uMSim

2.0

Generated by Doxygen 1.8.10

Thu Oct 22 2015 10:47:45

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5.20 src/UMRootSaver.cc File Reference . . . 61
5.21 src/UMSD.cc File Reference . . . 62
5.22 src/UMVisManager.cc File Reference . . . 62

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Chapter 1

Hierarchical Index

1.1 Class Hierarchy

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

G4UserEventAction
    UMEventAction 24
G4UserRunAction
    RunAction 9
G4VHit
    UMHit 28
G4VModularPhysicsList
    UMPhysicsList 33
G4VPhysicsConstructor
    PhysListEmStandard 7
G4VSensitiveDetector
    UMSD 43
G4VUserDetectorConstruction
    UMDetectorConstruction 18
G4VUserPrimaryGeneratorAction
    UMPrimaryGeneratorAction 37
UMConfig 13
UMRootSaver 40

Chapter 2

Data Structure Index

2.1 Data Structures

Here are the data structures with brief descriptions:

PhysListEmStandard 7
RunAction
The user-defined Run action class At the 9
UMConfig 13
UMDetectorConstruction 18
UMEventAction 24
UMHit 28
UMPhysicsList 33
UMPrimaryGeneratorAction 37
UMRootSaver 40
UMSD 43

Chapter 3

File Index

3.1 File List

Here is a list of all files with brief descriptions:

include/PhysListEmStandard.hh . . . 47
include/RunAction.hh . . . 48
include/UMConfig.hh . . . 48
include/UMDetectorConstruction.hh . . . 49
include/UMEventAction.hh . . . 50
include/UMHit.hh . . . 51
include/UMPhysicsList.hh . . . 52
include/UMPrimaryGeneratorAction.hh . . . 53
include/UMRootSaver.hh . . . 54
include/UMSD.hh . . . 55
include/UMVisManager.hh . . . 56
src/PhysListEmStandard.cc . . . 56
src/RunAction.cc . . . 57
src/UMConfig.cc . . . 57
src/UMDetectorConstruction.cc . . . 58
src/UMEventAction.cc . . . 59
src/UMHit.cc . . . 59
src/UMPhysicsList.cc . . . 60
src/UMPrimaryGeneratorAction.cc . . . 61
src/UMRootSaver.cc . . . 61
src/UMSD.cc . . . 62
src/UMVisManager.cc . . . 62

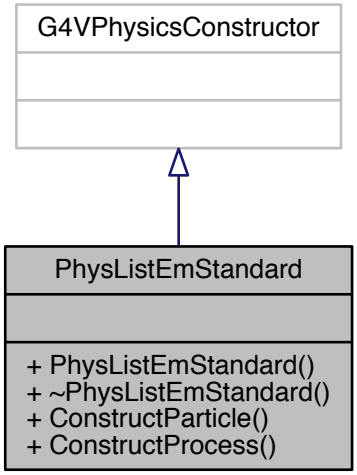
Chapter 4

Data Structure Documentation

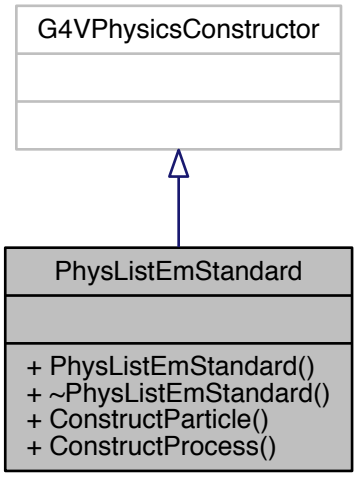
4.1 PhysListEmStandard Class Reference

`#include <PhysListEmStandard.hh>`

Inheritance diagram for PhysListEmStandard:



Collaboration diagram for PhysListEmStandard:



Public Member Functions

- PhysListEmStandard (const G4String &name="standard")

  Construnctor.
- ~PhysListEmStandard ()
- void ConstructParticle ()

  This method is dummy for physics.
- void ConstructProcess ()

4.1.1 Detailed Description

Header for Electromagnetic Interactions Physics List EmStandard is used

Author

Nikolaos Karastathis < nkarast .at. cern .dot. ch >

Version

v2.0

4.1.2 Constructor & Destructor Documentation

4.1.2.1 PhysListEmStandard::PhysListEmStandard (const G4String & *name* = "standard")

Construnctor.

