVE
- we sometimes make exceptions for this Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally NO WARRANTY BECAUSE THE LIBRARY IS LICENSED FREE OF THERE IS NO WARRANTY FOR THE TO THE EXTENT PERMITTED BY APPLICABLE LAW EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND OR OTHER PARTIES PROVIDE THE LIBRARY AS IS WITH OUT WARRANTY OF ANY EITHER EXPRESSED OR BUT NOT LIMITED THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE LIBRARY IS WITH YOU SHOULD THE LIBRARY PROVE YOU ASSUME THE COST OF ALL NECESSARY REPAIR OR CORRECTION IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT OR ANY OTHER PARTY WHO MAY MODIFY AND OR REDISTRIBUTE THE LIBRARY AS PERMITTED BE LIABLE TO YOU FOR DAMAGES
- we sometimes make exceptions for this Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally NO WARRANTY BECAUSE THE LIBRARY IS LICENSED FREE OF THERE IS NO WARRANTY FOR THE TO THE EXTENT PERMITTED BY APPLICABLE LAW EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND OR OTHER PARTIES PROVIDE THE LIBRARY AS IS WITH OUT WARRANTY OF ANY EITHER EXPRESSED OR BUT NOT LIMITED THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE LIBRARY IS WITH YOU SHOULD THE LIBRARY PROVE YOU ASSUME THE COST OF ALL NECESSARY REPAIR OR CORRECTION IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT OR ANY OTHER PARTY WHO MAY MODIFY AND OR REDISTRIBUTE THE LIBRARY AS PERMITTED BE LIABLE TO YOU FOR INCLUDING ANY GENERAL
- we sometimes make exceptions for this Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally NO WARRANTY BECAUSE THE LIBRARY IS LICENSED FREE OF THERE IS NO WARRANTY FOR THE TO THE EXTENT PERMITTED BY APPLICABLE LAW EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND OR OTHER PARTIES PROVIDE THE LIBRARY AS IS WITH OUT WARRANTY OF ANY EITHER EXPRESSED OR BUT NOT LIMITED THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE LIBRARY IS WITH YOU SHOULD THE LIBRARY PROVE YOU ASSUME THE COST OF ALL NECESSARY REPAIR OR CORRECTION IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT OR ANY OTHER PARTY WHO MAY MODIFY AND OR REDISTRIBUTE THE LIBRARY AS PERMITTED BE LIABLE TO YOU FOR INCLUDING ANY SPECIAL
- we sometimes make exceptions for this Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally NO WARRANTY BECAUSE THE LIBRARY IS LICENSED FREE OF THERE IS NO WARRANTY FOR THE TO THE EXTENT PERMITTED BY APPLICABLE LAW EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND OR OTHER PARTIES PROVIDE THE LIBRARY AS IS WITH OUT WARRANTY OF ANY EITHER EXPRESSED OR BUT NOT LIMITED THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE THE ENTIRE RISK AS TO THE

QUALITY AND PERFORMANCE OF THE **LIBRARY** IS WITH YOU SHOULD THE **LIBRARY** PROVE YOU ASSUME THE COST OF ALL NECESSARY REPAIR OR CORRECTION IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT OR ANY OTHER PARTY WHO MAY MODIFY AND OR REDISTRIBUTE THE **LIBRARY** AS PERMITTED BE LIABLE TO YOU FOR INCLUDING ANY INCIDENTAL OR CONSEQUENTIAL **DAMAGES** ARISING OUT OF THE USE OR INABILITY TO USE THE EVEN IF SUCH **HOLDER** OR OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH **DAMAGES** END OF TERMS AND CONDITIONS How to Apply These Terms to Your New Libraries If you develop a new and you want it to be of the greatest possible use to the public

- either version of the but WITHOUT ANY **WARRANTY**
- if not
- if write to the Free Software Inc
- if write to the Free Software Temple MA USA Also add information on how to contact you by electronic and paper mail You should also get your if any
- if write to the Free Software Temple MA USA Also add information on how to contact you by electronic and paper mail You should also get your if to sign a copyright disclaimer for the if necessary Here is a sample
- alter the names
- alter the hereby disclaims all copyright interest in the library April Ty Coon

14.88.1 Function Documentation

14.88.1.1 and that you are informed that you can do these things To protect your we need to make restrictions that forbid distributors to deny you these rights or to ask you to surrender these rights These restrictions translate to certain responsibilities for you if you distribute copies of the library or if you modify it For if you distribute copies of the whether gratis or for a you must give the recipients all the rights that we gave you You must make sure that receive or can get the source code If you link other code with the you must provide complete object files to the so that they can relink them with the library after making changes to the library and recompiling it And you must show them these terms so they know their rights We protect your rights with a two step and (2)

14.88.1.2 and each file should have at least the copyright line and a pointer to where the full notice is found< one line to give the library's name and a brief idea of what it does. > Copyright (C)

14.88.1.3 if the work is an executable linked with the with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the work is made by offering access to copy from a designated offer equivalent access to copy the above specified materials from the same place e Verify that the user has already received a copy of these materials or that you have already sent this user a copy For an the required form of the work that uses the Library must include any data and utility programs needed for reproducing the executable from it as a special the materials to be distributed need not include anything that is normally distributed (in either source or binary form)

14.88.1.4 if write to the Free Software Temple MA USA Also add information on how to contact you by electronic and paper mail You should also get your employer (if you work as a programmer)

14.88.1.5 alter the hereby disclaims all copyright interest in the library Frob (a library for tweaking knobs)

- 14.88.1.6 the intent is to exercise the right to control the distribution of derivative or collective works based on the Library In mere aggregation of another work not based on the Library with the you must alter all the notices that refer to this so that they refer to the ordinary GNU General Public instead of to this it is irreversible for that so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy This option is useful when you wish to copy part of the code of the Library into a program that is not a library You may copy and distribute the which must be distributed under the terms of Sections and above on a medium customarily used for software interchange If distribution of object code is made by offering access to copy from a designated then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source even though third parties are not compelled to copy the source along with the object code A program that contains no derivative of any portion of the but is designed to work with the Library by being compiled or linked with is called a work that uses the Library Such a in is not a derivative work of the and therefore falls outside the scope of this License linking a work that uses the Library with the Library creates an executable that is a derivative of the rather than a work that uses the library The executable is therefore covered by this License Section states terms for distribution of such executables When a work that uses the Library uses material from a header file that is part of the the object code for the work may be a derivative work of the Library even though the source code is not Whether this is true is especially significant if the work can be linked without the or if the work is itself a library The threshold for this to be true is not precisely defined by law If such an object file uses only numerical data structure layouts and and small macros and small functions (ten lines or less in *length*) [inline]
- 14.88.1.7 the intent is to exercise the right to control the distribution of derivative or collective works based on the Library In mere aggregation of another work not based on the Library with the Library (or with a work based on the Library)
- 14.88.1.8 the intent is to exercise the right to control the distribution of derivative or collective works based on the Library In mere aggregation of another work not based on the Library with the you must alter all the notices that refer to this so that they refer to the ordinary GNU General Public instead of to this it is irreversible for that so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy This option is useful when you wish to copy part of the code of the Library into a program that is not a library You may copy and distribute the Library (or a portion or derivative of it, under Section 2)
- 14.88.1.9 the intent is to exercise the right to control the distribution of derivative or collective works based on the Library In mere aggregation of another work not based on the Library with the you must alter all the notices that refer to this so that they refer to the ordinary GNU General Public instead of to this it is irreversible for that so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy This option is useful when you wish to copy part of the code of the Library into a program that is not a library You may copy and distribute the which must be distributed under the terms of Sections and above on a medium customarily used for software interchange If distribution of object code is made by offering access to copy from a designated then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source even though third parties are not compelled to copy the source along with the object code A program that contains no derivative of any portion of the but is designed to work with the Library by being compiled or linked with is called a work that uses the Library Such a in is not a derivative work of the and therefore falls outside the scope of this License linking a work that uses the Library with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library)
- 14.88.1.10 if the work is an executable linked with the with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified Library (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

- 14.88.1.11 if the work is an executable linked with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the work is made by offering access to copy from a designated offer equivalent access to copy the above specified materials from the same place e Verify that the user has already received a copy of these materials or that you have already sent this user a copy For an the required form of the work that uses the Library must include any data and utility programs needed for reproducing the executable from it as a special the materials to be distributed need not include anything that is normally and so on of the operating system on which the executable unless that component itself accompanies the executable It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system Such a contradiction means you cannot use both them and the Library together in an executable that you distribute You may place library facilities that are a work based on the Library side by side in a single library together with other library facilities not covered by this and distribute such a combined provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise and provided that you do these two uncombined with any other library facilities This must be distributed under the terms of the Sections above b Give prominent notice with the combined library of the fact that part of it is a work based on the and explaining where to find the accompanying uncombined form of the same work You may not link or distribute the Library except as expressly provided under this License Any attempt otherwise to link or distribute the Library is and will automatically terminate your rights under this License parties who have received or from you under this License will not have their licenses terminated so long as such parties remain in full compliance You are not required to accept this since you have not signed it nothing else grants you permission to modify or distribute the Library or its derivative works These actions are prohibited by law if you do not accept this License by modifying or distributing the Library (or any work based on the *Library*)
- 14.88.1.12 we sometimes make exceptions for this Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally NO WARRANTY BECAUSE THE LIBRARY IS LICENSED FREE OF THERE IS NO WARRANTY FOR THE TO THE EXTENT PERMITTED BY APPLICABLE LAW EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND OR OTHER PARTIES PROVIDE THE LIBRARY AS IS WITHOUT WARRANTY OF ANY EITHER EXPRESSED OR BUT NOT LIMITED THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE LIBRARY IS WITH YOU SHOULD THE LIBRARY PROVE YOU ASSUME THE COST OF ALL NECESSARY REPAIR OR CORRECTION IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT OR ANY OTHER PARTY WHO MAY MODIFY AND OR REDISTRIBUTE THE LIBRARY AS PERMITTED BE LIABLE TO YOU FOR INCLUDING ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE LIBRARY (INCLUDING BUT NOT LIMITED TO LOSS OF DATA OR DATA BEING RENDERED INACCURATE OR LOSSES SUSTAINED BY YOU OR THIRD PARTIES OR A FAILURE OF THE LIBRARY TO OPERATE WITH ANY OTHER SOFTWARE)
- 14.88.1.13 the intent is to exercise the right to control the distribution of derivative or collective works based on the Library In mere aggregation of another work not based on the Library with the you must alter all the notices that refer to this so that they refer to the ordinary GNU General Public instead of to this License (If a newer version than version 2 of the ordinary GNU General Public License has *appeared*, then you can specify that version instead if you *wish*.)
- 14.88.1.14 and distribute a copy of this License along with the Library You may charge a fee for the physical act of transferring a and you may at your option offer warranty protection in exchange for a fee You may modify your copy or copies of the Library or any portion of thus forming a work based on the and copy and distribute such modifications or work under the terms of Section provided that you also meet all of these other than as an argument passed when the facility is then you must make a good faith effort to ensure in the event an application does not supply such function or the facility still and performs whatever part of its purpose remains meaningful (For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional:if the application does not supply *it*, the square root function must still compute square roots.)

14.88.1.15 either version of the or (at your option)

14.88.1.16 if the work is an executable linked with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the work is made by offering access to copy from a designated offer equivalent access to copy the above specified materials from the same place e Verify that the user has already received a copy of these materials or that you have already sent this user a copy For an the required form of the work that uses the Library must include any data and utility programs needed for reproducing the executable from it as a special the materials to be distributed need not include anything that is normally and so on of the operating system on which the executable unless that component itself accompanies the executable It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system Such a contradiction means you cannot use both them and the Library together in an executable that you distribute You may place library facilities that are a work based on the Library side by side in a single library together with other library facilities not covered by this and distribute such a combined provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise and provided that you do these two uncombined with any other library facilities This must be distributed under the terms of the Sections above b Give prominent notice with the combined library of the fact that part of it is a work based on the and explaining where to find the accompanying uncombined form of the same work You may not link or distribute the Library except as expressly provided under this License Any attempt otherwise to link or distribute the Library is and will automatically terminate your rights under this License parties who have received or from you under this License will not have their licenses terminated so long as such parties remain in full compliance You are not required to accept this since you have not signed it nothing else grants you permission to modify or distribute the Library or its derivative works These actions are prohibited by law if you do not accept this License by modifying or distributing the you indicate your acceptance of this License to do and all its terms and conditions for distributing or modifying the Library or works based on it Each time you redistribute the the recipient automatically receives a license from the original licensor to link with or modify the Library subject to these terms and conditions You may not impose any further restrictions on the recipients exercise of the rights granted herein You are not responsible for enforcing compliance by third parties with this License as a consequence of a court judgment or allegation of patent infringement or for any other reason (not limited to patent issues)

14.88.1.17 GNU LESSER GENERAL PUBLIC LICENSE February Free Software Inc Temple MA USA Everyone is permitted to copy and distribute verbatim copies of this license but changing it is not allowed [This is the first released version of the Lesser GPL. It also counts as the successor of the GNU Library Public License, version 2, hence the version number 2.1.] Preamble The licenses for most software are designed to take away your freedom to share and change it By the GNU General Public Licenses are intended to guarantee your freedom to share and change free software to make sure the software is free for all its users This the Lesser General Public applies to some specially designated software packages typically libraries of the Free Software Foundation and other authors who decide to use it You can use it but we suggest you first think carefully about whether this license or the ordinary General Public License is the better strategy to use in any particular based on the explanations below When we speak of free we are referring to freedom of not price Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for this service if you wish)

14.88.1.18 we sometimes make exceptions for this Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally NO WARRANTY BECAUSE THE LIBRARY IS LICENSED FREE OF THERE IS NO WARRANTY FOR THE TO THE EXTENT PERMITTED BY APPLICABLE LAW EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND OR OTHER PARTIES PROVIDE THE LIBRARY AS IS WITHOUT WARRANTY OF ANY EITHER EXPRESSED OR BUT NOT LIMITED THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE LIBRARY IS WITH YOU SHOULD THE LIBRARY PROVE YOU ASSUME THE COST OF ALL NECESSARY REPAIR OR CORRECTION IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT OR ANY OTHER PARTY WHO MAY MODIFY AND OR REDISTRIBUTE THE LIBRARY AS PERMITTED BE LIABLE TO YOU FOR INCLUDING ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE EVEN IF SUCH HOLDER OR OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES END OF TERMS AND CONDITIONS How to Apply These Terms to Your New Libraries If you develop a new and you want it to be of the greatest possible use to the we recommend making it free software that everyone can redistribute and change You can do so by permitting redistribution under these terms (or , alternatively , under the terms of the ordinary General Public License)

14.88.1.19 the intent is to exercise the right to control the distribution of derivative or collective works based on the Library In mere aggregation of another work not based on the Library with the you must alter all the notices that refer to this so that they refer to the ordinary GNU General Public instead of to this it is irreversible for that so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy This option is useful when you wish to copy part of the code of the Library into a program that is not a library You may copy and distribute the which must be distributed under the terms of Sections and above on a medium customarily used for software interchange If distribution of object code is made by offering access to copy from a designated then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source even though third parties are not compelled to copy the source along with the object code A program that contains no derivative of any portion of the but is designed to work with the Library by being compiled or linked with is called a work that uses the Library Such a in is not a derivative work of the and therefore falls outside the scope of this License linking a work that uses the Library with the Library creates an executable that is a derivative of the rather than a work that uses the library The executable is therefore covered by this License Section states terms for distribution of such executables When a work that uses the Library uses material from a header file that is part of the the object code for the work may be a derivative work of the Library even though the source code is not Whether this is true is especially significant if the work can be linked without the or if the work is itself a library The threshold for this to be true is not precisely defined by law If such an object file uses only numerical data structure layouts and and small macros and small then the use of the object file is regardless of whether it is legally a derivative work (Executables containing this object code plus portions of the Library will still fall under Section 6.)

14.88.1.20 if the work is an executable linked with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the work is made by offering access to copy from a designated offer equivalent access to copy the above specified materials from the same place e Verify that the user has already received a copy of these materials or that you have already sent this user a copy For an the required form of the work that uses the Library must include any data and utility programs needed for reproducing the executable from it as a special the materials to be distributed need not include anything that is normally and so on of the operating system on which the executable unless that component itself accompanies the executable It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system Such a contradiction means you cannot use both them and the Library together in an executable that you distribute You may place library facilities that are a work based on the Library side by side in a single library together with other library facilities not covered by this and distribute such a combined provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise and provided that you do these two uncombined with any other library facilities This must be distributed under the terms of the Sections above b Give prominent notice with the combined library of the fact that part of it is a work based on the and explaining where to find the accompanying uncombined form of the same work You may not link or distribute the Library except as expressly provided under this License Any attempt otherwise to link or distribute the Library is and will automatically terminate your rights under this License parties who have received or from you under this License will not have their licenses terminated so long as such parties remain in full compliance You are not required to accept this since you have not signed it nothing else grants you permission to modify or distribute the Library or its derivative works These actions are prohibited by law if you do not accept this License by modifying or distributing the you indicate your acceptance of this License to do and all its terms and conditions for distributing or modifying the Library or works based on it Each time you redistribute the the recipient automatically receives a license from the original licensor to link with or modify the Library subject to these terms and conditions You may not impose any further restrictions on the recipients exercise of the rights granted herein You are not responsible for enforcing compliance by third parties with this License as a consequence of a court judgment or allegation of patent infringement or for any other conditions are imposed on you (whether by court order, agreement or otherwise)

14.88.2 Variable Documentation

14.88.2.1 if the work is an executable linked with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three to give the same user the materials specified in above

Definition at line 158 of file LICENSE.txt.

14.88.2.2 we sometimes make exceptions for this Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally NO WARRANTY BECAUSE THE LIBRARY IS LICENSED FREE OF THERE IS NO WARRANTY FOR THE TO THE EXTENT PERMITTED BY APPLICABLE LAW EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND OR OTHER PARTIES PROVIDE THE LIBRARY AS IS WITHOUT WARRANTY OF ANY EITHER EXPRESSED OR BUT NOT LIMITED THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE LIBRARY IS WITH YOU SHOULD THE LIBRARY PROVE YOU ASSUME THE COST OF ALL NECESSARY REPAIR OR CORRECTION IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT OR ANY OTHER PARTY WHO MAY MODIFY AND OR REDISTRIBUTE THE LIBRARY AS PERMITTED ABOVE

Definition at line 437 of file LICENSE.txt.

14.88.2.3 the intent is to exercise the right to control the distribution of derivative or collective works based on the Library In mere aggregation of another work not based on the Library with the you must alter all the notices that refer to this so that they refer to the ordinary GNU General Public instead of to this it is irreversible for that so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy This option is useful when you wish to copy part of the code of the Library into a program that is not a library You may copy and distribute the which must be distributed under the terms of Sections and above on a medium customarily used for software interchange If distribution of object code is made by offering access to copy from a designated then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source even though third parties are not compelled to copy the source along with the object code A program that contains no derivative of any portion of the but is designed to work with the Library by being compiled or linked with is called a work that uses the Library Such a in is not a derivative work of the and therefore falls outside the scope of this License linking a work that uses the Library with the Library creates an executable that is a derivative of the rather than a work that uses the library The executable is therefore covered by this License Section states terms for distribution of such executables When a work that uses the Library uses material from a header file that is part of the the object code for the work may be a derivative work of the Library even though the source code is not Whether this is true is especially significant if the work can be linked without the or if the work is itself a library The threshold for this to be true is not precisely defined by law If such an object file uses only numerical data structure layouts and accessors

Definition at line 253 of file LICENSE.txt.

14.88.2.4 the intent is to exercise the right to control the distribution of derivative or collective works based on the Library In addition

Definition at line 202 of file LICENSE.txt.

14.88.2.5 and that you are informed that you can do these things To protect your we need to make restrictions that forbid distributors to deny you these rights or to ask you to surrender these rights These restrictions translate to certain responsibilities for you if you distribute copies of the library or if you modify it For if you distribute copies of the whether gratis or for a you must give the recipients all the rights that we gave you You must make sure that receive or can get the source code If you link other code with the you must provide complete object files to the so that they can relink them with the library after making changes to the library and recompiling it And you must show them these terms so they know their rights We protect your rights with a two step which gives you legal permission to distribute and or modify the library To protect each we want to make it very clear that there is no warranty for the free library Also

Definition at line 50 of file LICENSE.txt.

14.88.2.6 if the work is an executable linked with the with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the and

Definition at line 271 of file LICENSE.txt.

14.88.2.7 if write to the Free Software Temple MA USA Also add information on how to contact you by electronic and paper mail You should also get your if any

Definition at line 493 of file LICENSE.txt.

14.88.2.8 if the work is an executable linked with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the work is made by offering access to copy from a designated offer equivalent access to copy the above specified materials from the same place e Verify that the user has already received a copy of these materials or that you have already sent this user a copy For an the required form of the work that uses the Library must include any data and utility programs needed for reproducing the executable from it as a special the materials to be distributed need not include anything that is normally and so on of the operating system on which the executable unless that component itself accompanies the executable It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system Such a contradiction means you cannot use both them and the Library together in an executable that you distribute You may place library facilities that are a work based on the Library side by side in a single library together with other library facilities not covered by this and distribute such a combined provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise and provided that you do these two uncombined with any other library facilities This must be distributed under the terms of the Sections above b Give prominent notice with the combined library of the fact that part of it is a work based on the and explaining where to find the accompanying uncombined form of the same work You may not link or distribute the Library except as expressly provided under this License Any attempt otherwise to link or distribute the Library is and will automatically terminate your rights under this License parties who have received or from you under this License will not have their licenses terminated so long as such parties remain in full compliance You are not required to accept this since you have not signed it nothing else grants you permission to modify or distribute the Library or its derivative works These actions are prohibited by law if you do not accept this License by modifying or distributing the you indicate your acceptance of this License to do and all its terms and conditions for distributing or modifying the Library or works based on it Each time you redistribute the the recipient automatically receives a license from the original licensor to link with or modify the Library subject to these terms and conditions You may not impose any further restrictions on the recipients exercise of the rights granted herein You are not responsible for enforcing compliance by third parties with this License as a consequence of a court judgment or allegation of patent infringement or for any other conditions are imposed on they do not excuse you from the conditions of this License If you cannot distribute so as to satisfy simultaneously your obligations under this License and any other pertinent then as a consequence you may not distribute the Library at all For if a patent license would not permit royalty free redistribution of the Library by all those who receive copies directly or indirectly through then the only way you could satisfy both it and this License would be to refrain entirely from distribution of the Library If any portion of this section is held invalid or unenforceable under any particular the balance of the section is intended to apply

Definition at line 380 of file LICENSE.txt.

14.88.2.9 if write to the Free Software Temple Boston

Definition at line 4 of file LICENSE.txt.

14.88.2.10 it is up to the author donor to decide if he or she is willing to distribute software through any other system and a licensee cannot impose that choice This section is intended to make thoroughly clear what is believed to be a consequence of the rest of this License If the distribution and or use of the Library is restricted in certain countries either by patents or by copyrighted the original copyright holder who places the Library under this License may add an geographical distribution limitation excluding those so that distribution is permitted only in or among countries not thus excluded In such case [explicit]

Definition at line 4 of file LICENSE.txt.

14.88.2.11 we sometimes make exceptions for this Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally NO WARRANTY BECAUSE THE LIBRARY IS LICENSED FREE OF CHARGE

Definition at line 437 of file LICENSE.txt.

14.88.2.12 if the work is an executable linked with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the work is made by offering access to copy from a designated offer equivalent access to copy the above specified materials from the same place e Verify that the user has already received a copy of these materials or that you have already sent this user a copy For an the required form of the work that uses the Library must include any data and utility programs needed for reproducing the executable from it as a special the materials to be distributed need not include anything that is normally and so on of the operating system on which the executable unless that component itself accompanies the executable It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system Such a contradiction means you cannot use both them and the Library together in an executable that you distribute You may place library facilities that are a work based on the Library side by side in a single library together with other library facilities not covered by this and distribute such a combined provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise and provided that you do these two uncombined with any other library facilities This must be distributed under the terms of the Sections above b Give prominent notice with the combined library of the fact that part of it is a work based on the and explaining where to find the accompanying uncombined form of the same work You may not link or distribute the Library except as expressly provided under this License Any attempt otherwise to link or distribute the Library is and will automatically terminate your rights under this License parties who have received or from you under this License will not have their licenses terminated so long as such parties remain in full compliance You are not required to accept this since you have not signed it nothing else grants you permission to modify or distribute the Library or its derivative works These actions are prohibited by law if you do not accept this License by modifying or distributing the you indicate your acceptance of this License to do and all its terms and conditions for distributing or modifying the Library or works based on it Each time you redistribute the the recipient automatically receives a license from the original licensor to link with or modify the Library subject to these terms and conditions You may not impose any further restrictions on the recipients exercise of the rights granted herein You are not responsible for enforcing compliance by third parties with this License as a consequence of a court judgment or allegation of patent infringement or for any other conditions are imposed on they do not excuse you from the conditions of this License If you cannot distribute so as to satisfy simultaneously your obligations under this License and any other pertinent then as a consequence you may not distribute the Library at all For if a patent license would not permit royalty free redistribution of the Library by all those who receive copies directly or indirectly through then the only way you could satisfy both it and this License would be to refrain entirely from distribution of the Library If any portion of this section is held invalid or unenforceable under any particular circumstance

Definition at line 380 of file LICENSE.txt.

14.88.2.13 if the work is an executable linked with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the work is made by offering access to copy from a designated offer equivalent access to copy the above specified materials from the same place e Verify that the user has already received a copy of these materials or that you have already sent this user a copy For an the required form of the work that uses the Library must include any data and utility programs needed for reproducing the executable from it as a special the materials to be distributed need not include anything that is normally and so on of the operating system on which the executable unless that component itself accompanies the executable It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system Such a contradiction means you cannot use both them and the Library together in an executable that you distribute You may place library facilities that are a work based on the Library side by side in a single library together with other library facilities not covered by this and distribute such a combined provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise and provided that you do these two uncombined with any other library facilities This must be distributed under the terms of the Sections above b Give prominent notice with the combined library of the fact that part of it is a work based on the and explaining where to find the accompanying uncombined form of the same work You may not link or distribute the Library except as expressly provided under this License Any attempt otherwise to link or distribute the Library is and will automatically terminate your rights under this License parties who have received or from you under this License will not have their licenses terminated so long as such parties remain in full compliance You are not required to accept this since you have not signed it nothing else grants you permission to modify or distribute the Library or its derivative works These actions are prohibited by law if you do not accept this License by modifying or distributing the you indicate your acceptance of this License to do and all its terms and conditions for distributing or modifying the Library or works based on it Each time you redistribute the the recipient automatically receives a license from the original licensor to link with or modify the Library subject to these terms and conditions You may not impose any further restrictions on the recipients exercise of the rights granted herein You are not responsible for enforcing compliance by third parties with this License as a consequence of a court judgment or allegation of patent infringement or for any other conditions are imposed on they do not excuse you from the conditions of this License If you cannot distribute so as to satisfy simultaneously your obligations under this License and any other pertinent then as a consequence you may not distribute the Library at all For if a patent license would not permit royalty free redistribution of the Library by all those who receive copies directly or indirectly through then the only way you could satisfy both it and this License would be to refrain entirely from distribution of the Library If any portion of this section is held invalid or unenforceable under any particular the balance of the section is intended to and the section as a whole is intended to apply in other circumstances It is not the purpose of this section to induce you to infringe any patents or other property right claims or to contest validity of any such claims

Definition at line 380 of file LICENSE.txt.

14.88.2.14 if the work is an executable linked with the complete machine readable work that uses the as object code and or source code

Definition at line 235 of file LICENSE.txt.

14.88.2.15 and distribute a copy of this License along with the Library You may charge a fee for the physical act of transferring a and you may at your option offer warranty protection in exchange for a fee You may modify your copy or copies of the Library or any portion of thus forming a work based on the and copy and distribute such modifications or work under the terms of Section provided that you also meet all of these conditions

Definition at line 158 of file LICENSE.txt.

14.88.2.16 **GNU LESSER GENERAL PUBLIC LICENSE** February Free Software Inc Temple MA USA Everyone is permitted to copy and distribute verbatim copies of this license but changing it is not allowed [This is the first released version of the Lesser GPL. It also counts as the successor of the GNU Library Public License, version 2, hence the version number 2.1.] Preamble The licenses for most software are designed to take away your freedom to share and change it By contrast

Definition at line 4 of file LICENSE.txt.

14.88.2.17 alter the hereby disclaims all copyright interest in the library April Ty Coon

Definition at line 500 of file LICENSE.txt.

14.88.2.18 if the work is an executable linked with the with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the work is made by offering access to copy from a designated offer equivalent access to copy the above specified materials from the same place e Verify that the user has already received a copy of these materials or that you have already sent this user a copy For an the required form of the work that uses the Library must include any data and utility programs needed for reproducing the executable from it as a special the materials to be distributed need not include anything that is normally and so on of the operating system on which the executable unless that component itself accompanies the executable It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system Such a contradiction means you cannot use both them and the Library together in an executable that you distribute You may place library facilities that are a work based on the Library side by side in a single library together with other library facilities not covered by this and distribute such a combined provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise and provided that you do these two uncombined with any other library facilities This must be distributed under the terms of the Sections above b Give prominent notice with the combined library of the fact that part of it is a work based on the and explaining where to find the accompanying uncombined form of the same work You may not link or distribute the Library except as expressly provided under this License Any attempt otherwise to link or distribute the Library is and will automatically terminate your rights under this License parties who have received copies

Definition at line 323 of file LICENSE.txt.

14.88.2.19 if the work is an executable linked with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the work is made by offering access to copy from a designated offer equivalent access to copy the above specified materials from the same place e Verify that the user has already received a copy of these materials or that you have already sent this user a copy For an the required form of the work that uses the Library must include any data and utility programs needed for reproducing the executable from it as a special the materials to be distributed need not include anything that is normally and so on of the operating system on which the executable unless that component itself accompanies the executable It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system Such a contradiction means you cannot use both them and the Library together in an executable that you distribute You may place library facilities that are a work based on the Library side by side in a single library together with other library facilities not covered by this and distribute such a combined provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise and provided that you do these two uncombined with any other library facilities This must be distributed under the terms of the Sections above b Give prominent notice with the combined library of the fact that part of it is a work based on the and explaining where to find the accompanying uncombined form of the same work You may not link or distribute the Library except as expressly provided under this License Any attempt otherwise to link or distribute the Library is and will automatically terminate your rights under this License parties who have received or from you under this License will not have their licenses terminated so long as such parties remain in full compliance You are not required to accept this since you have not signed it nothing else grants you permission to modify or distribute the Library or its derivative works These actions are prohibited by law if you do not accept this License by modifying or distributing the you indicate your acceptance of this License to do and all its terms and conditions for distributing or modifying the Library or works based on it Each time you redistribute the the recipient automatically receives a license from the original licensor to copy

Definition at line 50 of file LICENSE.txt.

14.88.2.20 if the work is an executable linked with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into it if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the work is made by offering access to copy from a designated offer equivalent access to copy the above specified materials from the same place e Verify that the user has already received a copy of these materials or that you have already sent this user a copy For an the required form of the work that uses the Library must include any data and utility programs needed for reproducing the executable from it as a special the materials to be distributed need not include anything that is normally and so on of the operating system on which the executable unless that component itself accompanies the executable It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system Such a contradiction means you cannot use both them and the Library together in an executable that you distribute You may place library facilities that are a work based on the Library side by side in a single library together with other library facilities not covered by this and distribute such a combined provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise and provided that you do these two uncombined with any other library facilities This must be distributed under the terms of the Sections above b Give prominent notice with the combined library of the fact that part of it is a work based on the and explaining where to find the accompanying uncombined form of the same work You may not link or distribute the Library except as expressly provided under this License Any attempt otherwise to link or distribute the Library is and will automatically terminate your rights under this License parties who have received or from you under this License will not have their licenses terminated so long as such parties remain in full compliance You are not required to accept this since you have not signed it nothing else grants you permission to modify or distribute the Library or its derivative works These actions are prohibited by law if you do not accept this License by modifying or distributing the you indicate your acceptance of this License to do and all its terms and conditions for copying

Definition at line 362 of file LICENSE.txt.

14.88.2.21 it is up to the author donor to decide if he or she is willing to distribute software through any other system and a licensee cannot impose that choice This section is intended to make thoroughly clear what is believed to be a consequence of the rest of this License If the distribution and or use of the Library is restricted in certain countries either by patents or by copyrighted the original copyright holder who places the Library under this License may add an geographical distribution limitation excluding those countries [explicit]

Definition at line 406 of file LICENSE.txt.

14.88.2.22 we sometimes make exceptions for this Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally NO WARRANTY BECAUSE THE LIBRARY IS LICENSED FREE OF THERE IS NO WARRANTY FOR THE TO THE EXTENT PERMITTED BY APPLICABLE LAW EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND OR OTHER PARTIES PROVIDE THE LIBRARY AS IS WITHOUT WARRANTY OF ANY EITHER EXPRESSED OR BUT NOT LIMITED THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE LIBRARY IS WITH YOU SHOULD THE LIBRARY PROVE YOU ASSUME THE COST OF ALL NECESSARY REPAIR OR CORRECTION IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT OR ANY OTHER PARTY WHO MAY MODIFY AND OR REDISTRIBUTE THE LIBRARY AS PERMITTED BE LIABLE TO YOU FOR DAMAGES

Definition at line 437 of file LICENSE.txt.

14.88.2.23 we sometimes make exceptions for this Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally NO WARRANTY BECAUSE THE LIBRARY IS LICENSED FREE OF THERE IS NO WARRANTY FOR THE TO THE EXTENT PERMITTED BY APPLICABLE LAW EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND OR OTHER PARTIES PROVIDE THE LIBRARY AS IS WITHOUT WARRANTY OF ANY EITHER EXPRESSED OR BUT NOT LIMITED THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE LIBRARY IS WITH YOU SHOULD THE LIBRARY PROVE DEFECTIVE

Definition at line 437 of file LICENSE.txt.

14.88.2.24 if the work is an executable linked with the with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the work is made by offering access to copy from a designated offer equivalent access to copy the above specified materials from the same place e Verify that the user has already received a copy of these materials or that you have already sent this user a copy For an the required form of the work that uses the Library must include any data and utility programs needed for reproducing the executable from it as a special the materials to be distributed need not include anything that is normally and so on of the operating system on which the executable unless that component itself accompanies the executable It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system Such a contradiction means you cannot use both them and the Library together in an executable that you distribute You may place library facilities that are a work based on the Library side by side in a single library together with other library facilities not covered by this and distribute such a combined provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise and provided that you do these two uncombined with any other library facilities This must be distributed under the terms of the Sections above b Give prominent notice with the combined library of the fact that part of it is a work based on the and explaining where to find the accompanying uncombined form of the same work You may not link or distribute the Library except as expressly provided under this License Any attempt otherwise to link or distribute the Library is and will automatically terminate your rights under this License parties who have received or from you under this License will not have their licenses terminated so long as such parties remain in full compliance You are not required to accept this since you have not signed it nothing else grants you permission to modify or distribute the Library or its derivative works These actions are prohibited by law if you do not accept this License by modifying or distributing the you indicate your acceptance of this License to do and all its terms and conditions for distributing or modifying the Library or works based on it Each time you redistribute the the recipient automatically receives a license from the original licensor to distribute

Definition at line 368 of file LICENSE.txt.

14.88.2.25 and that you are informed that you can do these things To protect your we need to make restrictions that forbid distributors to deny you these rights or to ask you to surrender these rights These restrictions translate to certain responsibilities for you if you distribute copies of the library or if you modify it For if you distribute copies of the whether gratis or for a you must give the recipients all the rights that we gave you You must make sure that receive or can get the source code If you link other code with the you must provide complete object files to the so that they can relink them with the library after making changes to the library and recompiling it And you must show them these terms so they know their rights We protect your rights with a two step which gives you legal permission to distribute and or modify the library To protect each distributor

Definition at line 50 of file LICENSE.txt.

14.88.2.26 **GNU LESSER GENERAL PUBLIC LICENSE** February Free Software Inc Temple MA USA Everyone is permitted to copy and distribute verbatim copies of this license document

Definition at line 4 of file LICENSE.txt.

14.88.2.27 if the work is an executable linked with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the work is made by offering access to copy from a designated offer equivalent access to copy the above specified materials from the same place e Verify that the user has already received a copy of these materials or that you have already sent this user a copy For an the required form of the work that uses the Library must include any data and utility programs needed for reproducing the executable from it as a special the materials to be distributed need not include anything that is normally and so on of the operating system on which the executable unless that component itself accompanies the executable It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system Such a contradiction means you cannot use both them and the Library together in an executable that you distribute You may place library facilities that are a work based on the Library side by side in a single library together with other library facilities not covered by this and distribute such a combined provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise and provided that you do these two uncombined with any other library facilities This must be distributed under the terms of the Sections above b Give prominent notice with the combined library of the fact that part of it is a work based on the and explaining where to find the accompanying uncombined form of the same work You may not link or distribute the Library except as expressly provided under this License Any attempt otherwise to link or distribute the Library is and will automatically terminate your rights under this License parties who have received or from you under this License will not have their licenses terminated so long as such parties remain in full compliance You are not required to accept this since you have not signed it nothing else grants you permission to modify or distribute the Library or its derivative works These actions are prohibited by law if you do not accept this License by modifying or distributing the you indicate your acceptance of this License to do and all its terms and conditions for distributing or modifying the Library or works based on it Each time you redistribute the the recipient automatically receives a license from the original licensor to link with or modify the Library subject to these terms and conditions You may not impose any further restrictions on the recipients exercise of the rights granted herein You are not responsible for enforcing compliance by third parties with this License as a consequence of a court judgment or allegation of patent infringement or for any other conditions are imposed on they do not excuse you from the conditions of this License If you cannot distribute so as to satisfy simultaneously your obligations under this License and any other pertinent then as a consequence you may not distribute the Library at all For example

Definition at line 35 of file LICENSE.txt.

14.88.2.28 if the work is an executable linked with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the work is made by offering access to copy from a designated offer equivalent access to copy the above specified materials from the same place e Verify that the user has already received a copy of these materials or that you have already sent this user a copy For an the required form of the work that uses the Library must include any data and utility programs needed for reproducing the executable from it as a special exception

Definition at line 303 of file LICENSE.txt.

14.88.2.29 if the work is an executable linked with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the work is made by offering access to copy from a designated offer equivalent access to copy the above specified materials from the same place e Verify that the user has already received a copy of these materials or that you have already sent this user a copy For an executable

Definition at line 301 of file LICENSE.txt.

14.88.2.30 and that you are informed that you can do these things To protect your we need to make restrictions that forbid distributors to deny you these rights or to ask you to surrender these rights These restrictions translate to certain responsibilities for you if you distribute copies of the library or if you modify it For if you distribute copies of the whether gratis or for a fee

Definition at line 35 of file LICENSE.txt.

14.88.2.31 and that you are informed that you can do these things To protect your we need to make restrictions that forbid distributors to deny you these rights or to ask you to surrender these rights These restrictions translate to certain responsibilities for you if you distribute copies of the library or if you modify it For if you distribute copies of the whether gratis or for a you must give the recipients all the rights that we gave you You must make sure that receive or can get the source code If you link other code with the you must provide complete object files to the so that they can relink them with the library after making changes to the library and recompiling it And you must show them these terms so they know their rights We protect your rights with a two step which gives you legal permission to distribute and or modify the library To protect each we want to make it very clear that there is no warranty for the free library if the library is modified by someone else and passed the recipients should know that what they have is not the original so that the original author s reputation will not be affected by problems that might be introduced by others Finally

Definition at line 50 of file LICENSE.txt.

14.88.2.32 if write to the Free Software Foundation [explicit]

Definition at line 4 of file LICENSE.txt.

14.88.2.33 we sometimes make exceptions for this Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally NO WARRANTY BECAUSE THE LIBRARY IS LICENSED FREE OF THERE IS NO WARRANTY FOR THE TO THE EXTENT PERMITTED BY APPLICABLE LAW EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND OR OTHER PARTIES PROVIDE THE LIBRARY AS IS WITHOUT WARRANTY OF ANY EITHER EXPRESSED OR BUT NOT LIMITED THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE LIBRARY IS WITH YOU SHOULD THE LIBRARY PROVE YOU ASSUME THE COST OF ALL NECESSARY REPAIR OR CORRECTION IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT OR ANY OTHER PARTY WHO MAY MODIFY AND OR REDISTRIBUTE THE LIBRARY AS PERMITTED BE LIABLE TO YOU FOR INCLUDING ANY GENERAL

Definition at line 437 of file LICENSE.txt.

14.88.2.34 we sometimes make exceptions for this Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally NO WARRANTY BECAUSE THE LIBRARY IS LICENSED FREE OF THERE IS NO WARRANTY FOR THE TO THE EXTENT PERMITTED BY APPLICABLE LAW EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND OR OTHER PARTIES PROVIDE THE LIBRARY AS IS WITHOUT WARRANTY OF ANY EITHER EXPRESSED OR BUT NOT LIMITED THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE LIBRARY IS WITH YOU SHOULD THE LIBRARY PROVE YOU ASSUME THE COST OF ALL NECESSARY REPAIR OR CORRECTION IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT HOLDER

Definition at line 437 of file LICENSE.txt.

14.88.2.35 if the work is an executable linked with the with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the work is made by offering access to copy from a designated offer equivalent access to copy the above specified materials from the same place e Verify that the user has already received a copy of these materials or that you have already sent this user a copy For an the required form of the work that uses the Library must include any data and utility programs needed for reproducing the executable from it as a special the materials to be distributed need not include anything that is normally and so on of the operating system on which the executable unless that component itself accompanies the executable It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system Such a contradiction means you cannot use both them and the Library together in an executable that you distribute You may place library facilities that are a work based on the Library side by side in a single library together with other library facilities not covered by this and distribute such a combined provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise and provided that you do these two uncombined with any other library facilities This must be distributed under the terms of the Sections above b Give prominent notice with the combined library of the fact that part of it is a work based on the and explaining where to find the accompanying uncombined form of the same work You may not link or distribute the Library except as expressly provided under this License Any attempt otherwise to link or distribute the Library is and will automatically terminate your rights under this License parties who have received or from you under this License will not have their licenses terminated so long as such parties remain in full compliance You are not required to accept this since you have not signed it However

Definition at line 235 of file LICENSE.txt.

14.88.2.36 if the work is an executable linked with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the work is made by offering access to copy from a designated offer equivalent access to copy the above specified materials from the same place e Verify that the user has already received a copy of these materials or that you have already sent this user a copy For an the required form of the work that uses the Library must include any data and utility programs needed for reproducing the executable from it as a special the materials to be distributed need not include anything that is normally and so on of the operating system on which the executable unless that component itself accompanies the executable It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system Such a contradiction means you cannot use both them and the Library together in an executable that you distribute You may place library facilities that are a work based on the Library side by side in a single library together with other library facilities not covered by this and distribute such a combined provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise and provided that you do these two uncombined with any other library facilities This must be distributed under the terms of the Sections above b Give prominent notice with the combined library of the fact that part of it is a work based on the and explaining where to find the accompanying uncombined form of the same work You may not link or distribute the Library except as expressly provided under this License Any attempt otherwise to link or distribute the Library is and will automatically terminate your rights under this License parties who have received or from you under this License will not have their licenses terminated so long as such parties remain in full compliance You are not required to accept this since you have not signed it nothing else grants you permission to modify or distribute the Library or its derivative works These actions are prohibited by law if you do not accept this License by modifying or distributing the you indicate your acceptance of this License to do and all its terms and conditions for distributing or modifying the Library or works based on it Each time you redistribute the the recipient automatically receives a license from the original licensor to link with or modify the Library subject to these terms and conditions You may not impose any further restrictions on the recipients exercise of the rights granted herein You are not responsible for enforcing compliance by third parties with this License If

Definition at line 368 of file LICENSE.txt.