Source for

See also

PhysListEmStandard (Shamelessly copied from a G4 example)

Author

Nikolaos Karastathis < nkarast .at. cern .dot. ch >

Version

v2.0

4.1.2.2 PhysListEmStandard::~PhysListEmStandard ( )

4.1.3 Member Function Documentation

4.1.3.1 void PhysListEmStandard::ConstructParticle ( ) [inline]

This method is dummy for physics.

4.1.3.2 void PhysListEmStandard::ConstructProcess ( )

This method will be invoked in the Construct() method. each physics process will be instantiated and registered to the process manager of each particle type

The documentation for this class was generated from the following files:

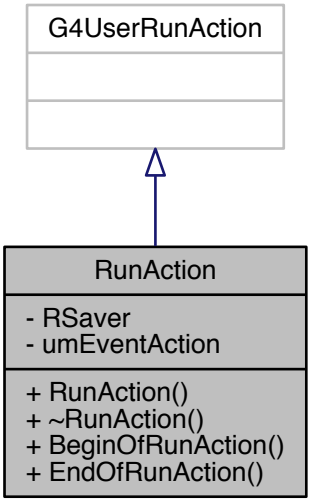
- include/PhysListEmStandard.hh
- src/PhysListEmStandard.cc

4.2 RunAction Class Reference

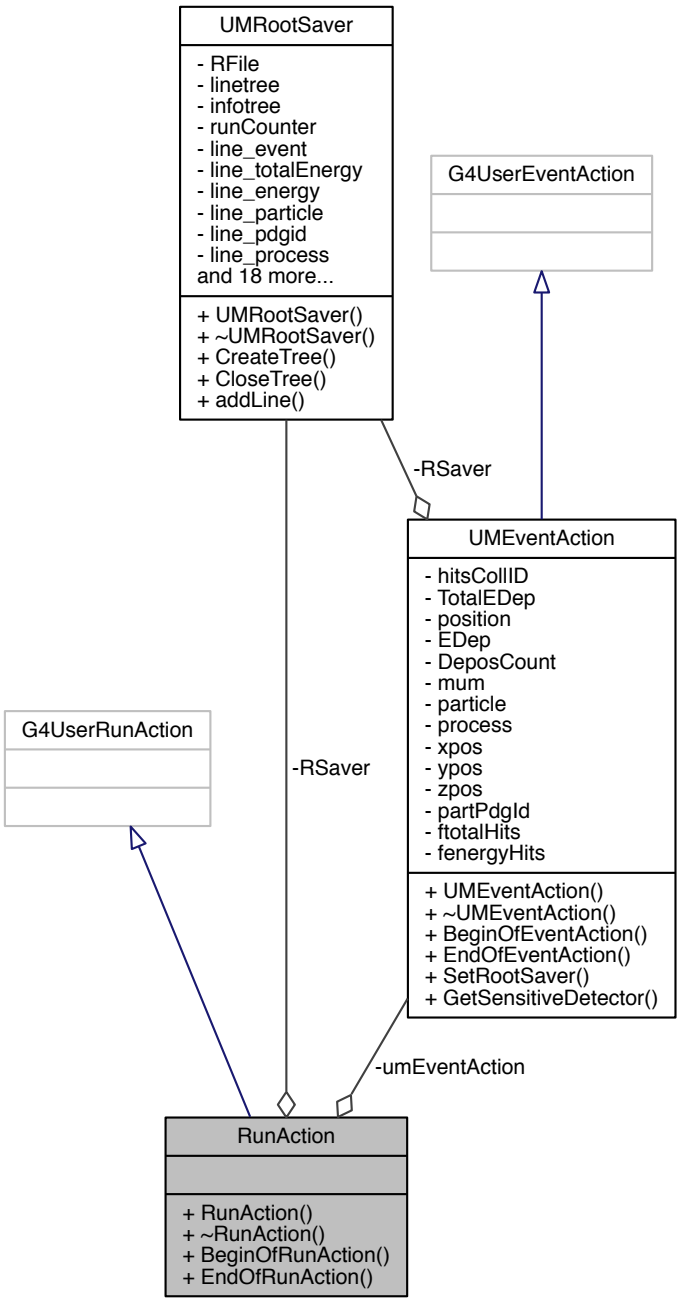
The user-defined Run action class At the.