14.88.2.37 we sometimes make exceptions for this Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally NO WARRANTY BECAUSE THE LIBRARY IS LICENSED FREE OF THERE IS NO WARRANTY FOR THE TO THE EXTENT PERMITTED BY APPLICABLE LAW EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND OR OTHER PARTIES PROVIDE THE LIBRARY AS IS WITHOUT WARRANTY OF ANY EITHER EXPRESSED OR IMPLIED

Definition at line 437 of file LICENSE.txt.

14.88.2.38 alter the Inc

Definition at line 487 of file LICENSE.txt.

14.88.2.39 we sometimes make exceptions for this Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally NO WARRANTY BECAUSE THE LIBRARY IS LICENSED FREE OF THERE IS NO WARRANTY FOR THE TO THE EXTENT PERMITTED BY APPLICABLE LAW EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND OR OTHER PARTIES PROVIDE THE LIBRARY AS IS WITHOUT WARRANTY OF ANY EITHER EXPRESSED OR INCLUDING

Definition at line 437 of file LICENSE.txt.

14.88.2.40 it is up to the author donor to decide if he or she is willing to distribute software through any other system and a licensee cannot impose that choice This section is intended to make thoroughly clear what is believed to be a consequence of the rest of this License If the distribution and or use of the Library is restricted in certain countries either by patents or by copyrighted interfaces

Definition at line 406 of file LICENSE.txt.

14.88.2.41 and distribute a copy of this License along with the Library You may charge a fee for the physical act of transferring a and you may at your option offer warranty protection in exchange for a fee You may modify your copy or copies of the Library or any portion of thus forming a work based on the and copy and distribute such modifications or work under the terms of Section provided that you also meet all of these other than as an argument passed when the facility is invoked

Definition at line 158 of file LICENSE.txt.

14.88.2.42 the intent is to exercise the right to control the distribution of derivative or collective works based on the Library In mere aggregation of another work not based on the Library with the you must alter all the notices that refer to this so that they refer to the ordinary GNU General Public instead of to this it is irreversible for that so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy This option is useful when you wish to copy part of the code of the Library into a program that is not a library You may copy and distribute the which must be distributed under the terms of Sections and above on a medium customarily used for software interchange If distribution of object code is made by offering access to copy from a designated then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source even though third parties are not compelled to copy the source along with the object code A program that contains no derivative of any portion of the but is designed to work with the Library by being compiled or linked with is called a work that uses the Library Such a in isolation

Definition at line 235 of file LICENSE.txt.

14.88.2.43 the intent is to exercise the right to control the distribution of derivative or collective works based on the Library In mere aggregation of another work not based on the Library with the you must alter all the notices that refer to this so that they refer to the ordinary GNU General Public instead of to this it is irreversible for that so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy This option is useful when you wish to copy part of the code of the Library into a program that is not a library You may copy and distribute the which must be distributed under the terms of Sections and above on a medium customarily used for software interchange If distribution of object code is made by offering access to copy from a designated then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source even though third parties are not compelled to copy the source along with the object code A program that contains no derivative of any portion of the but is designed to work with the Library by being compiled or linked with it

Definition at line 31 of file LICENSE.txt.

14.88.2.44 if the work is an executable linked with the with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the work is made by offering access to copy from a designated offer equivalent access to copy the above specified materials from the same place e Verify that the user has already received a copy of these materials or that you have already sent this user a copy For an the required form of the work that uses the Library must include any data and utility programs needed for reproducing the executable from it as a special the materials to be distributed need not include anything that is normally kernel

Definition at line 323 of file LICENSE.txt.

14.88.2.45 we sometimes make exceptions for this Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally NO WARRANTY BECAUSE THE LIBRARY IS LICENSED FREE OF THERE IS NO WARRANTY FOR THE TO THE EXTENT PERMITTED BY APPLICABLE LAW EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND OR OTHER PARTIES PROVIDE THE LIBRARY AS IS WITHOUT WARRANTY OF ANY KIND

Definition at line 437 of file LICENSE.txt.

14.88.2.46 and that you are informed that you can do these things To protect your we need to make restrictions that forbid distributors to deny you these rights or to ask you to surrender these rights These restrictions translate to certain responsibilities for you if you distribute copies of the library or if you modify it For if you distribute copies of the whether gratis or for a you must give the recipients all the rights that we gave you You must make sure that receive or can get the source code If you link other code with the you must provide complete object files to the so that they can relink them with the library after making changes to the library and recompiling it And you must show them these terms so they know their rights We protect your rights with a two step which gives you legal permission to distribute and or modify the library To protect each we want to make it very clear that there is no warranty for the free library if the library is modified by someone else and passed the recipients should know that what they have is not the original so that the original author s reputation will not be affected by problems that might be introduced by others software patents pose a constant threat to the existence of any free program We wish to make sure that a company cannot effectively restrict the users of a free program by obtaining a restrictive license from a patent holder we insist that any patent license obtained for a version of the library must be consistent with the full freedom of use specified in this license Most GNU including some is covered by the ordinary GNU General Public License This the GNU Lesser General Public applies to certain designated libraries

Definition at line 50 of file LICENSE.txt.

14.88.2.47 if write to the Free Software Temple MA USA Also add information on how to contact you by electronic and paper mail You should also get your if to sign a copyright disclaimer for the library

Definition at line 35 of file LICENSE.txt.

14.88.2.48 if the work is an executable linked with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the work is made by offering access to copy from a designated offer equivalent access to copy the above specified materials from the same place e Verify that the user has already received a copy of these materials or that you have already sent this user a copy For an the required form of the work that uses the Library must include any data and utility programs needed for reproducing the executable from it as a special the materials to be distributed need not include anything that is normally and so on of the operating system on which the executable unless that component itself accompanies the executable It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system Such a contradiction means you cannot use both them and the Library together in an executable that you distribute You may place library facilities that are a work based on the Library side by side in a single library together with other library facilities not covered by this and distribute such a combined provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise and provided that you do these two uncombined with any other library facilities This must be distributed under the terms of the Sections above b Give prominent notice with the combined library of the fact that part of it is a work based on the and explaining where to find the accompanying uncombined form of the same work You may not link or distribute the Library except as expressly provided under this License Any attempt otherwise to link or distribute the Library is and will automatically terminate your rights under this License parties who have received or from you under this License will not have their licenses terminated so long as such parties remain in full compliance You are not required to accept this since you have not signed it nothing else grants you permission to modify or distribute the Library or its derivative works These actions are prohibited by law if you do not accept this License by modifying or distributing the you indicate your acceptance of this License to do and all its terms and conditions for distributing or modifying the Library or works based on it Each time you redistribute the Library

Definition at line 158 of file LICENSE.txt.

14.88.2.49 we sometimes make exceptions for this Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally NO WARRANTY BECAUSE THE LIBRARY IS LICENSED FREE OF THERE IS NO WARRANTY FOR THE LIBRARY

Definition at line 437 of file LICENSE.txt.

14.88.2.50 and that you are informed that you can do these things To protect your we need to make restrictions that forbid distributors to deny you these rights or to ask you to surrender these rights These restrictions translate to certain responsibilities for you if you distribute copies of the library or if you modify it For if you distribute copies of the whether gratis or for a you must give the recipients all the rights that we gave you You must make sure that receive or can get the source code If you link other code with the you must provide complete object files to the so that they can relink them with the library after making changes to the library and recompiling it And you must show them these terms so they know their rights We protect your rights with a two step which gives you legal permission to distribute and or modify the library To protect each we want to make it very clear that there is no warranty for the free library if the library is modified by someone else and passed the recipients should know that what they have is not the original so that the original author s reputation will not be affected by problems that might be introduced by others software patents pose a constant threat to the existence of any free program We wish to make sure that a company cannot effectively restrict the users of a free program by obtaining a restrictive license from a patent holder we insist that any patent license obtained for a version of the library must be consistent with the full freedom of use specified in this license Most GNU including some is covered by the ordinary GNU General Public License This license

Definition at line 4 of file LICENSE.txt.

14.88.2.51 either version of the License

Definition at line 4 of file LICENSE.txt.

14.88.2.52 and that you are informed that you can do these things To protect your we need to make restrictions that forbid distributors to deny you these rights or to ask you to surrender these rights These restrictions translate to certain responsibilities for you if you distribute copies of the library or if you modify it For if you distribute copies of the whether gratis or for a you must give the recipients all the rights that we gave you You must make sure that receive or can get the source code If you link other code with the you must provide complete object files to the so that they can relink them with the library after making changes to the library and recompiling it And you must show them these terms so they know their rights We protect your rights with a two step method

Definition at line 35 of file LICENSE.txt.

14.88.2.53 if the work is an executable linked with the with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the work is made by offering access to copy from a designated offer equivalent access to copy the above specified materials from the same place e Verify that the user has already received a copy of these materials or that you have already sent this user a copy For an the required form of the work that uses the Library must include any data and utility programs needed for reproducing the executable from it as a special the materials to be distributed need not include anything that is normally and so on of the operating system on which the executable unless that component itself accompanies the executable It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system Such a contradiction means you cannot use both them and the Library together in an executable that you distribute You may place library facilities that are a work based on the Library side by side in a single library together with other library facilities not covered by this and distribute such a combined provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise and provided that you do these two uncombined with any other library facilities This must be distributed under the terms of the Sections above b Give prominent notice with the combined library of the fact that part of it is a work based on the and explaining where to find the accompanying uncombined form of the same work You may not link or distribute the Library except as expressly provided under this License Any attempt otherwise to modify

Definition at line 323 of file LICENSE.txt.

14.88.2.54 alter the names

Definition at line 496 of file LICENSE.txt.

14.88.2.55 if not

Definition at line 487 of file LICENSE.txt.

14.88.2.56 it is up to the author donor to decide if he or she is willing to distribute software through any other system and a licensee cannot impose that choice This section is intended to make thoroughly clear what is believed to be a consequence of the rest of this License If the distribution and or use of the Library is restricted in certain countries either by patents or by copyrighted the original copyright holder who places the Library under this License may add an geographical distribution limitation excluding those so that distribution is permitted only in or among countries not thus excluded In such this License incorporates the limitation as if written in the body of this License The Free Software Foundation may publish revised and or new versions of the Lesser General Public License from time to time Such new versions will be similar in spirit to the present but may differ in detail to address new problems or concerns Each version is given a distinguishing version number If the Library specifies a version number of this License which applies to it and any later you have the option of following the terms and conditions either of that version or of any later version published by the Free Software Foundation If the Library does not specify a license version number [explicit]

Definition at line 406 of file LICENSE.txt.

14.88.2.57 if the work is an executable linked with the with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the work is made by offering access to copy from a designated offer equivalent access to copy the above specified materials from the same place e Verify that the user has already received a copy of these materials or that you have already sent this user a copy For an the required form of the work that uses the Library must include any data and utility programs needed for reproducing the executable from it as a special the materials to be distributed need not include anything that is normally and so on of the operating system on which the executable unless that component itself accompanies the executable It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system Such a contradiction means you cannot use both them and the Library together in an executable that you distribute You may place library facilities that are a work based on the Library side by side in a single library together with other library facilities not covered by this and distribute such a combined provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise and provided that you do these two uncombined with any other library facilities This must be distributed under the terms of the Sections above b Give prominent notice with the combined library of the fact that part of it is a work based on the and explaining where to find the accompanying uncombined form of the same work You may not link or distribute the Library except as expressly provided under this License Any attempt otherwise to link or distribute the Library is and will automatically terminate your rights under this License parties who have received or from you under this License will not have their licenses terminated so long as such parties remain in full compliance You are not required to accept this since you have not signed it nothing else grants you permission to modify or distribute the Library or its derivative works These actions are prohibited by law if you do not accept this License by modifying or distributing the you indicate your acceptance of this License to do and all its terms and conditions for distributing or modifying the Library or works based on it Each time you redistribute the the recipient automatically receives a license from the original licensor to link with or modify the Library subject to these terms and conditions You may not impose any further restrictions on the recipients exercise of the rights granted herein You are not responsible for enforcing compliance by third parties with this License as a consequence of a court judgment or allegation of patent infringement or for any other conditions are imposed on they do not excuse you from the conditions of this License If you cannot distribute so as to satisfy simultaneously your obligations under this License and any other pertinent obligations

Definition at line 380 of file LICENSE.txt.

14.88.2.58 if the work is an executable linked with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written offer

Definition at line 303 of file LICENSE.txt.

14.88.2.59 and that you are informed that you can do these things To protect your we need to make restrictions that forbid distributors to deny you these rights or to ask you to surrender these rights These restrictions translate to certain responsibilities for you if you distribute copies of the library or if you modify it For if you distribute copies of the whether gratis or for a you must give the recipients all the rights that we gave you You must make sure that receive or can get the source code If you link other code with the you must provide complete object files to the so that they can relink them with the library after making changes to the library and recompiling it And you must show them these terms so they know their rights We protect your rights with a two step which gives you legal permission to distribute and or modify the library To protect each we want to make it very clear that there is no warranty for the free library if the library is modified by someone else and passed on

Definition at line 50 of file LICENSE.txt.

14.88.2.60 if the work is an executable linked with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs one

Definition at line 303 of file LICENSE.txt.

14.88.2.61 and distribute a copy of this License along with the Library You may charge a fee for the physical act of transferring a and you may at your option offer warranty protection in exchange for a fee You may modify your copy or copies of the Library or any portion of thus forming a work based on the and copy and distribute such modifications or work under the terms of Section provided that you also meet all of these other than as an argument passed when the facility is then you must make a good faith effort to ensure in the event an application does not supply such function or the facility still operates

Definition at line 158 of file LICENSE.txt.

14.88.2.62 the intent is to exercise the right to control the distribution of derivative or collective works based on the Library In mere aggregation of another work not based on the Library with the you must alter all the notices that refer to this so that they refer to the ordinary GNU General Public instead of to this it is irreversible for that so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy This option is useful when you wish to copy part of the code of the Library into a program that is not a library You may copy and distribute the which must be distributed under the terms of Sections and above on a medium customarily used for software interchange If distribution of object code is made by offering access to copy from a designated then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source even though third parties are not compelled to copy the source along with the object code A program that contains no derivative of any portion of the but is designed to work with the Library by being compiled or linked with is called a work that uses the Library Such a in is not a derivative work of the and therefore falls outside the scope of this License linking a work that uses the Library with the Library creates an executable that is a derivative of the rather than a work that uses the library The executable is therefore covered by this License Section states terms for distribution of such executables When a work that uses the Library uses material from a header file that is part of the the object code for the work may be a derivative work of the Library even though the source code is not Whether this is true is especially significant if the work can be linked without the or if the work is itself a library The threshold for this to be true is not precisely defined by law If such an object file uses only numerical parameters

Definition at line 253 of file LICENSE.txt.

14.88.2.63 if the work is an executable linked with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the work is made by offering access to copy from a designated offer equivalent access to copy the above specified materials from the same place e Verify that the user has already received a copy of these materials or that you have already sent this user a copy For an the required form of the work that uses the Library must include any data and utility programs needed for reproducing the executable from it as a special the materials to be distributed need not include anything that is normally and so on of the operating system on which the executable unless that component itself accompanies the executable It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system Such a contradiction means you cannot use both them and the Library together in an executable that you distribute You may place library facilities that are a work based on the Library side by side in a single library together with other library facilities not covered by this and distribute such a combined provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise permitted

Definition at line 323 of file LICENSE.txt.

14.88.2.64 if write to the Free Software Temple Place

Definition at line 4 of file LICENSE.txt.

14.88.2.65 if the work is an executable linked with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the work is made by offering access to copy from a designated place

Definition at line 235 of file LICENSE.txt.

14.88.2.66 that you can change the software and use pieces of it in new free programs

Definition at line 32 of file LICENSE.txt.

14.88.2.67 we sometimes make exceptions for this Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally NO WARRANTY BECAUSE THE LIBRARY IS LICENSED FREE OF THERE IS NO WARRANTY FOR THE TO THE EXTENT PERMITTED BY APPLICABLE LAW EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND OR OTHER PARTIES PROVIDE THE LIBRARY AS IS WITHOUT WARRANTY OF ANY EITHER EXPRESSED OR BUT NOT LIMITED THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE LIBRARY IS WITH YOU SHOULD THE LIBRARY PROVE YOU ASSUME THE COST OF ALL NECESSARY REPAIR OR CORRECTION IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT OR ANY OTHER PARTY WHO MAY MODIFY AND OR REDISTRIBUTE THE LIBRARY AS PERMITTED BE LIABLE TO YOU FOR INCLUDING ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE EVEN IF SUCH HOLDER OR OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES END OF TERMS AND CONDITIONS How to Apply These Terms to Your New Libraries If you develop a new and you want it to be of the greatest possible use to the public

Definition at line 462 of file LICENSE.txt.

14.88.2.68 rather

Definition at line 202 of file LICENSE.txt.

14.88.2.69 and that you are informed that you can do these things To protect your we need to make restrictions that forbid distributors to deny you these rights or to ask you to surrender these rights These restrictions translate to certain responsibilities for you if you distribute copies of the library or if you modify it For if you distribute copies of the whether gratis or for a you must give the recipients all the rights that we gave you You must make sure that receive or can get the source code If you link other code with the you must provide complete object files to the recipients

Definition at line 35 of file LICENSE.txt.

14.88.2.70 if the work is an executable linked with the with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the work is made by offering access to copy from a designated offer equivalent access to copy the above specified materials from the same place e Verify that the user has already received a copy of these materials or that you have already sent this user a copy For an the required form of the work that uses the Library must include any data and utility programs needed for reproducing the executable from it as a special the materials to be distributed need not include anything that is normally and so on of the operating system on which the executable unless that component itself accompanies the executable It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system Such a contradiction means you cannot use both them and the Library together in an executable that you distribute You may place library facilities that are a work based on the Library side by side in a single library together with other library facilities not covered by this and distribute such a combined provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise and provided that you do these two uncombined with any other library facilities This must be distributed under the terms of the Sections above b Give prominent notice with the combined library of the fact that part of it is a work based on the and explaining where to find the accompanying uncombined form of the same work You may not link or distribute the Library except as expressly provided under this License Any attempt otherwise to link or distribute the Library is and will automatically terminate your rights under this License parties who have received or rights

Definition at line 35 of file LICENSE.txt.

14.88.2.71 if the work is an executable linked with the with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the work is made by offering access to copy from a designated offer equivalent access to copy the above specified materials from the same place e Verify that the user has already received a copy of these materials or that you have already sent this user a copy For an the required form of the work that uses the Library must include any data and utility programs needed for reproducing the executable from it as a special the materials to be distributed need not include anything that is normally and so on of the operating system on which the executable runs

Definition at line 323 of file LICENSE.txt.

14.88.2.72 if write to the Free Software Temple MA USA Also add information on how to contact you by electronic and paper mail You should also get your if to sign a copyright disclaimer for the if necessary Here is a sample

Definition at line 493 of file LICENSE.txt.

14.88.2.73 the intent is to exercise the right to control the distribution of derivative or collective works based on the Library In mere aggregation of another work not based on the Library with the you must alter all the notices that refer to this so that they refer to the ordinary GNU General Public instead of to this it is irreversible for that so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy This option is useful when you wish to copy part of the code of the Library into a program that is not a library You may copy and distribute the which must be distributed under the terms of Sections and above on a medium customarily used for software interchange If distribution of object code is made by offering access to copy from a designated then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source even though third parties are not compelled to copy the source along with the object code A program that contains no derivative of any portion of the but is designed to work with the Library by being compiled or linked with is called a work that uses the Library Such a in is not a derivative work of the and therefore falls outside the scope of this License linking a work that uses the Library with the Library creates an executable that is a derivative of the rather than a work that uses the library The executable is therefore covered by this License Section states terms for distribution of such executables When a work that uses the Library uses material from a header file that is part of the the object code for the work may be a derivative work of the Library even though the source code is not Whether this is true is especially significant if the work can be linked without the or if the work is itself a library The threshold for this to be true is not precisely defined by law If such an object file uses only numerical data structure layouts and and small macros and small then the use of the object file is regardless of whether it is legally a derivative if the work is a derivative of the you may distribute the object code for the work under the terms of Section Any executables containing that work also fall under Section

Definition at line 266 of file LICENSE.txt.

14.88.2.74 we sometimes make exceptions for this Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally NO WARRANTY BECAUSE THE LIBRARY IS LICENSED FREE OF THERE IS NO WARRANTY FOR THE TO THE EXTENT PERMITTED BY APPLICABLE LAW EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND OR OTHER PARTIES PROVIDE THE LIBRARY AS IS WITHOUT WARRANTY OF ANY EITHER EXPRESSED OR BUT NOT LIMITED THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE LIBRARY IS WITH YOU SHOULD THE LIBRARY PROVE YOU ASSUME THE COST OF ALL NECESSARY SERVICING

Definition at line 437 of file LICENSE.txt.

14.88.2.75 if the work is an executable linked with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the work is made by offering access to copy from a designated offer equivalent access to copy the above specified materials from the same place e Verify that the user has already received a copy of these materials or that you have already sent this user a copy For an the required form of the work that uses the Library must include any data and utility programs needed for reproducing the executable from it as a special the materials to be distributed need not include anything that is normally and so on of the operating system on which the executable unless that component itself accompanies the executable It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system Such a contradiction means you cannot use both them and the Library together in an executable that you distribute You may place library facilities that are a work based on the Library side by side in a single library together with other library facilities not covered by this and distribute such a combined provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise and provided that you do these two uncombined with any other library facilities This must be distributed under the terms of the Sections above b Give prominent notice with the combined library of the fact that part of it is a work based on the and explaining where to find the accompanying uncombined form of the same work You may not link or distribute the Library except as expressly provided under this License Any attempt otherwise to link or distribute the Library is and will automatically terminate your rights under this License parties who have received or from you under this License will not have their licenses terminated so long as such parties remain in full compliance You are not required to accept this since you have not signed it nothing else grants you permission to modify or distribute the Library or its derivative works These actions are prohibited by law if you do not accept this License by modifying or distributing the you indicate your acceptance of this License to do so

Definition at line 362 of file LICENSE.txt.

14.88.2.76 and that you are informed that you can do these things To protect your we need to make restrictions that forbid distributors to deny you these rights or to ask you to surrender these rights These restrictions translate to certain responsibilities for you if you distribute copies of the library or if you modify it For if you distribute copies of the whether gratis or for a you must give the recipients all the rights that we gave you You must make sure that receive or can get the source code If you link other code with the you must provide complete object files to the so that they can relink them with the library after making changes to the library and recompiling it And you must show them these terms so they know their rights We protect your rights with a two step which gives you legal permission to distribute and or modify the library To protect each we want to make it very clear that there is no warranty for the free library if the library is modified by someone else and passed the recipients should know that what they have is not the original so that the original author s reputation will not be affected by problems that might be introduced by others software patents pose a constant threat to the existence of any free program We wish to make sure that a company cannot effectively restrict the users of a free program by obtaining a restrictive license from a patent holder we insist that any patent license obtained for a version of the library must be consistent with the full freedom of use specified in this license Most GNU software

Definition at line 4 of file LICENSE.txt.

14.88.2.77 we sometimes make exceptions for this Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally NO WARRANTY BECAUSE THE LIBRARY IS LICENSED FREE OF THERE IS NO WARRANTY FOR THE TO THE EXTENT PERMITTED BY APPLICABLE LAW EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND OR OTHER PARTIES PROVIDE THE LIBRARY AS IS WITHOUT WARRANTY OF ANY EITHER EXPRESSED OR BUT NOT LIMITED THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE LIBRARY IS WITH YOU SHOULD THE LIBRARY PROVE YOU ASSUME THE COST OF ALL NECESSARY REPAIR OR CORRECTION IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT OR ANY OTHER PARTY WHO MAY MODIFY AND OR REDISTRIBUTE THE LIBRARY AS PERMITTED BE LIABLE TO YOU FOR INCLUDING ANY SPECIAL

Definition at line 437 of file LICENSE.txt.

14.88.2.78 if the work is an executable linked with the with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the work is made by offering access to copy from a designated offer equivalent access to copy the above specified materials from the same place e Verify that the user has already received a copy of these materials or that you have already sent this user a copy For an the required form of the work that uses the Library must include any data and utility programs needed for reproducing the executable from it as a special the materials to be distributed need not include anything that is normally and so on of the operating system on which the executable unless that component itself accompanies the executable It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system Such a contradiction means you cannot use both them and the Library together in an executable that you distribute You may place library facilities that are a work based on the Library side by side in a single library together with other library facilities not covered by this and distribute such a combined provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise and provided that you do these two uncombined with any other library facilities This must be distributed under the terms of the Sections above b Give prominent notice with the combined library of the fact that part of it is a work based on the and explaining where to find the accompanying uncombined form of the same work You may not link or distribute the Library except as expressly provided under this License Any attempt otherwise to sublicense

Definition at line 323 of file LICENSE.txt.

14.88.2.79 if the work is an executable linked with the with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three to give the same user the materials specified in Subsection

Definition at line 303 of file LICENSE.txt.

14.88.2.80 if write to the Free Software Temple Suite

Definition at line 4 of file LICENSE.txt.

14.88.2.81 this section has the sole purpose of protecting the integrity of the free software distribution system which is implemented by public license practices Many people have made generous contributions to the wide range of software distributed through that system in reliance on consistent application of that system

Definition at line 398 of file LICENSE.txt.

14.88.2.82 **and distribute a copy of this License along with the Library** You may charge a fee for the physical act of transferring a and you may at your option offer warranty protection in exchange for a fee You may modify your copy or copies of the Library or any portion of thus forming a work based on the and copy and distribute such modifications or work under the terms of Section provided that you also meet all of these other than as an argument passed when the facility is then you must make a good faith effort to ensure in the event an application does not supply such function or table

Definition at line 158 of file LICENSE.txt.

14.88.2.83 **and distribute a copy of this License along with the Library** You may charge a fee for the physical act of transferring a and you may at your option offer warranty protection in exchange for a fee You may modify your copy or copies of the Library or any portion of thus forming a work based on the and copy and distribute such modifications or work under the terms of Section provided that you also meet all of these other than as an argument passed when the facility is then you must make a good faith effort to ensure in the event an application does not supply such function or the facility still and performs whatever part of its purpose remains and can be reasonably considered independent and separate works in then this and its terms

Definition at line 193 of file LICENSE.txt.

14.88.2.84 **and distribute a copy of this License along with the Library** You may charge a fee for the physical act of transferring a and you may at your option offer warranty protection in exchange for a fee You may modify your copy or copies of the Library or any portion of thus forming a work based on the and copy and distribute such modifications or work under the terms of Section provided that you also meet all of these other than as an argument passed when the facility is then you must make a good faith effort to ensure that

Definition at line 158 of file LICENSE.txt.

14.88.2.85 **and distribute a copy of this License along with the Library** You may charge a fee for the physical act of transferring a and you may at your option offer warranty protection in exchange for a fee You may modify your copy or copies of the Library or any portion of thus forming a work based on the and copy and distribute such modifications or work under the terms of Section provided that you also meet all of these other than as an argument passed when the facility is then you must make a good faith effort to ensure in the event an application does not supply such function or the facility still and performs whatever part of its purpose remains and can be reasonably considered independent and separate works in themselves

Definition at line 193 of file LICENSE.txt.

14.88.2.86 if the work is an executable linked with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the work is made by offering access to copy from a designated offer equivalent access to copy the above specified materials from the same place e Verify that the user has already received a copy of these materials or that you have already sent this user a copy For an the required form of the work that uses the Library must include any data and utility programs needed for reproducing the executable from it as a special the materials to be distributed need not include anything that is normally and so on of the operating system on which the executable unless that component itself accompanies the executable It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system Such a contradiction means you cannot use both them and the Library together in an executable that you distribute You may place library facilities that are a work based on the Library side by side in a single library together with other library facilities not covered by this and distribute such a combined provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise and provided that you do these two uncombined with any other library facilities This must be distributed under the terms of the Sections above b Give prominent notice with the combined library of the fact that part of it is a work based on the and explaining where to find the accompanying uncombined form of the same work You may not link or distribute the Library except as expressly provided under this License Any attempt otherwise to link or distribute the Library is and will automatically terminate your rights under this License parties who have received or from you under this License will not have their licenses terminated so long as such parties remain in full compliance You are not required to accept this since you have not signed it nothing else grants you permission to modify or distribute the Library or its derivative works These actions are prohibited by law if you do not accept this License Therefore

Definition at line 50 of file LICENSE.txt.

14.88.2.87 it is up to the author donor to decide if he or she is willing to distribute software through any other system and a licensee cannot impose that choice This section is intended to make thoroughly clear what is believed to be a consequence of the rest of this License If the distribution and or use of the Library is restricted in certain countries either by patents or by copyrighted the original copyright holder who places the Library under this License may add an geographical distribution limitation excluding those so that distribution is permitted only in or among countries not thus excluded In such this License incorporates the limitation as if written in the body of this License The Free Software Foundation may publish revised and or new versions of the Lesser General Public License from time to time Such new versions will be similar in spirit to the present but may differ in detail to address new problems or concerns Each version is given a distinguishing version number If the Library specifies a version number of this License which applies to it and any later you have the option of following the terms and conditions either of that version or of any later version published by the Free Software Foundation If the Library does not specify a license version you may choose any version ever published by the Free Software Foundation If you wish to incorporate parts of the Library into other free programs whose distribution conditions are incompatible with these [explicit]

Definition at line 406 of file LICENSE.txt.

14.88.2.88 and that you are informed that you can do these things To protect your we need to make restrictions that forbid distributors to deny you these rights or to ask you to surrender these rights These restrictions translate to certain responsibilities for you if you distribute copies of the library or if you modify it For if you distribute copies of the whether gratis or for a you must give the recipients all the rights that we gave you You must make sure that they

Definition at line 35 of file LICENSE.txt.

14.88.2.89 if the work is an executable linked with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the work is made by offering access to copy from a designated offer equivalent access to copy the above specified materials from the same place e Verify that the user has already received a copy of these materials or that you have already sent this user a copy For an the required form of the work that uses the Library must include any data and utility programs needed for reproducing the executable from it as a special the materials to be distributed need not include anything that is normally and so on of the operating system on which the executable unless that component itself accompanies the executable It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system Such a contradiction means you cannot use both them and the Library together in an executable that you distribute You may place library facilities that are a work based on the Library side by side in a single library together with other library facilities not covered by this and distribute such a combined provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise and provided that you do these two things

Definition at line 323 of file LICENSE.txt.

14.88.2.90 and distribute a copy of this License along with the Library You may charge a fee for the physical act of transferring a and you may at your option offer warranty protection in exchange for a fee You may modify your copy or copies of the Library or any portion of thus forming a work based on the and copy and distribute such modifications or work under the terms of Section provided that you also meet all of these other than as an argument passed when the facility is then you must make a good faith effort to ensure in the event an application does not supply such function or the facility still and performs whatever part of its purpose remains and can be reasonably considered independent and separate works in then this and its do not apply to those sections when you distribute them as separate works But when you distribute the same sections as part of a whole which is a work based on the the distribution of the whole must be on the terms of this whose permissions for other licensees extend to the entire and thus to each and every part regardless of who wrote it Thus

Definition at line 193 of file LICENSE.txt.

14.88.2.91 we sometimes make exceptions for this Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally NO WARRANTY BECAUSE THE LIBRARY IS LICENSED FREE OF THERE IS NO WARRANTY FOR THE TO THE EXTENT PERMITTED BY APPLICABLE LAW EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND OR OTHER PARTIES PROVIDE THE LIBRARY AS IS WITHOUT WARRANTY OF ANY EITHER EXPRESSED OR BUT NOT LIMITED TO

Definition at line 437 of file LICENSE.txt.

14.88.2.92 and that you are informed that you can do these things To protect your we need to make restrictions that forbid distributors to deny you these rights or to ask you to surrender these rights These restrictions translate to certain responsibilities for you if you distribute copies of the library or if you modify it For if you distribute copies of the whether gratis or for a you must give the recipients all the rights that we gave you You must make sure that too

Definition at line 4 of file LICENSE.txt.

14.88.2.93 the intent is to exercise the right to control the distribution of derivative or collective works based on the Library In mere aggregation of another work not based on the Library with the you must alter all the notices that refer to this so that they refer to the ordinary GNU General Public instead of to this it is irreversible for that so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy This option is useful when you wish to copy part of the code of the Library into a program that is not a library You may copy and distribute the which must be distributed under the terms of Sections and above on a medium customarily used for software interchange If distribution of object code is made by offering access to copy from a designated then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source even though third parties are not compelled to copy the source along with the object code A program that contains no derivative of any portion of the but is designed to work with the Library by being compiled or linked with is called a work that uses the Library Such a in is not a derivative work of the and therefore falls outside the scope of this License linking a work that uses the Library with the Library creates an executable that is a derivative of the rather than a work that uses the library The executable is therefore covered by this License Section states terms for distribution of such executables When a work that uses the Library uses material from a header file that is part of the the object code for the work may be a derivative work of the Library even though the source code is not Whether this is true is especially significant if the work can be linked without the or if the work is itself a library The threshold for this to be true is not precisely defined by law If such an object file uses only numerical data structure layouts and and small macros and small then the use of the object file is unrestricted

Definition at line 262 of file LICENSE.txt.

14.88.2.94 **GNU LESSER GENERAL PUBLIC LICENSE** February Free Software Inc Temple MA USA Everyone is permitted to copy and distribute verbatim copies of this license but changing it is not allowed [This is the first released version of the Lesser GPL. It also counts as the successor of the GNU Library Public License, version 2, hence the version number 2.1.] Preamble The licenses for most software are designed to take away your freedom to share and change it By the GNU General Public Licenses are intended to guarantee your freedom to share and change free software to make sure the software is free for all its users This the Lesser General Public applies to some specially designated software packages typically libraries of the Free Software Foundation and other authors who decide to use it You can use it but we suggest you first think carefully about whether this license or the ordinary General Public License is the better strategy to use in any particular based on the explanations below When we speak of free we are referring to freedom of use

Definition at line 4 of file LICENSE.txt.

14.88.2.95 **GNU LESSER GENERAL PUBLIC LICENSE Version**

Definition at line 2 of file LICENSE.txt.

14.88.2.96 it is up to the author donor to decide if he or she is willing to distribute software through any other system and a licensee cannot impose that choice This section is intended to make thoroughly clear what is believed to be a consequence of the rest of this License If the distribution and or use of the Library is restricted in certain countries either by patents or by copyrighted the original copyright holder who places the Library under this License may add an geographical distribution limitation excluding those so that distribution is permitted only in or among countries not thus excluded In such this License incorporates the limitation as if written in the body of this License The Free Software Foundation may publish revised and or new versions of the Lesser General Public License from time to time Such new versions will be similar in spirit to the present but may differ in detail to address new problems or concerns Each version is given a distinguishing version number If the Library specifies a version number of this License which applies to it and any later version [explicit]

Definition at line 50 of file LICENSE.txt.

14.88.2.97 if the work is an executable linked with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the work is made by offering access to copy from a designated offer equivalent access to copy the above specified materials from the same place e Verify that the user has already received a copy of these materials or that you have already sent this user a copy For an the required form of the work that uses the Library must include any data and utility programs needed for reproducing the executable from it as a special the materials to be distributed need not include anything that is normally and so on of the operating system on which the executable unless that component itself accompanies the executable It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system Such a contradiction means you cannot use both them and the Library together in an executable that you distribute You may place library facilities that are a work based on the Library side by side in a single library together with other library facilities not covered by this and distribute such a combined provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise and provided that you do these two uncombined with any other library facilities This must be distributed under the terms of the Sections above b Give prominent notice with the combined library of the fact that part of it is a work based on the and explaining where to find the accompanying uncombined form of the same work You may not link or distribute the Library except as expressly provided under this License Any attempt otherwise to link or distribute the Library is void

Definition at line 323 of file LICENSE.txt.

14.88.2.98 we sometimes make exceptions for this Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally NO WARRANTY BECAUSE THE LIBRARY IS LICENSED FREE OF THERE IS NO WARRANTY FOR THE TO THE EXTENT PERMITTED BY APPLICABLE LAW EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND OR OTHER PARTIES PROVIDE THE LIBRARY AS IS WITHOUT WARRANTY OF ANY EITHER EXPRESSED OR BUT NOT LIMITED THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE LIBRARY IS WITH YOU SHOULD THE LIBRARY PROVE YOU ASSUME THE COST OF ALL NECESSARY REPAIR OR CORRECTION IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT OR ANY OTHER PARTY WHO MAY MODIFY AND OR REDISTRIBUTE THE LIBRARY AS PERMITTED BE LIABLE TO YOU FOR INCLUDING ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE EVEN IF SUCH HOLDER OR OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES END OF TERMS AND CONDITIONS How to Apply These Terms to Your New Libraries If you develop a new and you want it to be of the greatest possible use to the we recommend making it free software that everyone can redistribute and change You can do so by permitting redistribution under these attach the following notices to the library It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty

Definition at line 155 of file LICENSE.txt.

14.88.2.99 either version of the but WITHOUT ANY WARRANTY

Definition at line 482 of file LICENSE.txt.

14.88.2.100 and distribute a copy of this License along with the Library You may charge a fee for the physical act of transferring a and you may at your option offer warranty protection in exchange for a fee You may modify your copy or copies of the Library or any portion of thus forming a work based on the and copy and distribute such modifications or work under the terms of Section provided that you also meet all of these other than as an argument passed when the facility is then you must make a good faith effort to ensure in the event an application does not supply such function or the facility still and performs whatever part of its purpose remains and can be reasonably considered independent and separate works in then this and its do not apply to those sections when you distribute them as separate works But when you distribute the same sections as part of a whole which is a work based on the the distribution of the whole must be on the terms of this whose permissions for other licensees extend to the entire whole

Definition at line 193 of file LICENSE.txt.

14.88.2.101 if the work is an executable linked with the with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the work is made by offering access to copy from a designated offer equivalent access to copy the above specified materials from the same place e Verify that the user has already received a copy of these materials or that you have already sent this user a copy For an the required form of the work that uses the Library must include any data and utility programs needed for reproducing the executable from it as a special the materials to be distributed need not include anything that is normally and so on of the operating system on which the executable unless that component itself accompanies the executable It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system Such a contradiction means you cannot use both them and the Library together in an executable that you distribute You may place library facilities that are a work based on the Library side by side in a single library together with other library facilities not covered by this and distribute such a combined provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise and provided that you do these two uncombined with any other library facilities This must be distributed under the terms of the Sections above b Give prominent notice with the combined library of the fact that part of it is a work based on the and explaining where to find the accompanying uncombined form of the same work You may not link or distribute the Library except as expressly provided under this License Any attempt otherwise to link with

Definition at line 323 of file LICENSE.txt.

14.88.2.102 the intent is to exercise the right to control the distribution of derivative or collective works based on the Library In mere aggregation of another work not based on the Library with the you must alter all the notices that refer to this so that they refer to the ordinary GNU General Public instead of to this it is irreversible for that so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy This option is useful when you wish to copy part of the code of the Library into a program that is not a library You may copy and distribute the which must be distributed under the terms of Sections and above on a medium customarily used for software interchange If distribution of object code is made by offering access to copy from a designated then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source even though third parties are not compelled to copy the source along with the object code A program that contains no derivative of any portion of the but is designed to work with the Library by being compiled or linked with is called a work that uses the Library Such a work

Definition at line 235 of file LICENSE.txt.

14.88.2.103 if the work is an executable linked with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three years

Definition at line 303 of file LICENSE.txt.

14.88.2.104 if the work is an executable linked with the complete machine readable work that uses the as object code and or source so that the user can modify the Library and then relink to produce a modified executable containing the modified rather than copying library functions into the if the user installs as long as the modified version is interface compatible with the version that the work was made with c Accompany the work with a written valid for at least three to give the same user the materials specified in for a charge no more than the cost of performing this distribution d If distribution of the work is made by offering access to copy from a designated offer equivalent access to copy the above specified materials from the same place e Verify that the user has already received a copy of these materials or that you have already sent this user a copy For an the required form of the work that uses the Library must include any data and utility programs needed for reproducing the executable from it as a special the materials to be distributed need not include anything that is normally and so on of the operating system on which the executable unless that component itself accompanies the executable It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system Such a contradiction means you cannot use both them and the Library together in an executable that you distribute You may place library facilities that are a work based on the Library side by side in a single library together with other library facilities not covered by this and distribute such a combined provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise and provided that you do these two uncombined with any other library facilities This must be distributed under the terms of the Sections above b Give prominent notice with the combined library of the fact that part of it is a work based on the and explaining where to find the accompanying uncombined form of the same work You may not link or distribute the Library except as expressly provided under this License Any attempt otherwise to link or distribute the Library is and will automatically terminate your rights under this License parties who have received or from you under this License will not have their licenses terminated so long as such parties remain in full compliance You are not required to accept this since you have not signed it nothing else grants you permission to modify or distribute the Library or its derivative works These actions are prohibited by law if you do not accept this License by modifying or distributing the you indicate your acceptance of this License to do and all its terms and conditions for distributing or modifying the Library or works based on it Each time you redistribute the the recipient automatically receives a license from the original licensor to link with or modify the Library subject to these terms and conditions You may not impose any further restrictions on the recipients exercise of the rights granted herein You are not responsible for enforcing compliance by third parties with this License as a consequence of a court judgment or allegation of patent infringement or for any other conditions are imposed on they do not excuse you from the conditions of this License If you cannot distribute so as to satisfy simultaneously your obligations under this License and any other pertinent then as a consequence you may not distribute the Library at all For if a patent license would not permit royalty free redistribution of the Library by all those who receive copies directly or indirectly through you

Definition at line 193 of file LICENSE.txt.

14.89 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/latch.cpp File Reference

methods for setting/checking latch bits for egs_brachy

```
#include "latch.h"
Include dependency graph for latch.cpp:
```

14.89.1 Detailed Description

methods for setting/checking latch bits for egs_brachy

14.90 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/latch.h File Reference

handle particles latch bits for egs_brachy

```
#include "egs_advanced_application.h"
#include "pubsub.h"
```

Include dependency graph for latch.h: This graph shows which files directly or indirectly include this file:

Classes

- class [Latch](#)

A class for handling latch bits relevant to egs_brachy. The [Latch](#) class listens for particle events and sets/unsets latch bits on the particle based on the event type.

14.90.1 Detailed Description

handle particles latch bits for egs_brachy

14.91 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/lib/geometry/sources/README.md File Reference

14.92 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/muen.h File Reference

Functions for loading muen data from a file.

```
#include <algorithm>
#include <fstream>
#include <string>
#include <iostream>
#include <iostream>
#include <sstream>
#include <map>
#include <cstdlib>
#include <vector>
#include "egs_functions.h"
#include "egs_input.h"
#include "egs_interpolator.h"
```

Include dependency graph for muen.h: This graph shows which files directly or indirectly include this file:

Classes

- class [muen::MuenDataParser](#)

class for parsing muen data from a file.

Namespaces

- [muen](#)

Typedefs

- `typedef pair< double, double > muen::MuenAtET`
pair of form (energy, muen(energy))
- `typedef map< string, vector< MuenAtET > > muen::MuenMapT`
Map from medium name to vector of (e, muen(e)) data for that medium.

Functions

- `std::vector< std::string > & muen::split (const std::string &s, char delim, std::vector< std::string > &elems)`
Split a string on input delimiter.
- `std::vector< std::string > muen::split (const std::string &s, char delim)`
Split a string on input delimiter.

14.92.1 Detailed Description

Functions for loading muen data from a file.

Author

Randle Taylor (randle.taylor@gmail.com)

14.93 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/phantom.cpp File Reference

Implementation of phantom objects.

```
#include <algorithm>
#include <vector>
#include <fstream>
#include "phantom.h"
#include <iomanip>
#include "gzstream.h"
#include "latch.h"
#include "egs_run_control.h"
Include dependency graph for phantom.cpp:
```

Classes

- struct [RegionResult](#)

Functions

- bool `tlenRegTopResultCompare` (const `RegionResult` &`firstElem`, const `RegionResult` &`secondElem`)
- bool `edepRegTopResultCompare` (const `RegionResult` &`firstElem`, const `RegionResult` &`secondElem`)
- string `space2underscore` (std::string `text`)

14.93.1 Detailed Description

Implementation of phantom objects.

Author

Randle Taylor (randle.taylor@gmail.com)

14.93.2 Function Documentation

14.93.2.1 bool `edepRegTopResultCompare` (const `RegionResult` & `firstElem`, const `RegionResult` & `secondElem`)

Definition at line 76 of file phantom.cpp.

14.93.2.2 string `space2underscore` (std::string `text`)

Definition at line 83 of file phantom.cpp.

14.93.2.3 bool `tlenRegTopResultCompare` (const `RegionResult` & `firstElem`, const `RegionResult` & `secondElem`)

Definition at line 72 of file phantom.cpp.

14.94 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/phantom.h File Reference

Header file for phantom objects.

```
#include <map>
#include <set>
#include "egs_scoring.h"
#include "egs_application.h"
#include "egs_interface2.h"
#include "pubsub.h"
```

Include dependency graph for phantom.h: This graph shows which files directly or indirectly include this file:

Classes

- class `EB_Phantom`

A class to represent a single phantom for scoring dose in egs_brachy.

14.94.1 Detailed Description

Header file for phantom objects.

Author

Randle Taylor (randle.taylor@gmail.com)

14.95 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/phsp.cpp File Reference

Implementation of the [PHSPControl](#) object.

```
#include "phsp.h"
#include <sys/types.h>
#include <sys/stat.h>
#include "egs_interface2.h"
#include "iaea_header.h"
Include dependency graph for phsp.cpp:
```

Functions

- bool [dirExists](#) (string path)
return true if input path is an existing directory

14.95.1 Detailed Description

Implementation of the [PHSPControl](#) object.

14.95.2 Function Documentation

14.95.2.1 bool dirExists (string path)

return true if input path is an existing directory

Definition at line 51 of file phsp.cpp.

14.96 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/phsp.h File Reference

Definition of the [PHSPControl](#) object.

```
#include "egs_functions.h"
#include "egs_input.h"
#include "egs_advanced_application.h"
#include "egs_transformations.h"
#include "pubsub.h"
#include "iaea_phsp.h"
```

Include dependency graph for phsp.h: This graph shows which files directly or indirectly include this file:

Classes

- class [PHSPControl](#)

14.96.1 Detailed Description

Definition of the [PHSPControl](#) object.

14.97 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/pubsub.cpp File Reference

```
#include "pubsub.h"
```

Include dependency graph for pubsub.cpp:

14.98 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/pubsub.h File Reference

A simple pub/sub module to allow various egs_brachy classes to subscribe to particle events.

```
#include <list>
#include <string>
#include <map>
```

Include dependency graph for pubsub.h: This graph shows which files directly or indirectly include this file:

Classes

- class [Subscriber](#)
- class [Publisher](#)

Typedefs

- typedef pair< bool, [EB_Message](#) > [SendMessage](#)

Enumerations

- enum [EB_Message](#) {
 NEW_HISTORY, PARTICLE_INITIALIZED, PARTICLE_TAKING_STEP, PARTICLE_TOOK_STEP,
 PARTICLE_ESCAPING_SOURCE, PARTICLE_ESCAPED_SOURCE, PARTICLE_ESCAPING_GEOM,
 PARTICLE_ESCAPED_GEOM,
 PHOTON_SCATTER_EVENT, NON_SOURCE_PHOTON_SCATTER_EVENT }

14.98.1 Detailed Description

A simple pub/sub module to allow various egs_brachy classes to subscribe to particle events.

Adapted from <http://www.cs.sjsu.edu/~pearce/modules/patterns/events/pubsubimp.htm>

14.98.2 Typedef Documentation

14.98.2.1 `typedef pair<bool, EB_Message> SendMessage`

Definition at line 69 of file pubsub.h.

14.98.3 Enumeration Type Documentation

14.98.3.1 `enum EB_Message`

Enumerator

NEW_HISTORY
PARTICLE_INITIALIZED
PARTICLE_TAKING_STEP
PARTICLE_TOOK_STEP
PARTICLE_ESCAPING_SOURCE
PARTICLE_ESCAPED_SOURCE
PARTICLE_ESCAPING_GEOM
PARTICLE_ESCAPED_GEOM
PHOTON_SCATTER_EVENT
NON_SOURCE_PHOTON_SCATTER_EVENT

Definition at line 54 of file pubsub.h.

14.99 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/recycle.cpp File Reference

class implementations for recycling

```
#include "recycle.h"
Include dependency graph for recycle.cpp:
```

14.99.1 Detailed Description

class implementations for recycling

14.100 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/recycle.h File Reference

class definitions for recycling

```
#include <map>
#include <set>
#include <stack>
#include <cstdlib>
#include "egs_functions.h"
#include "egs_input.h"
#include "egs_rndm.h"
#include "egs_transformations.h"
#include "pubsub.h"
#include "ginfo.h"
#include "latch.h"
```

Include dependency graph for recycle.h: This graph shows which files directly or indirectly include this file:

Classes

- class [RecycleOpts](#)

14.100.1 Detailed Description

class definitions for recycling

14.101 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/run_tests.py File Reference

Namespaces

- [run_tests](#)

Functions

- def [run_tests.dyn_import](#) (name)
- def [run_tests.create_egsinp](#) (test_module)
- def [run_tests.find_cpu_time](#) (egslst)
- def [run_tests.run_simulation](#) ()
- def [run_tests.cleanup](#) ()
- def [run_tests.find_tests](#) ()
- def [run_tests.run_all_tests](#) ()

Variables

- bool `run_tests.VERBOSE` = False
- string `run_tests.timing_hard_fail` = "--timing-hard-fail"
- `run_tests.EGS_HOME` = os.environ["EGS_HOME"]
- `run_tests.EGS_BRACHY` = os.path.join(EGS_HOME, "egs_brachy")
- string `run_tests.USER_CODE` = "egs_brachy"
- string `run_tests.TEST_EGSINP_FILE` = "eb_test_run"
- `run_tests.TEST_EGSINP_PATH_ROOT` = os.path.join(EGS_BRACHY, TEST_EGSINP_FILE)
- string `run_tests.TEST_EGSINP_PATH` = TEST_EGSINP_PATH_ROOT+.egsinp"
- string `run_tests.PASS_FMT` = "%(pass_fail)s - %(test)s - ran in %(actual_time).3G s/MHz (%(real_time).3G s)"
- string `run_tests.TIMING_WARN_FMT`
- string `run_tests.FAIL_FMT`
- string `run_tests.cpu_speed_cmd` = """/grep -i "cpu mhz" /proc/cpuinfo | tail -1 | awk -F ":" '{print \$2}'""""
- `run_tests.CPU_MHZ` = float(os.environ["CPU_MHZ"])
- string `run_tests.source` = "CPU_MHZ env variable"
- `run_tests.p`
- `run_tests.stdin`
- `run_tests.stdout`
- `run_tests.stderr`
- float `run_tests.TIMING_MARGIN` = 1.05

14.102 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/spec_scoring.cpp File Reference

implementation of spectrum scoring classes.

```
#include "spec_scoring.h"
#include <fstream>
#include <stdarg.h>
Include dependency graph for spec_scoring.cpp:
```

Functions

- std::string `string_format` (const std::string fmt,...)
- string `getFileNameFromPath` (const string &s)

14.102.1 Detailed Description

implementation of spectrum scoring classes.

14.102.2 Function Documentation

14.102.2.1 string getFileNameFromPath (const string & s)

Definition at line 69 of file spec_scoring.cpp.

14.102.2.2 std::string string_format (const std::string *fmt*, ...)

Definition at line 47 of file spec_scoring.cpp.

14.103 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/spec_scoring.h File Reference

Definition of spectrum scoring classes.

```
#include <sstream>
#include "egs_advanced_application.h"
#include "egs_functions.h"
#include "egs_input.h"
#include "egs_interface2.h"
#include "egs_scoring.h"
#include "ginfo.h"
#include "pubsub.h"
```

Include dependency graph for spec_scoring.h: This graph shows which files directly or indirectly include this file:

Classes

- class [EnergyScoringStats](#)
a class to use for scoring information about total energy initialized, escaping sources etc
- class [BaseSpectrumScorer](#)
abstract base class for scoring spectrum information
- class [SurfaceCountSpectrum](#)
A class for scoring a histogram of the number of particles escaping a source geometry.
- class [EnergyWeightedSurfaceSpectrum](#)
A class for scoring the energy weighted spectrum (normalized to total radiant energy) of particles on the surface of a source geometry.
- class [EnergyFluenceSpectrumInVoxel](#)
A class for scoring the energy weighted spectrum (normalized to total radiant energy) of particles on the surface of a source geometry.

14.103.1 Detailed Description

Definition of spectrum scoring classes.

14.104 /home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/timing.h File Reference

```
#include <sstream>
#include <iomanip>
#include "egs_timer.h"
```

Include dependency graph for timing.h: This graph shows which files directly or indirectly include this file:

Classes

- class [EB_Timer](#)
- class [EB_TimingTree](#)

Index

/home/randlet/EGSnrc/egs_home/egs_brachy/egs_←
brachy/array_sizes.h, 226
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_←
_brachy/eb_ieaphsp_source/docs/eb_←
ieaphsp_source.dox, 226
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_←
brachy/eb_ieaphsp_source/docs/output/html/dy←
js, 226
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_←
brachy/eb_ieaphsp_source/docs/output/html/jquery.←
js, 227
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_←
brachy/eb_ieaphsp_source/docs/output/html/se←
_0.js, 242
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_←
brachy/eb_ieaphsp_source/docs/output/html/search/all.←
_1.js, 243
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_←
brachy/eb_ieaphsp_source/docs/output/html/se←
_2.js, 243
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_←
brachy/eb_ieaphsp_source/docs/output/html/se←
_3.js, 244
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_←
brachy/eb_ieaphsp_source/docs/output/html/se←
_0.js, 244
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_←
brachy/eb_ieaphsp_source/docs/output/html/se←
_0.js, 245
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_←
brachy/eb_ieaphsp_source/docs/output/html/se←
_0.js, 245
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_←
brachy/eb_ieaphsp_source/docs/output/html/se←
_0.js, 245
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_←
brachy/eb_ieaphsp_source/docs/output/html/se←
_1.js, 246
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_←
brachy/eb_ieaphsp_source/docs/output/html/se←
_2.js, 248
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_←
brachy/eb_ieaphsp_source/docs/output/html/se←
_3.js, 249
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_←
brachy/eb_ieaphsp_source/eb_ieaphsp_←
source.cpp, 249
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_←
brachy/eb_ieaphsp_source/eb_ieaphsp_←
source.h, 250
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_←
brachy/eb_tests/_init__.py, 251
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_←
brachy/eb_tests/brem_cyl/_init__.py, 251
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_←
brachy/eb_tests/brem_cyl/test.py, 254
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_←
brachy/eb_tests/flu_cutoff/_init__.py, 251
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_←
brachy/eb_tests/flu_cutoff/test.py, 255
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_←
brachy/eb_tests/iaeа.py, 263
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_←
brachy/eb_tests/iaeа_errors.py, 263
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_←
brachy/eb_tests/iaeа_types.py, 264
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_←
brachy/eb_tests/phsp_run/_init__.py, 251
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_←
brachy/eb_tests/phsp_run/test.py, 255
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_←
brachy/eb_tests/phsp_scoring/_init__.py,
251
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_←
brachy/eb_tests/phsp_scoring/test.py, 255
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_←
brachy/eb_tests/recycling/_init__.py, 251
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_←
brachy/eb_tests/recycling/test.py, 256
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_←
brachy/eb_tests/scatter/_init__.py, 252
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_←
brachy/eb_tests/scatter/test.py, 256
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_←
brachy/eb_tests/seeds_in_xyz/_init__.py,
252
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_←
brachy/eb_tests/seeds_in_xyz/test.py, 257
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_←
brachy/eb_tests/seeds_in_xyz_genvelope/_←
_init__.py, 252
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_←
brachy/eb_tests/seeds_in_xyz_genvelope/test.←
py, 257
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_←
brachy/eb_ieaphsp_source/eb_ieaphsp_←

```

brachy/eb_tests/simple_dose_sph/__init__.py, 252
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/simple_dose_sph/test.py, 257
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/single_generator/__init__.py, 252
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/single_generator/test.py, 258
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/source_energies/__init__.py, 252
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/source_energies/test.py, 258
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/spec_absolute/__init__.py, 253
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/spec_absolute/test.py, 259
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/spec_eflu/__init__.py, 253
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/spec_eflu/test.py, 259
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/spec_vox/__init__.py, 253
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/spec_vox/test.py, 260
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/stepped_source/__init__.py, 253
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/stepped_source/test.py, 260
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/tg43mode/__init__.py, 253
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/tg43mode/test.py, 261
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/tg43mode_recycle/__init__.py, 253
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/tg43mode_recycle/test.py, 261
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/tg43mode_zeroweight/__init__.py, 254
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/tg43mode_zeroweight/test.py, 261
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/utils.py, 264
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/variable_activity/__init__.py, 254
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/variable_activity/test.py, 262
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/variable_w_recycling/__init__.py, 254
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/variable_w_recycling/test.py, 262
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/volume_correction/__init__.py, 254
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_tests/volume_correction/test.py, 263
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_volcor.cpp, 265
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/eb_volcor.h, 266
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/egs_brachy.cpp, 267
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/egs_brachy.h, 270
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/ginfo.cpp, 271
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/ginfo.h, 274
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/gzstream/LICENSE.txt, 275
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/gzstream.C, 275
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/gzstream.gzstream.h, 275
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/latch.cpp, 332
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/latch.h, 333
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/lib/geometry/sources/README.md, 333
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/muen.h, 333
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/phantom.cpp, 334
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/phantom.h, 335
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/phsp.cpp, 336
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/phsp.h, 336
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/publish.cpp, 337
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/publish.h, 337
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/recycle.cpp, 338
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/recycle.h, 339
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/run_tests.py, 339
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_brachy/spec_scoring.cpp, 340

```

brachy/spec_scoring.h, 341
/home/randlet/EGSnrc/egs_home/egs_brachy/egs_←
 brachy/timing.h, 341
__init__
 eb_tests::iaeа::IAEAPhaseSpace, 189
 eb_tests::iaeа_errors::IAEAPhaseSpaceError, 191
_create_source
 eb_tests::iaeа::IAEAPhaseSpace, 190
_set_path
 eb_tests::iaeа::IAEAPhaseSpace, 190
_source_id
 eb_tests::iaeа::IAEAPhaseSpace, 190
~BaseSpectrumScorer
 BaseSpectrumScorer, 117
~EB_Application
 EB_Application, 128
~EB_IAEASource
 EB_IAEASource, 147
~EB_Phantom
 EB_Phantom, 155
~EB_TimingTree
 EB_TimingTree, 166
~GeomInfo
 GeomInfo, 179
~Options
 ebvolcor::Options, 203
~Publisher
 Publisher, 210
~Subscriber
 Subscriber, 216
~VolumeCorrector
 ebvolcor::VolumeCorrector, 219
~gzstreambase
 gzstreambase, 185
~gzstreambuf
 gzstreambuf, 187
a0
 jquery.js, 229
ABOVE
 LICENSE.txt, 302
ACCESS
 PHSPControl, 207
ALL_TYPES
 PHSPControl, 207
APP_MAIN
 egs_brachy.cpp, 269
APPEND
 PHSPControl, 207
AVG_E
 eb_tests::spec_eflu::test, 88
above
 LICENSE.txt, 302
abs_root
 gen_geom, 104
 gen_media, 105
 gen_specs, 107
 gen_transport, 108
access
 eb_tests::iaeа::IAEAPhaseSpace, 190
accessors
 LICENSE.txt, 302
active_source
 EB_Application, 136
aD
 jquery.js, 231
ad
 jquery.js, 231
addNode
 Node, 200
addRecycledParticlesToStack
 EB_Application, 129
addScatter
 Latch, 195
addState
 BaseSpectrumScorer, 117
 EB_Application, 129
 EB_IAEASource, 147
 EB_Phantom, 155
 EnergyScoringStats, 171
addTimer
 EB_TimingTree, 166
addition
 LICENSE.txt, 303
aK
 jquery.js, 229
all_0.js
 searchData, 243
all_1.js
 searchData, 243
all_2.js
 searchData, 244
all_3.js
 searchData, 244
all_particles
 eb_tests::iaeа_types, 74
Also
 LICENSE.txt, 303
aM
 jquery.js, 231
and
 LICENSE.txt, 297, 303
any
 LICENSE.txt, 303
ap
 jquery.js, 231
app
 EB_Phantom, 161
apply
 LICENSE.txt, 303
applyVolumeCorrections
 ebvolcor::VolumeCorrector, 219
approx_equal
 eb_tests::volume_correction::test, 100
aQ
 jquery.js, 231
array_sizes.h

MXMED, 226
 MXSTACK, 226
 at jquery.js, 229
 au jquery.js, 231
 ausgab EB_Application, 129
 autovol_phantom_geom_types EB_Phantom, 161
 avgVoxelVol EB_Phantom, 155
 aZ jquery.js, 231
 b jquery.js, 229, 232
 BENCHMARK_DOSES eb_tests::variable_w_recycling::test, 99
 BIN_WIDTH eb_tests::spec_eflu::test, 88
 eb_tests::spec_vox::test, 90
 base_geom ebvolcor::VolumeCorrector, 220
 base_transform EB_Application, 136
 ebvolcor::VolumeCorrector, 220
 base_transform_inv EB_Application, 136
 ebvolcor::VolumeCorrector, 220
 BaseSpectrumScorer, 115
 ~BaseSpectrumScorer, 117
 addState, 117
 BaseSpectrumScorer, 117
 bin_width, 121
 bins, 121
 cur_history, 121
 DEFAULT_NBINS, 121
 e_max, 121
 e_min, 121
 eff_history, 121
 egsnrc_mode, 122
 fextension, 122
 format, 122
 getBin, 117
 getBinWidth, 118
 getFileExtension, 118
 getFileName, 118
 getInfo, 118
 getParticleEnergy, 118
 getParticleName, 118
 getResult, 118
 getSpectrumScorer, 118
 getSubTitle, 119
 getTitle, 119
 getXAxisLabel, 119
 getYAxisLabel, 119
 isValid, 119
 nbins, 122
 outputCSV, 119
 outputData, 119
 outputEGSnrc, 119
 outputResults, 120
 outputTotal, 120
 outputXMGR, 120
 particle_type, 122
 readData, 120
 resetCounter, 120
 score, 120
 setEffectiveHistories, 120
 source, 122
 total_scored, 122
 update, 120
 valid, 122
 bb jquery.js, 240
 bcse_factor EB_Application, 136
 bcse_med_num EB_Application, 137
 bh jquery.js, 229
 bin_width BaseSpectrumScorer, 121
 bins BaseSpectrumScorer, 121
 Boston LICENSE.txt, 304
 boundary_step PHSPControl, 208
 bounds ebvolcor::Options, 204
 bounds_volume ebvolcor::Options, 204
 ebvolcor::Results, 214
 bq jquery.js, 240
 bs jquery.js, 240
 buf gzstreambase, 186
 buffer gzstreambuf, 188
 bufferSize gzstreambuf, 188
 build_tree GeomInfo, 179
 c jquery.js, 240
 CDGeomRegType ginfo.cpp, 272
 CHARGE LICENSE.txt, 304
 CORRECT_VOLUME ebvolcor, 102
 CPU_MHZ run_tests, 111

calcEffectiveHistories
 EB_Application, 129

can_write_3ddose
 EB_Phantom, 161

canWrite3ddose
 EB_Phantom, 155

case
 LICENSE.txt, 304

checkFlag
 Latch, 195

children
 GeomRegionInfo, 184
 Node, 200

circumstance
 LICENSE.txt, 305

claims
 LICENSE.txt, 305

classes_0.js
 searchData, 245

cleanup
 run_tests, 111

clearAusgabCalls
 EB_Application, 129

close
 gzstreambase, 185
 gzstreambuf, 187

code
 LICENSE.txt, 306

combineResults
 EB_Application, 129

compare_3ddose_files
 eb_tests::utils, 96

compare_results
 eb_tests::brem_cyl::test, 70
 eb_tests::flu_cutoff::test, 72
 eb_tests::phsp_run::test, 77
 eb_tests::phsp_scoring::test, 78
 eb_tests::recycling::test, 79
 eb_tests::scatter::test, 80
 eb_tests::seeds_in_xyz::test, 81
 eb_tests::seeds_in_xyz_genvelope::test, 82
 eb_tests::simple_dose_sph::test, 83
 eb_tests::single_generator::test, 84
 eb_tests::source_energies::test, 85
 eb_tests::spec_absolute::test, 86
 eb_tests::spec_eflu::test, 88
 eb_tests::spec_vox::test, 90
 eb_tests::stepped_source::test, 92
 eb_tests::tg43mode::test, 93
 eb_tests::tg43mode_recycle::test, 94
 eb_tests::tg43mode_zeroweight::test, 95
 eb_tests::variable_activity::test, 98
 eb_tests::variable_w_recycling::test, 99
 eb_tests::volume_correction::test, 100

conditions
 LICENSE.txt, 306

containsInclude
 egs_brachy.cpp, 269

contrast
 LICENSE.txt, 306

convertTold
 search.js, 246

Coon
 LICENSE.txt, 307

copies
 LICENSE.txt, 307

copy
 LICENSE.txt, 307

copyParticleToSourceLoc
 EB_Application, 129

copying
 LICENSE.txt, 308

Copyright
 LICENSE.txt, 297

correctGeneralVolumes
 ebvolcor::VolumeCorrector, 219

correctPhantomVolumesForSources
 ebvolcor::VolumeCorrector, 220

correctVolumes
 EB_Application, 129

corrected_volumes
 EB_Phantom, 161

count
 EB_IAEASource, 148

countAutoEnvelopeInscribed
 ginfo.cpp, 272

countries
 LICENSE.txt, 309

cpu_speed_cmd
 run_tests, 111

create_egsinp
 run_tests, 111

createPhantoms
 EB_Application, 129

createResults
 search.js, 246

createTransforms
 EB_Application, 130

css
 jquery.js, 240

cur_history
 BaseSpectrumScorer, 121
 EB_Phantom, 161

cur_R
 EB_Application, 137

curCSS
 jquery.js, 241

DAMAGES
 LICENSE.txt, 309

DEFAULT_BCSE_FACTOR
 EB_Application, 137

DEFAULT_NBINS
 BaseSpectrumScorer, 121

DEFAULT RAND POINT DENSITY
 ebvolcor::Options, 204

DEFECTIVE

LICENSE.txt, 309
DOSRZ_NRC_DOSES
 eb_tests::brem_cyl::test, 70
density
 ebvolcor::Options, 204
 ebvolcor::Results, 214
describeSimulation
 EB_Application, 130
describeUserCode
 EB_Application, 130
destroySource
 PHSPControl, 207
dirExists
 phsp.cpp, 336
discardTopParticle
 EB_Application, 130
distribute
 LICENSE.txt, 310
distributed
 LICENSE.txt, 297
distributor
 LICENSE.txt, 310
do_bcse
 EB_Application, 137
do_brem_split
 EB_Application, 137
doPhotonSplitting
 EB_Application, 130
doc_utils, 69
 find_file_descriptions, 69
doc_utils.py, 223
document
 LICENSE.txt, 310
dose_scale
 EB_Phantom, 161
doses_approx_equal
 eb_tests::utils, 96
dyn_import
 run_tests, 111
dynsections.js
 toggleFolder, 227
 toggleInherit, 227
 toggleLevel, 227
 toggleVisibility, 227
 updateStripes, 227

e_max
 BaseSpectrumScorer, 121
e_min
 BaseSpectrumScorer, 121
EB_Application, 123
 ~EB_Application, 128
 active_source, 136
 addRecycledParticlesToStack, 129
 addState, 129
 ausgab, 129
 base_transform, 136
 base_transform_inv, 136
 bcse_factor, 136

bcse_med_num, 137
calcEffectiveHistories, 129
clearAusgabCalls, 129
combineResults, 129
copyParticleToSourceLoc, 129
correctVolumes, 129
createPhantoms, 129
createTransforms, 130
cur_R, 137
DEFAULT_BCSE_FACTOR, 137
describeSimulation, 130
describeUserCode, 130
discardTopParticle, 130
do_bcse, 137
do_brem_split, 137
doPhotonSplitting, 130
EB_Application, 128
effective_histories, 137
egsAdvApplicationOutputData, 130
egsAdvApplicationReadData, 130
egsApplicationOutputData, 130
egsApplicationReadData, 131
egsBrachyOutputData, 131
egsBrachyReadData, 131
enableAusgabCalls, 131
enterNewRegion, 131
escoring, 137
extra_scoring_doses, 137
extra_scoring_doses_edep, 137
extra_scoring_mass, 137
extra_scoring_reg, 138
extra_scoring_vols, 138
file_vc_results, 138
flu_cutoff, 138
gcr_phantom, 138
gcr_phantom_reg, 138
gen_vc_results, 138
getCurrentResult, 131
getOutputVolcorFormat, 131
getPhantomByName, 131
ginfo, 138
global_e_max_rr, 139
global_ecut, 139
global_i_do_rr, 139
global_pcut, 139
gz_data_in, 139
gz_data_out, 139
initAusgabCalls, 132
initBCSE, 132
initCrossSections, 132
initDoseScaling, 132
initEDepScoring, 132
initGCRScoring, 132
initGeometry, 132
initMuenData, 133
initOutputFiles, 133
initPHSPScoring, 133
initRunControl, 133

initRunMode, 133
initRussianRoulette, 133
initScatScoring, 133
initScoring, 134
initSimulation, 134
initSource, 134
initSourceTransforms, 134
initSpectrumScoring, 134
initTrackLengthScoring, 134
initVarianceReduction, 134
initXCCScaling, 134
is_phsp_source, 139
isStuck, 135
last_position, 139
last_R, 140
latch_control, 140
media_muen, 140
media_muen_names, 140
n_stuck, 140
nbr_split, 140
nsources, 140
output_3ddose_files, 140
output_dose_format, 140
output_egsdat_format, 141
output_egsphant, 141
output_egsphant_format, 141
output_volcor_format, 141
output_volcor_phantoms, 141
output_voxinfo, 141
output_voxinfo_format, 141
outputData, 135
outputDataHelper, 135
outputResults, 135
p_init_locs, 141
pevent_pub, 142
phantom_geoms, 142
phsp, 142
printIncludedFiles, 135
RM_NORMAL, 128
RM_SUPERPOSITION, 128
RM_VC_ONLY, 128
readData, 135
readDataHelper, 135
record_n_init, 142
recycle_opts, 142
resetCounter, 135
revision, 142
run_mode, 142
run_mode_name, 142
RunMode, 128
runSimulation, 136
score_edep, 143
score_scat, 143
score_tlen, 143
simulateSingleShower, 136
single_generator, 143
source_e_max_rr, 143
source_ecut, 143
source_envelope_geom, 143
source_i_do_rr, 143
source_pcut, 144
source_transforms, 144
source_vc_results, 144
source_weights, 144
spectrum_scopers, 144
startNewParticle, 136
startNewShower, 136
steps_at_same_loc, 144
steps_in_other, 144
steps_in_phantoms, 144
steps_in_sources, 144
superpos_geom, 145
timing_blocks, 145
EB_EPSILON
 egs_brachy.h, 271
EB_IAEA_SOURCE_EXPORT
 eb_ieaphsp_source.h, 250
EB_IAEA_SOURCE_LOCAL
 eb_ieaphsp_source.h, 250
EB_IAEASource, 145
 ~EB_IAEASource, 147
 addState, 147
 count, 148
 EB_IAEASource, 147
 Emax, 148
 Emin, 149
 getEmax, 147
 getFluence, 147
 getNextParticle, 147
 i_parallel, 149
 iaea_header_ext, 149
 initSourceParams, 148
 is_valid, 149
 isValid, 148
 n_parallel, 149
 next_source_id, 149
 Nfirst, 149
 Nincident, 149
 Nlast, 149
 Nparticle, 150
 Nphoton, 150
 Npos, 150
 Nread, 150
 Nused, 150
 openPHSPFile, 148
 p_source_id, 150
 phsp_file, 150
 phsp_file_name, 150
 resetCounter, 148
 setSimulationChunk, 148
 setState, 148
 source_id, 151
 storeState, 148
EB_Message
 pubsub.h, 338
EB_Phantom, 151

~EB_Phantom, 155
 addState, 155
 app, 161
 autovol_phantom_geom_types, 161
 avgVoxelVol, 155
 can_write_3ddose, 161
 canWrite3ddose, 155
 corrected_volumes, 161
 cur_history, 161
 dose_scale, 161
 EB_Phantom, 155
 edep_score, 161
 effective_histories, 161
 enableInteractionScoring, 155
 enableScatterScoring, 155
 enableTLenScoring, 155
 GeomDirections, 154
 geometry, 161
 getCorrectedVolume, 156
 getCurrentScore, 156
 getEGSdatScoringArrays, 156
 getRealMass, 156
 getRealRho, 156
 getRegionResults, 156
 getRegionsWithCorrections, 156
 getResult, 157
 getScoringArrays, 157
 getTlenNorm, 157
 getUncorrectedMass, 157
 getUncorrectedVolume, 157
 global_reg_start, 162
 global_reg_stop, 162
 global_regions, 162
 globalRegIsInPhant, 157
 globalToLocal, 157
 mscat_score, 162
 needs_user_geoms, 162
 needsUserVolumes, 157
 nsources, 162
 output3DBounds, 158
 output3DDoses, 158
 output3ddoseResults, 158
 outputData, 158
 outputDoseStats, 158
 outputEGSPhant, 158
 outputResults, 158
 outputTopDoses, 158
 outputVolumeCorrection, 159
 outputVoxellInfo, 159
 prim_score, 162
 publisher, 162
 readData, 159
 resetCounter, 159
 scoreEdep, 159
 scoreTlen, 159
 setCorrectedVolume, 159
 setDoseScale, 159
 setEffectiveHistories, 160
 setHistory, 160
 sscat_score, 163
 threeddose_geom_types, 163
 tlen_score, 163
 total_radiant_e, 163
 update, 160
 writeEGSPhant, 160
 writeVolumeCorrection, 160
 writeVoxellInfo, 160
 XDIR, 154
 YDIR, 154
 ZDIR, 154
EB_Timer, 163
 EB_Timer, 164
 getDuration, 164
 getElapsedTime, 164
 getLevel, 164
 getName, 164
 getStartTime, 164
 getStop, 164
 isRunning, 164
 isStopped, 165
 name, 165
 nested_level, 165
 start, 165
 start_time, 165
 stop, 165
 stop_time, 165
 timer, 165
EB_TimingTree, 166
 ~EB_TimingTree, 166
 addTimer, 166
 EB_TimingTree, 166
 level, 167
 outputInfo, 166
 running_blocks, 167
 stopTimer, 166
 stopped_blocks, 167
EGS_BRACHY
 run_tests, 111
EGS_HOME
 run_tests, 112
EGSINP
 eb_tests::brem_cyl::test, 70
 eb_tests::flu_cutoff::test, 72
 eb_tests::phsp_run::test, 77
 eb_tests::phsp_scoring::test, 78
 eb_tests::recycling::test, 79
 eb_tests::scatter::test, 80
 eb_tests::seeds_in_xyz::test, 81
 eb_tests::seeds_in_xyz_genvelope::test, 82
 eb_tests::simple_dose_sph::test, 83
 eb_tests::single_generator::test, 84
 eb_tests::source_energies::test, 85
 eb_tests::spec_absolute::test, 86
 eb_tests::spec_eflu::test, 88
 eb_tests::spec_vox::test, 90
 eb_tests::stepped_source::test, 92

eb_tests::tg43mode::test, 93
eb_tests::tg43mode_recycle::test, 94
eb_tests::tg43mode_zeroweight::test, 95
eb_tests::variable_activity::test, 98
eb_tests::variable_w_recycling::test, 99
eb_tests::volume_correction::test, 100

ELECTRON
PHSPControl, 207

EMAX
eb_tests::spec_absolute::test, 86
eb_tests::spec_eflu::test, 88
eb_tests::spec_vox::test, 90

EMIN
eb_tests::spec_absolute::test, 87
eb_tests::spec_eflu::test, 88
eb_tests::spec_vox::test, 90

ESCAPED_SOURCE
Latch, 194

EXPECTED
eb_tests::phsp_scoring::test, 78

each
jquery.js, 229, 230

eb_iaeaphsp_source.h
EB_IAEA_SOURCE_EXPORT, 250
EB_IAEA_SOURCE_LOCAL, 250

eb_tests, 69

eb_tests.brem_cyl, 70
eb_tests.brem_cyl.test, 70

eb_tests.flu_cutoff, 71
eb_tests.flu_cutoff.test, 71

eb_tests.iaeа, 72
eb_tests.iaeа.IAEAPhaseSpace, 189

eb_tests.iaeа_errors, 73
eb_tests.iaeа_errors.IAEAPhaseSpaceError, 191
eb_tests.iaeа_errors.IAEAPhaseSpaceSetupError, 192

eb_tests.iaeа_types, 74

eb_tests.phsp_run, 76
eb_tests.phsp_run.test, 76

eb_tests.phsp_scoring, 77
eb_tests.phsp_scoring.test, 77

eb_tests.recycling, 79
eb_tests.recycling.test, 79

eb_tests.scatter, 79
eb_tests.scatter.test, 80

eb_tests.seeds_in_xyz, 81
eb_tests.seeds_in_xyz.test, 81

eb_tests.seeds_in_xyz_genvelope, 81
eb_tests.seeds_in_xyz_genvelope.test, 82

eb_tests.simple_dose_sph, 82
eb_tests.simple_dose_sph.test, 82

eb_tests.single_generator, 84
eb_tests.single_generator.test, 84

eb_tests.source_energies, 84
eb_tests.source_energies.test, 85

eb_tests.spec_absolute, 86
eb_tests.spec_absolute.test, 86

eb_tests.spec_eflu, 87
eb_tests.spec_eflu.test, 87

eb_tests.spec_vox, 89
eb_tests.spec_vox.test, 89

eb_tests.stepped_source, 91
eb_tests.stepped_source.test, 91

eb_tests.tg43mode, 92
eb_tests.tg43mode.test, 92

eb_tests.tg43mode_recycle, 93
eb_tests.tg43mode_recycle.test, 94

eb_tests.tg43mode_zeroweight, 95
eb_tests.tg43mode_zeroweight.test, 95

eb_tests.utils, 96

eb_tests.variable_activity, 97
eb_tests.variable_activity.test, 97

eb_tests.variable_w_recycling, 98
eb_tests.variable_w_recycling.test, 98

eb_tests.volume_correction, 99
eb_tests.volume_correction.test, 99

eb_tests::brem_cyl::test
compare_results, 70
DOSRZ_NRC_DOSES, 70
EGSINP, 70
expected_doses, 71
TIME_LIMIT_S_PER_MHZ, 71

eb_tests::flu_cutoff::test
compare_results, 72
EGSINP, 72
TIME_LIMIT_S_PER_MHZ, 72

eb_tests::iaeа
HEN_HOUSE, 72
IAEA_DLL, 72
iaeadll, 73

eb_tests::iaeа::IAEAPhaseSpace
__init__, 189
_create_source, 190
_set_path, 190
_source_id, 190
access, 190
header_ext, 191
maximum_energy, 190
num_orig_particles, 190
num_particles, 190
path, 191
phsp_ext, 191
source_id, 190

eb_tests::iaeа_errors
error_messages, 73
new_source_errors, 73

eb_tests::iaeа_errors::IAEAPhaseSpaceError
__init__, 191
message, 192

eb_tests::iaeа_types
all_particles, 74
electrons, 74
IAEA_Float, 74
IAEA_I16, 74
IAEA_I32, 75
IAEA_I64, 75
iaeа_file_modes, 74

max_sources, 75
 neutrons, 75
 PIAEA_Float, 75
 PIAEA_I16, 75
 PIAEA_I32, 76
 PIAEA_I64, 76
 particle_types, 75
 photons, 75
 positrons, 76
 protons, 76
 eb_tests::phsp_run::test
 compare_results, 77
 EGSINP, 77
 TIME_LIMIT_S_PER_MHZ, 77
 eb_tests::phsp_scoring::test
 compare_results, 78
 EGSINP, 78
 EXPECTED, 78
 MAX_E, 78
 NHIST, 78
 RM, 78
 SOURCE_WEIGHTS, 78
 TIME_LIMIT_S_PER_MHZ, 78
 eb_tests::recycling::test
 compare_results, 79
 EGSINP, 79
 TIME_LIMIT_S_PER_MHZ, 79
 eb_tests::scatter::test
 compare_results, 80
 EGSINP, 80
 get_n_highest_doses, 80
 NCOMPARE, 80
 TIME_LIMIT_S_PER_MHZ, 80
 eb_tests::seeds_in_xyz::test
 compare_results, 81
 EGSINP, 81
 TIME_LIMIT_S_PER_MHZ, 81
 eb_tests::seeds_in_xyz_genvelope::test
 compare_results, 82
 EGSINP, 82
 TIME_LIMIT_S_PER_MHZ, 82
 eb_tests::simple_dose_sph::test
 compare_results, 83
 EGSINP, 83
 expected_doses, 83
 TIME_LIMIT_S_PER_MHZ, 83
 eb_tests::single_generator::test
 compare_results, 84
 EGSINP, 84
 TIME_LIMIT_S_PER_MHZ, 84
 eb_tests::source_energies::test
 compare_results, 85
 EGSINP, 85
 expected_results, 85
 TIME_LIMIT_S_PER_MHZ, 85
 eb_tests::spec_absolute::test
 compare_results, 86
 EGSINP, 86
 EMAX, 86
 EMIN, 87
 expected, 86
 TIME_LIMIT_S_PER_MHZ, 87
 eb_tests::spec_eflu::test
 AVG_E, 88
 BIN_WIDTH, 88
 compare_results, 88
 EGSINP, 88
 EMAX, 88
 EMIN, 88
 expected, 88
 N_BINS_IN_RANGE, 88
 NHIST, 88
 SCORED_IN_BIN_PER_MEV, 89
 SCORED_IN_BIN, 88
 TIME_LIMIT_S_PER_MHZ, 89
 TOTAL_E, 89
 eb_tests::spec_vox::test
 BIN_WIDTH, 90
 compare_results, 90
 EGSINP, 90
 EMAX, 90
 EMIN, 90
 expected, 90
 N_BINS_IN_RANGE, 90
 R1, 90
 R2, 90
 SCORED_IN_BIN, 91
 TIME_LIMIT_S_PER_MHZ, 91
 TRACK_LENGTH, 91
 VOLUME, 91
 eb_tests::stepped_source::test
 compare_results, 92
 EGSINP, 92
 get_n_highest_dose_pairs, 92
 NCOMPARE, 92
 TIME_LIMIT_S_PER_MHZ, 92
 eb_tests::tg43mode::test
 compare_results, 93
 EGSINP, 93
 get_n_highest_dose_pairs, 93
 NCOMPARE, 93
 TIME_LIMIT_S_PER_MHZ, 93
 eb_tests::tg43mode_recycle::test
 compare_results, 94
 EGSINP, 94
 get_n_highest_dose_pairs, 94
 NCOMPARE, 94
 TIME_LIMIT_S_PER_MHZ, 94
 eb_tests::tg43mode_zeroweight::test
 compare_results, 95
 EGSINP, 95
 get_n_highest_dose_pairs, 95
 NCOMPARE, 95
 TIME_LIMIT_S_PER_MHZ, 96
 eb_tests::utils
 compare_3ddose_files, 96

doses_approx_equal, 96
 extract_all_doses, 96
 REG_DOSE_UNC_RE, 97
 read3ddose, 96
 read_csv_spectrum, 97
 values_close, 97
 values_close_abs, 97
eb_tests::variable_activity::test
 compare_results, 98
 EGSINP, 98
 TIME_LIMIT_S_PER_MHZ, 98
eb_tests::variable_w_recycling::test
 BENCHMARK_DOSES, 99
 compare_results, 99
 EGSINP, 99
 TIME_LIMIT_S_PER_MHZ, 99
eb_tests::volume_correction::test
 approx_equal, 100
 compare_results, 100
 EGSINP, 100
 expected_volumes, 100
 read_vols, 100
 TIME_LIMIT_S_PER_MHZ, 100
ebvolcor, 101
 CORRECT_VOLUME, 102
 getShapeVolume, 102
 HitCounterT, 101
 isGZip, 102
 loadVolumes, 102
 NO_CORRECTION, 102
 PhantRegT, 101
 readVolumes, 102
 RegVolume, 101
 VolCorMode, 102
 ZERO_DOSE, 102
ebvolcor::FileResults, 176
 FileResults, 177
 nreg, 177
 outputResults, 177
 phantom_files, 177
 success, 177
 time, 177
ebvolcor::Options, 201
 ~Options, 203
 bounds, 204
 bounds_volume, 204
 DEFAULT RAND POINT DENSITY, 204
 density, 204
 getRandomPoint, 203
 input, 204
 mode, 205
 npoints, 205
 Options, 203
 rng, 205
 setBoundsShape, 203
 setDensity, 204
 setMode, 204
 setRNG, 204
 sobelAllowed, 205
 valid, 205
ebvolcor::Results, 213
 bounds_volume, 214
 density, 214
 npoints, 214
 other_volume, 215
 outputResults, 214
 regions_corrected, 215
 Results, 214
 success, 215
 time, 215
ebvolcor::VolumeCorrector, 218
 ~VolumeCorrector, 219
 applyVolumeCorrections, 219
 base_geom, 220
 base_transform, 220
 base_transform_inv, 220
 correctGeneralVolumes, 219
 correctPhantomVolumesForSources, 220
 gen_opts, 220
 ginfo, 221
 input, 221
 loadFileVolumeCorrections, 220
 phantom_files, 221
 phantoms, 221
 runFileCorrection, 220
 runGeneralCorrection, 220
 runSourceCorrection, 220
 setupOptions, 220
 source_opts, 221
 transforms, 221
 VolumeCorrector, 219
edep
 RegionResult, 213
edep_err
 RegionResult, 213
edep_score
 EB_Phantom, 161
edepRegTopResultCompare
 phantom.cpp, 335
eff_history
 BaseSpectrumScorer, 121
effective_histories
 EB_Application, 137
 EB_Phantom, 161
egs_brachy.cpp
 APP_MAIN, 269
 containsInclude, 269
 egsGetElectronData, 268, 269
 egsGetPhotonData, 268, 269
 egsGetRNGArray, 268, 269
 egsGetRNGPointers, 268, 269
 egsGetSteps, 268, 269
 egsOpenUnits, 269
 egsSetRNGState, 269
 egsSetSteps, 269
 F77_OBJ_, 269

```

getMuenForMedia, 269
printParticleWithSpherical, 269
egs_brachy.dox, 223
egs_brachy.h
    EB_EPSILON, 271
    NUM_STUCK_STEPS, 271
    PRINT_PARTICLE_WITH_DIR, 271
    PRINT_PARTICLE, 271
    SAME_POSITION_TOLERANCE, 271
egs_brachy.md, 223
egsAdvApplicationOutputData
    EB_Application, 130
egsAdvApplicationReadData
    EB_Application, 130
egsApplicationOutputData
    EB_Application, 130
egsApplicationReadData
    EB_Application, 131
egsBrachyOutputData
    EB_Application, 131
egsBrachyReadData
    EB_Application, 131
egsGetElectronData
    egs_brachy.cpp, 268, 269
egsGetPhotonData
    egs_brachy.cpp, 268, 269
egsGetRNGArray
    egs_brachy.cpp, 268, 269
egsGetRNGPointers
    egs_brachy.cpp, 268, 269
egsGetSteps
    egs_brachy.cpp, 268, 269
egsOpenUnits
    egs_brachy.cpp, 269
egsSetRNGState
    egs_brachy.cpp, 269
egsSetSteps
    egs_brachy.cpp, 269
egsnrc_mode
    BaseSpectrumScorer, 122
electrons
    eb_tests::iaea_types, 74
else
    jquery.js, 241
Emax
    EB_IAEASource, 148
Emin
    EB_IAEASource, 149
employer
    LICENSE.txt, 297
enableAusgabCalls
    EB_Application, 131
enableInteractionScoring
    EB_Phantom, 155
enableScatterScoring
    EB_Phantom, 155
enableTLenScoring
    EB_Phantom, 155
end
    GeomRegionInfo, 184
energyEscapingGeom
    EnergyScoringStats, 173
energyEscapingSources
    EnergyScoringStats, 173
energyEscapingGeom
    EnergyScoringStats, 171
energyEscapingSources
    EnergyScoringStats, 171
EnergyFluenceSpectrumInVoxel, 167
    EnergyFluenceSpectrumInVoxel, 168
geometry, 169
getFileExtension, 168
getResult, 168
getTitle, 169
getYAxisLabel, 169
local_scoring_region, 169
outputTotal, 169
region_volume, 169
score, 169
scoring_region, 170
EnergyScoringStats, 170
    addState, 171
    energyEscapingGeom, 173
    energyEscapingSources, 173
    energyEscapingGeom, 171
    energyEscapingSources, 171
    EnergyScoringStats, 171
    escapingGeomRatio, 172
    escapingSourcesRatio, 172
    getParticleEnergy, 172
    outputData, 172
    outputResults, 172
    readData, 172
    resetCounter, 172
    scoreEnergyInitialized, 172
    scoreParticleEscapingGeom, 173
    scoreParticleEscapingSource, 173
    scoreParticleInitialized, 173
    total_energy_initialized, 174
    totalEnergyInitialized, 173
    update, 173
EnergyWeightedSurfaceSpectrum, 174
    EnergyWeightedSurfaceSpectrum, 175
    getFileExtension, 175
    getResult, 175
    getSubTitle, 175
    getTitle, 175
    getYAxisLabel, 176
    outputTotal, 176
    score, 176
enterNewRegion
    EB_Application, 131
error_messages
    eb_tests::iaea_errors, 73
escapingGeomRatio
    EnergyScoringStats, 172

```

escapingSourcesRatio
 EnergyScoringStats, 172

escoring
 EB_Application, 137

example
 LICENSE.txt, 311

exception
 LICENSE.txt, 311

executable
 LICENSE.txt, 311

expected
 eb_tests::spec_absolute::test, 86
 eb_tests::spec_eflu::test, 88
 eb_tests::spec_vox::test, 90

expected_doses
 eb_tests::brem_cyl::test, 71
 eb_tests::simple_dose_sph::test, 83

expected_results
 eb_tests::source_energies::test, 85

expected_volumes
 eb_tests::volume_correction::test, 100

extend
 jquery.js, 230

extra_scoring_doses
 EB_Application, 137

extra_scoring_doses_edep
 EB_Application, 137

extra_scoring_mass
 EB_Application, 137

extra_scoring_reg
 EB_Application, 138

extra_scoring_vols
 EB_Application, 138

extract_all_doses
 eb_tests::utils, 96

F77_OBJ_
 egs_brachy.cpp, 269

FAIL_FMT
 run_tests, 112

fee
 LICENSE.txt, 312

fextension
 BaseSpectrumScorer, 122

file
 gzstreambuf, 188

file_vc_results
 EB_Application, 138

FileResults
 ebvolcor::FileResults, 177

files_0.js
 searchData, 245

Finally
 LICENSE.txt, 312

find_cpu_time
 run_tests, 111

find_file_descriptions
 doc_utils, 69

find_tests
 run_tests, 111

findGeomInVec
 ginfo.cpp, 272

finish
 PHSPControl, 207

Flag
 Latch, 194

flu_cutoff
 EB_Application, 138

flush_buffer
 gzstreambuf, 187

fname
 PHSPControl, 208

format
 BaseSpectrumScorer, 122

Foundation
 LICENSE.txt, 312

Frob
 LICENSE.txt, 297

functions
 LICENSE.txt, 297

functions_0.js
 searchData, 246

GENERAL
 LICENSE.txt, 312

gcr_phantom
 EB_Application, 138

gcr_phantom_reg
 EB_Application, 138

gen_docs, 103
 gen_docs, 103
 gen_geom, 104
 gen_media, 105
 gen_specs, 106
 gen_tests, 107
 gen_transport, 108
 modules, 103

gen_docs.py, 223

gen_geom, 103
 abs_root, 104
 gen_docs, 104
 gen_geom_docs, 104
 geom, 104
 get_filetype_links, 104
 get_images, 104
 get_readme, 104
 outfile, 104
 root, 105

gen_geom.py, 224

gen_geom_docs
 gen_geom, 104

gen_media, 105
 abs_root, 105
 gen_docs, 105
 get_muen, 105
 get_pegsless_materials, 105
 media_file, 105
 muen_dir, 106

outfile, 106
 root, 106
 gen_media.py, 224
 gen_opts
 ebvolcor::VolumeCorrector, 220
 gen_specs, 106
 abs_root, 107
 gen_docs, 106
 get_spectra, 106
 outfile, 107
 root, 107
 specs, 107
 gen_specs.py, 224
 gen_tests, 107
 gen_docs, 107
 get_tests, 107
 globber, 108
 outfile, 108
 root_tests, 108
 gen_tests.py, 225
 gen_transport, 108
 abs_root, 108
 gen_docs, 108
 outfile, 108
 root, 108
 transport, 109
 gen_transport.py, 225
 gen_vc_results
 EB_Application, 138
 geom
 gen_geom, 104
 geom.md, 226
 geom_to_regioninfo
 GeomInfo, 181
 geom_tree
 GeomInfo, 181
 GeomDirections
 EB_Phantom, 154
 GeomInfo, 178
 ~GeomInfo, 179
 build_tree, 179
 geom_to_regioninfo, 181
 geom_tree, 181
 GeomInfo, 179
 getChildren, 179
 getGeomRegs, 179
 global_ir_to_geom, 181
 global_ir_to_local_ir, 181
 global_ir_to_phant, 181
 global_ir_to_source, 181
 globalToLocal, 179
 globalToLocalReg, 180
 gmap, 182
 initializeFromInput, 180
 isPhantom, 180
 isSource, 180
 localToGlobal, 180
 ngeom, 182
 nreg_total, 182
 ordered_geom_data, 182
 phantom_geoms, 182
 phantom_names, 182
 phantomFromRegion, 180
 printInfo, 180
 setGeomMap, 181
 setGeometryIndexes, 180
 sim_geom_name, 182
 source_envelope_name, 183
 source_names, 183
 GeomRegionInfo, 183
 children, 184
 end, 184
 name, 184
 nreg, 184
 start, 184
 type, 184
 GeomRegionInfoMapT
 ginfo.h, 274
 GeomRegT
 ginfo.h, 274
 geometry
 EB_Phantom, 161
 EnergyFluenceSpectrumInVoxel, 169
 get_filetype_links
 gen_geom, 104
 get_images
 gen_geom, 104
 get_muen
 gen_media, 105
 get_n_highest_dose_pairs
 eb_tests::stepped_source::test, 92
 eb_tests::tg43mode::test, 93
 eb_tests::tg43mode_recycle::test, 94
 eb_tests::tg43mode_zeroweight::test, 95
 get_n_highest_doses
 eb_tests::scatter::test, 80
 get_pegless_materials
 gen_media, 105
 get_readme
 gen_geom, 104
 get_spectra
 gen_specs, 106
 get_tests
 gen_tests, 107
 getAutoEnvelopeChildren
 ginfo.cpp, 272
 getBin
 BaseSpectrumScorer, 117
 getBinWidth
 BaseSpectrumScorer, 118
 getCDChildren
 ginfo.cpp, 272
 getChildren
 GeomInfo, 179
 getCorrectedVolume
 EB_Phantom, 156

getCurrentResult
 EB_Application, 131
getCurrentScore
 EB_Phantom, 156
getDuration
 EB_Timer, 164
getEGSdatScoringArrays
 EB_Phantom, 156
getElapsedTime
 EB_Timer, 164
getEmax
 EB_IAEASource, 147
getFileExtension
 BaseSpectrumScorer, 118
 EnergyFluenceSpectrumInVoxel, 168
 EnergyWeightedSurfaceSpectrum, 175
 SurfaceCountSpectrum, 217
getFileName
 BaseSpectrumScorer, 118
getFileNameFromPath
 spec_scoring.cpp, 340
getFluence
 EB_IAEASource, 147
getGEvelopeChildren
 ginfo.cpp, 273
getGStackChildren
 ginfo.cpp, 273
getGeomBaseName
 ginfo.cpp, 273
getGeomRegs
 GeomInfo, 179
getIAEAParticleType
 PHSPControl, 207
 getInfo
 BaseSpectrumScorer, 118
getLevel
 EB_Timer, 164
getMuenForMedia
 egs_brachy.cpp, 269
getMuenInterpolator
 muen::MuenDataParser, 198
getNDChildren
 ginfo.cpp, 273
getName
 EB_Timer, 164
getNextParticle
 EB_IAEASource, 147
getNotifyEnabled
 Publisher, 210
getOutputVolcorFormat
 EB_Application, 131
getParticleEnergy
 BaseSpectrumScorer, 118
 EnergyScoringStats, 172
getParticleName
 BaseSpectrumScorer, 118
getPhantomByName
 EB_Application, 131
getRandomPoint
 ebvolcor::Options, 203
getRealMass
 EB_Phantom, 156
getRealRho
 EB_Phantom, 156
getRegionResults
 EB_Phantom, 156
getRegionsWithCorrections
 EB_Phantom, 156
getResult
 BaseSpectrumScorer, 118
 EB_Phantom, 157
 EnergyFluenceSpectrumInVoxel, 168
 EnergyWeightedSurfaceSpectrum, 175
 SurfaceCountSpectrum, 217
getScoringArrays
 EB_Phantom, 157
getShapeVolume
 ebvolcor, 102
getSpectrumScorer
 BaseSpectrumScorer, 118
getStartTime
 EB_Timer, 164
getStop
 EB_Timer, 164
getSubTitle
 BaseSpectrumScorer, 119
 EnergyWeightedSurfaceSpectrum, 175
 SurfaceCountSpectrum, 217
getTitle
 BaseSpectrumScorer, 119
 EnergyFluenceSpectrumInVoxel, 169
 EnergyWeightedSurfaceSpectrum, 175
 SurfaceCountSpectrum, 217
getTlenNorm
 EB_Phantom, 157
getUncorrectedMass
 EB_Phantom, 157
getUncorrectedVolume
 EB_Phantom, 157
getUnionChildren
 ginfo.cpp, 273
getXAxisLabel
 BaseSpectrumScorer, 119
getXPos
 search.js, 246
getYAxisLabel
 BaseSpectrumScorer, 119
 EnergyFluenceSpectrumInVoxel, 169
 EnergyWeightedSurfaceSpectrum, 176
 SurfaceCountSpectrum, 218
getYPos
 search.js, 246
ginfo
 EB_Application, 138
 ebvolcor::VolumeCorrector, 221
 ginfo.cpp

CDGeomRegType, 272
 countAutoEnvelopeInscribed, 272
 findGeomInVec, 272
 getAutoEnvelopeChildren, 272
 getCDChildren, 272
 getGEnvelopeChildren, 273
 getGStackChildren, 273
 getGeomBaseName, 273
 getNDChildren, 273
 getUnionChildren, 273
 join, 273
 maxNRegOfGeoms, 273
 nregForSubDiv, 273
 pairCompare, 273
ginfo.h
 GeomRegionInfoMapT, 274
 GeomRegT, 274
global_e_max_rr
 EB_Application, 139
global_ecut
 EB_Application, 139
global_i_do_rr
 EB_Application, 139
global_ir_to_geom
 GeomInfo, 181
global_ir_to_local_ir
 GeomInfo, 181
global_ir_to_phant
 GeomInfo, 181
global_ir_to_source
 GeomInfo, 181
global_pcut
 EB_Application, 139
global_reg_start
 EB_Phantom, 162
global_reg_stop
 EB_Phantom, 162
global_regions
 EB_Phantom, 162
globalRegIsInPhant
 EB_Phantom, 157
globalToLocal
 EB_Phantom, 157
 GeomInfo, 179
globalToLocalReg
 GeomInfo, 180
globber
 gen_tests, 108
gmap
 GeomInfo, 182
gz_data_in
 EB_Application, 139
gz_data_out
 EB_Application, 139
gzstreambase, 185
 ~gzstreambase, 185
 buf, 186
 close, 185
 gzstreambase, 185
 open, 185
 rdbuf, 186
gzstreambuf, 186
 ~gzstreambuf, 187
 buffer, 188
 bufferSize, 188
 close, 187
 file, 188
 flush_buffer, 187
 gzstreambuf, 187
 is_open, 187
 mode, 188
 open, 187
 opened, 188
 overflow, 187
 sync, 188
 underflow, 188
HEN_HOUSE
 eb_tests::iae, 72
HOLDER
 LICENSE.txt, 312
hasEscaped
 Latch, 195
header_ext
 eb_tests::iae::IAEAPhaseSpace, 191
HitCounterT
 ebvolcor, 101
However
 LICENSE.txt, 313
i_parallel
 EB_IAEASource, 149
IAEA_DLL
 eb_tests::iae, 72
IAEA_Float
 eb_tests::iae_types, 74
IAEA_I16
 eb_tests::iae_types, 74
IAEA_I32
 eb_tests::iae_types, 75
IAEA_I64
 eb_tests::iae_types, 75
IMPLIED
 LICENSE.txt, 314
IN_SOURCE
 Latch, 194
INCLUDING
 LICENSE.txt, 314
iae_file_modes
 eb_tests::iae_types, 74
iae_header_ext
 EB_IAEASource, 149
iaeadll
 eb_tests::iae, 73
id
 PHSPControl, 208
If

LICENSE.txt, 313
if
 jquery.js, 230
igzstream, 192
 igzstream, 193
 open, 193
 rdbuf, 193
Inc
 LICENSE.txt, 314
indexSectionNames
 search.js, 247
indexSectionsWithContent
 search.js, 247
initAusgabCalls
 EB_Application, 132
initBCSE
 EB_Application, 132
initCrossSections
 EB_Application, 132
initDoseScaling
 EB_Application, 132
initEDepScoring
 EB_Application, 132
initGCRScoring
 EB_Application, 132
initGeometry
 EB_Application, 132
initMuenData
 EB_Application, 133
initOutputFiles
 EB_Application, 133
initPHSPScoring
 EB_Application, 133
initRunControl
 EB_Application, 133
initRunMode
 EB_Application, 133
initRussianRoulette
 EB_Application, 133
initScatScoring
 EB_Application, 133
initScoring
 EB_Application, 134
initSimulation
 EB_Application, 134
initSource
 EB_Application, 134
 PHSPControl, 208
initSourceParams
 EB_IAEASource, 148
initSourceTransforms
 EB_Application, 134
initSpectrumScoring
 EB_Application, 134
initTrackLengthScoring
 EB_Application, 134
initVarianceReduction
 EB_Application, 134

initXCCScaling
 EB_Application, 134
initializeFromInput
 GeomInfo, 180
input
 ebvolcor::Options, 204
 ebvolcor::VolumeCorrector, 221
interfaces
 LICENSE.txt, 314
invoked
 LICENSE.txt, 315
is_open
 gzstreambuf, 187
is_phsp_source
 EB_Application, 139
is_valid
 EB_IAEASource, 149
isGZip
 ebvolcor, 102
isMultScat
 Latch, 195
isPhantom
 GeomInfo, 180
isPrimary
 Latch, 195
isRunning
 EB_Timer, 164
isSingleScat
 Latch, 196
isSource
 GeomInfo, 180
isStopped
 EB_Timer, 165
isStuck
 EB_Application, 135
isValid
 BaseSpectrumScorer, 119
 EB_IAEASource, 148
isolation
 LICENSE.txt, 315
it
 LICENSE.txt, 315

jQuery
 jquery.js, 241
join
 ginfo.cpp, 273
jquery.js
 a0, 229
 aD, 231
 ad, 231
 aK, 229
 aM, 231
 ap, 231
 aQ, 231
 at, 229
 au, 231
 aZ, 231
 b, 229, 232

bb, 240
bh, 229
bq, 240
bs, 240
c, 240
css, 240
curCSS, 241
each, 229, 230
else, 241
extend, 230
if, 230
jQuery, 241
k, 241
L, 241
p, 231
prototype, 241
V, 242
window, 242
x, 231
Z, 242

k
 jquery.js, 241

KIND
 LICENSE.txt, 315

kernel
 LICENSE.txt, 315

kill_after_scoring
 PHSPControl, 209

L
 jquery.js, 241

LIBRARY
 LICENSE.txt, 299, 317

LICENSE.txt
 ABOVE, 302
 above, 302
 accessors, 302
 addition, 303
 Also, 303
 and, 297, 303
 any, 303
 apply, 303
 Boston, 304
 CHARGE, 304
 case, 304
 circumstance, 305
 claims, 305
 code, 306
 conditions, 306
 contrast, 306
 Coon, 307
 copies, 307
 copy, 307
 copying, 308
 Copyright, 297
 countries, 309
 DAMAGES, 309
 DEFECTIVE, 309

 distribute, 310
 distributed, 297
 distributor, 310
 document, 310
 employer, 297
 example, 311
 exception, 311
 executable, 311
 fee, 312
 Finally, 312
 Foundation, 312
 Frob, 297
 functions, 297
 GENERAL, 312
 HOLDER, 312
 However, 313
 IMPLIED, 314
 INCLUDING, 314
 If, 313
 Inc, 314
 interfaces, 314
 invoked, 315
 isolation, 315
 it, 315
 KIND, 315
 kernel, 315
 LIBRARY, 299, 317
 libraries, 316
 Library, 298, 316
 library, 316
 License, 299, 317
 license, 317
 meaningful, 299
 method, 318
 modify, 318
 names, 318
 not, 318
 number, 318
 obligations, 319
 offer, 319
 on, 320
 one, 320
 operates, 320
 or, 299
 parameters, 320
 permitted, 320
 Place, 321
 place, 321
 programs, 321
 public, 321
 rather, 321
 reason, 300
 recipients, 322
 rights, 322
 runs, 322
 SERVICING, 323
 SPECIAL, 324
 sample, 322

Section, 323
so, 323
software, 300, 324
sublicense, 325
Subsection, 325
Suite, 325
system, 325
table, 326
terms, 300, 326
that, 326
themselves, 326
Therefore, 326
these, 327
they, 327
things, 327
Thus, 328
TO, 328
too, 328
unrestricted, 328
use, 329
Version, 329
version, 329
void, 329
WARRANTY, 330
warranty, 330
whole, 330
with, 331
work, 301, 331
years, 331
you, 301, 332
last_position
 EB_Application, 139
last_R
 EB_Application, 140
Latch, 193
 addScatter, 195
 checkFlag, 195
 ESCAPED_SOURCE, 194
 Flag, 194
 hasEscaped, 195
 IN_SOURCE, 194
 isMultScat, 195
 isPrimary, 195
 isSingleScat, 196
 MSCAT_PARTICLE, 194
 PRIM_PARTICLE, 194
 SSCAT_PARTICLE, 194
 setFlag, 196
 setPrimary, 196
 unsetFlag, 196
 update, 196
latch_control
 EB_Application, 140
level
 EB_TimingTree, 167
libraries
 LICENSE.txt, 316
Library
 LICENSE.txt, 298, 316
library
 LICENSE.txt, 316
License
 LICENSE.txt, 299, 317
license
 LICENSE.txt, 317
loadFileVolumeCorrections
 ebvolcor::VolumeCorrector, 220
loadVolumes
 ebvolcor, 102
local_scoring_region
 EnergyFluenceSpectrumInVoxel, 169
localToGlobal
 GeomInfo, 180
MAX_E
 eb_tests::phsp_scoring::test, 78
MSCAT_PARTICLE
 Latch, 194
MUEN_START
 muen::MuenDataParser, 199
MXMED
 array_sizes.h, 226
MXSTACK
 array_sizes.h, 226
max_sources
 eb_tests::iaeа_types, 75
maxNRegOfGeoms
 ginfo.cpp, 273
maximum_energy
 eb_tests::iaeа::IAEAPhaseSpace, 190
meaningful
 LICENSE.txt, 299
med_data
 muen::MuenDataParser, 199
media.md, 226
media_file
 gen_media, 105
media_muen
 EB_Application, 140
media_muen_names
 EB_Application, 140
message
 eb_tests::iaeа_errors::IAEAPhaseSpaceError, 192
method
 LICENSE.txt, 318
mode
 ebvolcor::Options, 205
 gzstreambuf, 188
 PHSPControl, 209
modify
 LICENSE.txt, 318
modules
 gen_docs, 103
mscat_score
 EB_Phantom, 162
muen, 109
 MuenAtET, 109

MuenMapT, 109
 split, 110
 muen::MuenDataParser, 197
 getMuenInterpolator, 198
 MUEN_START, 199
 med_data, 199
 MuenDataParser, 198
 NSKIP, 199
 setMuenFile, 198
 splitFileByMed, 199
 muen_dir
 gen_media, 106
 MuenAtET
 muen, 109
 MuenDataParser
 muen::MuenDataParser, 198
 MuenMapT
 muen, 109

N_BINS_IN_RANGE
 eb_tests::spec_eflu::test, 88
 eb_tests::spec_vox::test, 90

n_parallel
 EB_IAEASource, 149

n_stuck
 EB_Application, 140

NCOMPARE
 eb_tests::scatter::test, 80
 eb_tests::stepped_source::test, 92
 eb_tests::tg43mode::test, 93
 eb_tests::tg43mode_recycle::test, 94
 eb_tests::tg43mode_zeroweight::test, 95

NEUTRON
 PHSPControl, 207

NEW_HISTORY
 pubsub.h, 338

NHIST
 eb_tests::phsp_scoring::test, 78
 eb_tests::spec_eflu::test, 88

NO_CORRECTION
 ebvolcor, 102

NON_SOURCE_PHOTON_SCATTER_EVENT
 pubsub.h, 338

NSKIP
 muen::MuenDataParser, 199

NUM_STUCK_STEPS
 egs_brachy.h, 271

name
 EB_Timer, 165
 GeomRegionInfo, 184
 Node, 200

names
 LICENSE.txt, 318

nbins
 BaseSpectrumScorer, 122

nbr_split
 EB_Application, 140

needs_user_geoms
 EB_Phantom, 162

needsUserVolumes
 EB_Phantom, 157

nested_level
 EB_Timer, 165

neutrons
 eb_tests::iaea_types, 75

new_source_errors
 eb_tests::iaea_errors, 73

next_source_id
 EB_IAEASource, 149

Nfirst
 EB_IAEASource, 149

ngeom
 GeomInfo, 182

Nincident
 EB_IAEASource, 149

Nlast
 EB_IAEASource, 149

Node, 199
 addNode, 200
 children, 200
 name, 200
 Node, 200

not
 LICENSE.txt, 318

notify
 Publisher, 210

notifyEnabled
 Publisher, 211

Nparticle
 EB_IAEASource, 150

Nphoton
 EB_IAEASource, 150

npoints
 ebvolcor::Options, 205
 ebvolcor::Results, 214

Npos
 EB_IAEASource, 150

Nread
 EB_IAEASource, 150

nrecycle
 RecycleOpts, 212

nreg
 ebvolcor::FileResults, 177
 GeomRegionInfo, 184

nreg_total
 GeomInfo, 182

nregForSubDiv
 ginfo.cpp, 273

nsources
 EB_Application, 140
 EB_Phantom, 162

num_orig_particles
 eb_tests::iaea::IAEAPhaseSpace, 190

num_particles
 eb_tests::iaea::IAEAPhaseSpace, 190

num_written
 PHSPControl, 209

number
 LICENSE.txt, 318

Nused
 EB_IAEASource, 150

obligations
 LICENSE.txt, 319

offer
 LICENSE.txt, 319

ogzstream, 200
 ogzstream, 201
 open, 201
 rdbuf, 201

on
 LICENSE.txt, 320

one
 LICENSE.txt, 320

open
 gzstreambase, 185
 gzstreambuf, 187
 igzstream, 193
 ogzstream, 201

openPHSPFile
 EB_IAEASource, 148

opened
 gzstreambuf, 188

operates
 LICENSE.txt, 320

Options
 ebvolcor::Options, 203

or
 LICENSE.txt, 299

ordered_geom_data
 GeomInfo, 182

other_volume
 ebvolcor::Results, 215

outfile
 gen_geom, 104
 gen_media, 106
 gen_specs, 107
 gen_tests, 108
 gen_transport, 108

output3DBounds
 EB_Phantom, 158

output3DDoses
 EB_Phantom, 158

output3ddoseResults
 EB_Phantom, 158

output_3ddose_files
 EB_Application, 140

output_dose_format
 EB_Application, 140

output_egsdat_format
 EB_Application, 141

output_egsphant
 EB_Application, 141

output_egsphant_format
 EB_Application, 141

output_volcor_format
 EB_Application, 141

output_volcor_phantoms
 EB_Application, 141

output_voxinfo
 EB_Application, 141

output_voxinfo_format
 EB_Application, 141

outputCSV
 BaseSpectrumScorer, 119

outputData
 BaseSpectrumScorer, 119
 EB_Application, 135
 EB_Phantom, 158
 EnergyScoringStats, 172

outputDataHelper
 EB_Application, 135

outputDoseStats
 EB_Phantom, 158

outputEGSPhant
 EB_Phantom, 158

outputEGSnrc
 BaseSpectrumScorer, 119

outputInfo
 EB_TimingTree, 166

outputResults
 BaseSpectrumScorer, 120
 EB_Application, 135
 EB_Phantom, 158
 ebvolcor::FileResults, 177
 ebvolcor::Results, 214
 EnergyScoringStats, 172
 PHSPControl, 208

outputTopDoses
 EB_Phantom, 158

outputTotal
 BaseSpectrumScorer, 120
 EnergyFluenceSpectrumInVoxel, 169
 EnergyWeightedSurfaceSpectrum, 176
 SurfaceCountSpectrum, 218

outputVolumeCorrection
 EB_Phantom, 159

outputVoxellInfo
 EB_Phantom, 159

outputXMGR
 BaseSpectrumScorer, 120

overflow
 gzstreambuf, 187

p
 jquery.js, 231
 run_tests, 112

p_init_locs
 EB_Application, 141

p_source_id
 EB_IAEASource, 150

PARTICLE_ESCAPED_GEOM
 pubsub.h, 338

PARTICLE_ESCAPED_SOURCE
 pubsub.h, 338

PARTICLE_ESCAPING_GEOM
pubsub.h, 338

PARTICLE_ESCAPING_SOURCE
pubsub.h, 338

PARTICLE_INITIALIZED
pubsub.h, 338

PARTICLE_TAKING_STEP
pubsub.h, 338

PARTICLE_TOOK_STEP
pubsub.h, 338

PARTICLE_TYPE
PHSPControl, 207

PASS_FMT
run_tests, 112

PHOTON_SCATTER_EVENT
pubsub.h, 338

PHOTON
PHSPControl, 207

PHSPControl, 205
ACCESS, 207
ALL_TYPES, 207
APPEND, 207
boundary_step, 208
destroySource, 207
ELECTRON, 207
finish, 207
fname, 208
getIAEAParticleType, 207
id, 208
initSource, 208
kill_after_scoring, 209
mode, 209
NEUTRON, 207
num_written, 209
outputResults, 208
PARTICLE_TYPE, 207
PHOTON, 207
PHSPControl, 207
POSITRON, 207
PROTON, 207
print_header, 209
READ, 207
transform, 209
update, 208
WRITE, 207
writeParticle, 208

PIAEA_Float
eb_tests::iaea_types, 75

PIAEA_I16
eb_tests::iaea_types, 75

PIAEA_I32
eb_tests::iaea_types, 76

PIAEA_I64
eb_tests::iaea_types, 76

POSITRON
PHSPControl, 207

PRIM_PARTICLE
Latch, 194

PRINT_PARTICLE_WITH_DIR
egs_brachy.h, 271

PRINT_PARTICLE
egs_brachy.h, 271

PROTON
PHSPControl, 207

pairCompare
ginfo.cpp, 273

parameters
LICENSE.txt, 320

particle_type
BaseSpectrumScorer, 122

particle_types
eb_tests::iaea_types, 75

path
eb_tests::iaea::IAEAPhaseSpace, 191

permitted
LICENSE.txt, 320

prevent_pub
EB_Application, 142

PhantRegT
ebvolcor, 101

phantom.cpp
edepRegTopResultCompare, 335
space2underscore, 335
tlenRegTopResultCompare, 335

phantom_files
ebvolcor::FileResults, 177
ebvolcor::VolumeCorrector, 221

phantom_geoms
EB_Application, 142
GeomInfo, 182

phantom_names
GeomInfo, 182

phantomFromRegion
GeomInfo, 180

phantoms
ebvolcor::VolumeCorrector, 221

photons
eb_tests::iaea_types, 75

phsp
EB_Application, 142

phsp.cpp
dirExists, 336

phsp_ext
eb_tests::iaea::IAEAPhaseSpace, 191

phsp_file
EB_IAEASource, 150

phsp_file_name
EB_IAEASource, 150

Place
LICENSE.txt, 321

place
LICENSE.txt, 321

positrons
eb_tests::iaea_types, 76

prim_score
EB_Phantom, 162

print_header
 PHSPControl, 209

printIncludedFiles
 EB_Application, 135

printInfo
 GeomInfo, 180
 RecycleOpts, 212

printParticleWithSpherical
 egs_brachy.cpp, 269

programs
 LICENSE.txt, 321

protons
 eb_tests::iaea_types, 76

prototype
 jquery.js, 241

public
 LICENSE.txt, 321

Publisher, 209
 ~Publisher, 210
 getNotifyEnabled, 210
 notify, 210
 notifyEnabled, 211
 Publisher, 210
 setNotifyEnabled, 210
 subscribe, 210
 subscribers, 211
 unsubscribe, 211

publisher
 EB_Phantom, 162

pubsub.h
 EB_Message, 338
 NEW_HISTORY, 338
 NON_SOURCE_PHOTON_SCATTER_EVENT,
 338
 PARTICLE_ESCAPED_GEOM, 338
 PARTICLE_ESCAPED_SOURCE, 338
 PARTICLE_ESCAPING_GEOM, 338
 PARTICLE_ESCAPING_SOURCE, 338
 PARTICLE_INITIALIZED, 338
 PARTICLE_TAKING_STEP, 338
 PARTICLE_TOOK_STEP, 338
 PHOTON_SCATTER_EVENT, 338
 SendMessage, 338

R1
 eb_tests::spec_vox::test, 90

R2
 eb_tests::spec_vox::test, 90

READ
 PHSPControl, 207

REG_DOSE_UNC_RE
 eb_tests::utils, 97

RM_NORMAL
 EB_Application, 128

RM_SUPERPOSITION
 EB_Application, 128

RM_VC_ONLY
 EB_Application, 128

rather

LICENSE.txt, 321

rdbuf
 gzstreambase, 186
 igzstream, 193
 ogzstream, 201

read3ddose
 eb_tests::utils, 96

read_csv_spectrum
 eb_tests::utils, 97

read_vols
 eb_tests::volume_correction::test, 100

readData
 BaseSpectrumScorer, 120
 EB_Application, 135
 EB_Phantom, 159
 EnergyScoringStats, 172

readDataHelper
 EB_Application, 135

readVolumes
 ebvolcor, 102

reason
 LICENSE.txt, 300

recipients
 LICENSE.txt, 322

record_n_init
 EB_Application, 142

recycle_opts
 EB_Application, 142

RecycleOpts, 211
 nrecycle, 212
 printInfo, 212
 RecycleOpts, 212
 rotate, 212

reg
 RegionResult, 213

RegVolume
 ebvolcor, 101

region_volume
 EnergyFluenceSpectrumInVoxel, 169

RegionResult, 212
 edep, 213
 edep_err, 213
 reg, 213
 tlen, 213
 tlen_err, 213
 volume, 213

regions_corrected
 ebvolcor::Results, 215

resetCounter
 BaseSpectrumScorer, 120
 EB_Application, 135
 EB_IAEASource, 148
 EB_Phantom, 159
 EnergyScoringStats, 172

Results
 ebvolcor::Results, 214

revision
 EB_Application, 142

rights
 LICENSE.txt, 322
 RM
 eb_tests::phsp_scoring::test, 78
 rng
 ebvolcor::Options, 205
 root
 gen_geom, 105
 gen_media, 106
 gen_specs, 107
 gen_transport, 108
 root_tests
 gen_tests, 108
 rotate
 RecycleOpts, 212
 run_all_tests
 run_tests, 111
 run_mode
 EB_Application, 142
 run_mode_name
 EB_Application, 142
 run_simulation
 run_tests, 111
 run_tests, 110
 CPU_MHZ, 111
 cleanup, 111
 cpu_speed_cmd, 111
 create_egsinp, 111
 dyn_import, 111
 EGS_BRACHY, 111
 EGS_HOME, 112
 FAIL_FMT, 112
 find_cpu_time, 111
 find_tests, 111
 p, 112
 PASS_FMT, 112
 run_all_tests, 111
 run_simulation, 111
 source, 112
 stderr, 112
 stdin, 112
 stdout, 113
 TEST_EGSINP_FILE, 113
 TEST_EGSINP_PATH_ROOT, 113
 TEST_EGSINP_PATH, 113
 TIMING_MARGIN, 113
 TIMING_WARN_FMT, 113
 timing_hard_fail, 113
 USER_CODE, 113
 VERBOSE, 113
 runFileCorrection
 ebvolcor::VolumeCorrector, 220
 runGeneralCorrection
 ebvolcor::VolumeCorrector, 220
 RunMode
 EB_Application, 128
 runSimulation
 EB_Application, 136
 runSourceCorrection
 ebvolcor::VolumeCorrector, 220
 running_blocks
 EB_TimingTree, 167
 runs
 LICENSE.txt, 322
 SAME_POSITION_TOLERANCE
 egs_brachy.h, 271
 SCORED_IN_BIN_PER_MEV
 eb_tests::spec_eflu::test, 89
 SCORED_IN_BIN
 eb_tests::spec_eflu::test, 88
 eb_tests::spec_vox::test, 91
 SERVICING
 LICENSE.txt, 323
 SOURCE_WEIGHTS
 eb_tests::phsp_scoring::test, 78
 SPECIAL
 LICENSE.txt, 324
 SSCAT_PARTICLE
 Latch, 194
 sample
 LICENSE.txt, 322
 score
 BaseSpectrumScorer, 120
 EnergyFluenceSpectrumInVoxel, 169
 EnergyWeightedSurfaceSpectrum, 176
 SurfaceCountSpectrum, 218
 score_edep
 EB_Application, 143
 score_scat
 EB_Application, 143
 score_tlen
 EB_Application, 143
 scoreEdep
 EB_Phantom, 159
 scoreEnergyInitialized
 EnergyScoringStats, 172
 scoreParticleEscapingGeom
 EnergyScoringStats, 173
 scoreParticleEscapingSource
 EnergyScoringStats, 173
 scoreParticleInitialized
 EnergyScoringStats, 173
 scoreTlen
 EB_Phantom, 159
 scoring_region
 EnergyFluenceSpectrumInVoxel, 170
 search.js
 convertTold, 246
 createResults, 246
 getXPos, 246
 getYPos, 246
 indexSectionNames, 247
 indexSectionsWithContent, 247
 SearchBox, 247
 SearchResults, 247
 setClassAttr, 247

setKeyActions, 247
SearchBox
 search.js, 247
searchData
 all_0.js, 243
 all_1.js, 243
 all_2.js, 244
 all_3.js, 244
 classes_0.js, 245
 files_0.js, 245
 functions_0.js, 246
 variables_0.js, 248
 variables_1.js, 248
 variables_2.js, 249
 variables_3.js, 249
SearchResults
 search.js, 247
Section
 LICENSE.txt, 323
SendMessage
 pubsub.h, 338
setBoundsShape
 ebvolcor::Options, 203
setClassAttr
 search.js, 247
setCorrectedVolume
 EB_Phantom, 159
setDensity
 ebvolcor::Options, 204
setDoseScale
 EB_Phantom, 159
setEffectiveHistories
 BaseSpectrumScorer, 120
 EB_Phantom, 160
setFlag
 Latch, 196
setGeomMap
 GeomInfo, 181
setGeometryIndexes
 GeomInfo, 180
setHistory
 EB_Phantom, 160
setKeyActions
 search.js, 247
setMode
 ebvolcor::Options, 204
setMuenFile
 muen::MuenDataParser, 198
setNotifyEnabled
 Publisher, 210
setPrimary
 Latch, 196
setRNG
 ebvolcor::Options, 204
setSimulationChunk
 EB_IAEASource, 148
setState
 EB_IAEASource, 148
setupOptions
 ebvolcor::VolumeCorrector, 220
sim_geom_name
 GeomInfo, 182
simulateSingleShower
 EB_Application, 136
single_generator
 EB_Application, 143
so
 LICENSE.txt, 323
sobelAllowed
 ebvolcor::Options, 205
software
 LICENSE.txt, 300, 324
source
 BaseSpectrumScorer, 122
 run_tests, 112
 source_e_max_rr
 EB_Application, 143
 source_ecut
 EB_Application, 143
 source_envelope_geom
 EB_Application, 143
 source_envelope_name
 GeomInfo, 183
 source_i_do_rr
 EB_Application, 143
 source_id
 EB_IAEASource, 151
 eb_tests::iaeas::IAEAPhaseSpace, 190
 source_names
 GeomInfo, 183
 source_opts
 ebvolcor::VolumeCorrector, 221
 source_pcut
 EB_Application, 144
 source_transforms
 EB_Application, 144
 source_vc_results
 EB_Application, 144
 source_weights
 EB_Application, 144
space2underscore
 phantom.cpp, 335
spec_scoring.cpp
 getFileNameFromPath, 340
 string_format, 340
specs
 gen_specs, 107
spectra.md, 226
spectrum_scorers
 EB_Application, 144
split
 muen, 110
splitFileByMed
 muen::MuenDataParser, 199
sscat_score
 EB_Phantom, 163

start
 EB_Timer, 165
 GeomRegionInfo, 184
 start_time
 EB_Timer, 165
 startNewParticle
 EB_Application, 136
 startNewShower
 EB_Application, 136
 stderr
 run_tests, 112
 stdin
 run_tests, 112
 stdout
 run_tests, 113
 steps_at_same_loc
 EB_Application, 144
 steps_in_other
 EB_Application, 144
 steps_in_phantoms
 EB_Application, 144
 steps_in_sources
 EB_Application, 144
 stop
 EB_Timer, 165
 stop_time
 EB_Timer, 165
 stopTimer
 EB_TimingTree, 166
 stopped_blocks
 EB_TimingTree, 167
 storeState
 EB_IAEASource, 148
 string_format
 spec_scoring.cpp, 340
 sublicense
 LICENSE.txt, 325
 subscribe
 Publisher, 210
 Subscriber, 215
 ~Subscriber, 216
 update, 216
 subscribers
 Publisher, 211
 Subsection
 LICENSE.txt, 325
 success
 ebvolcor::FileResults, 177
 ebvolcor::Results, 215
 Suite
 LICENSE.txt, 325
 superpos_geom
 EB_Application, 145
 SurfaceCountSpectrum, 216
 getFileExtension, 217
 getResult, 217
 getSubTitle, 217
 getTitle, 217
 getYAxisLabel, 218
 outputTotal, 218
 score, 218
 SurfaceCountSpectrum, 217
 sync
 gzstreambuf, 188
 system
 LICENSE.txt, 325
 TEST_EGSINP_FILE
 run_tests, 113
 TEST_EGSINP_PATH_ROOT
 run_tests, 113
 TEST_EGSINP_PATH
 run_tests, 113
 TIME_LIMIT_S_PER_MHZ
 eb_tests::brem_cyl::test, 71
 eb_tests::flu_cutoff::test, 72
 eb_tests::phsp_run::test, 77
 eb_tests::phsp_scoring::test, 78
 eb_tests::recycling::test, 79
 eb_tests::scatter::test, 80
 eb_tests::seeds_in_xyz::test, 81
 eb_tests::seeds_in_xyz_genvelope::test, 82
 eb_tests::simple_dose_sph::test, 83
 eb_tests::single_generator::test, 84
 eb_tests::source_energies::test, 85
 eb_tests::spec_absolute::test, 87
 eb_tests::spec_eflu::test, 89
 eb_tests::spec_vox::test, 91
 eb_tests::stepped_source::test, 92
 eb_tests::tg43mode::test, 93
 eb_tests::tg43mode_recycle::test, 94
 eb_tests::tg43mode_zeroweight::test, 96
 eb_tests::variable_activity::test, 98
 eb_tests::variable_w_recycling::test, 99
 eb_tests::volume_correction::test, 100
 TIMING_MARGIN
 run_tests, 113
 TIMING_WARN_FMT
 run_tests, 113
 TOTAL_E
 eb_tests::spec_eflu::test, 89
 TRACK_LENGTH
 eb_tests::spec_vox::test, 91
 table
 LICENSE.txt, 326
 terms
 LICENSE.txt, 300, 326
 tests.md, 226
 that
 LICENSE.txt, 326
 themselves
 LICENSE.txt, 326
 Therefore
 LICENSE.txt, 326
 these
 LICENSE.txt, 327
 they

LICENSE.txt, 327
things
 LICENSE.txt, 327
threeddose_geom_types
 EB_Phantom, 163
Thus
 LICENSE.txt, 328
time
 ebvolcor::FileResults, 177
 ebvolcor::Results, 215
timer
 EB_Timer, 165
timing_blocks
 EB_Application, 145
timing_hard_fail
 run_tests, 113
tlen
 RegionResult, 213
tlen_err
 RegionResult, 213
tlen_score
 EB_Phantom, 163
tlenRegTopResultCompare
 phantom.cpp, 335
TO
 LICENSE.txt, 328
toggleFolder
 dynsections.js, 227
toggleInherit
 dynsections.js, 227
toggleLevel
 dynsections.js, 227
toggleVisibility
 dynsections.js, 227
too
 LICENSE.txt, 328
total_energy_initialized
 EnergyScoringStats, 174
total_radiant_e
 EB_Phantom, 163
total_scored
 BaseSpectrumScorer, 122
totalEnergyInitialized
 EnergyScoringStats, 173
transform
 PHSPControl, 209
transforms
 ebvolcor::VolumeCorrector, 221
transport
 gen_transport, 109
transport.md, 226
type
 GeomRegionInfo, 184
USER_CODE
 run_tests, 113
underflow
 gzstreambuf, 188
unrestricted
 LICENSE.txt, 328
unsetFlag
 Latch, 196
unsubscribe
 Publisher, 211
update
 BaseSpectrumScorer, 120
 EB_Phantom, 160
 EnergyScoringStats, 173
 Latch, 196
 PHSPControl, 208
 Subscriber, 216
updateStripes
 dynsections.js, 227
use
 LICENSE.txt, 329
V
 jquery.js, 242
VERBOSE
 run_tests, 113
VOLUME
 eb_tests::spec_vox::test, 91
valid
 BaseSpectrumScorer, 122
 ebvolcor::Options, 205
values_close
 eb_tests::utils, 97
values_close_abs
 eb_tests::utils, 97
variables_0.js
 searchData, 248
variables_1.js
 searchData, 248
variables_2.js
 searchData, 249
variables_3.js
 searchData, 249
Version
 LICENSE.txt, 329
version
 LICENSE.txt, 329
void
 LICENSE.txt, 329
VolCorMode
 ebvolcor, 102
volume
 RegionResult, 213
VolumeCorrector
 ebvolcor::VolumeCorrector, 219
WARRANTY
 LICENSE.txt, 330
WRITE
 PHSPControl, 207
warranty
 LICENSE.txt, 330
whole
 LICENSE.txt, 330

window
 jquery.js, 242
with
 LICENSE.txt, 331
work
 LICENSE.txt, 301, 331
writeEGSPphant
 EB_Phantom, 160
writeParticle
 PHSPControl, 208
writeVolumeCorrection
 EB_Phantom, 160
writeVoxellInfo
 EB_Phantom, 160

x
 jquery.js, 231
XDIR
 EB_Phantom, 154

YDIR
 EB_Phantom, 154
years
 LICENSE.txt, 331
you
 LICENSE.txt, 301, 332

z
 jquery.js, 242
ZDIR
 EB_Phantom, 154
ZERO_DOSE
 ebvolcor, 102