`#include <RunAction.hh>`

Inheritance diagram for RunAction:



Collaboration diagram for RunAction:



Public Member Functions

- RunAction (UMEventAction ∗evAct)

  Constructor.
- virtual ∼RunAction ()

  Destructor.
- void BeginOfRunAction (const G4Run ∗)

At the beggining of each Run execute these statements.

- void EndOfRunAction (const G4Run *)

  When the Run ends execute these statements.

Private Attributes

- UMRootSaver RSaver

  Link the run with the.

- UMEventAction * umEventAction

  Link to the to the.

4.2.1 Detailed Description

The user-defined Run action class At the.

See also

BeginOfRunAction a RootSaver object is created to store the information

4.2.2 Constructor & Destructor Documentation

4.2.2.1 RunAction::RunAction (UMEventAction * *theEventAction*)

Constructor.

Source for

See also

RunAction

Author

Nikolaos Karastathis < nkarast .at. cern .dot. ch >

Version

v2.0

Create an instance of RootSaver

4.2.2.2 virtual RunAction::~RunAction ( ) [inline], [virtual]

Destructor.

4.2.3 Member Function Documentation

4.2.3.1 void RunAction::BeginOfRunAction (const G4Run * *aRun*)

At the beggining of each Run execute these statements.

At the start of the Run create the ROOT trees. For each run a new TTree is created, with default names

4.2.3.2 void RunAction::EndOfRunAction (const G4Run * *aRun*)

When the Run ends execute these statements.

at the end of a run print out some info

4.2.4 Field Documentation

4.2.4.1 UMRootSaver RunAction::RSaver [private]

Link the run with the.

See also

UMRootSaver object (
RSaver)

4.2.4.2 UMEventAction* RunAction::umEventAction [private]

Link to the to the.

See also

UMEventAction

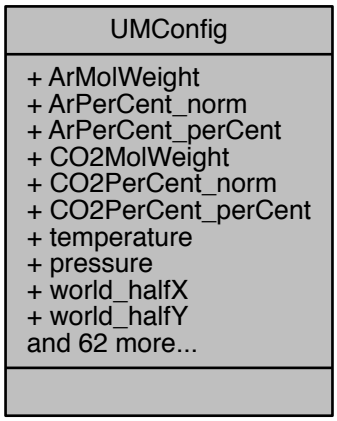
The documentation for this class was generated from the following files:

- include/RunAction.hh
- src/RunAction.cc

4.3 UMConfig Struct Reference

`#include <UMConfig.hh>`

Collaboration diagram for UMConfig:



Data Fields

- G4double ArMolWeight = 39.948
- G4double ArPerCent_norm = 0.93
- G4double ArPerCent_perCent = 93.∗perCent
- G4double CO2MolWeight = 44.01
- G4double CO2PerCent_norm = 0.07
- G4double CO2PerCent_perCent = 7.∗perCent
- G4double temperature = 273.15∗kelvin
- G4double pressure = 1.∗atmosphere
- G4double world_halfX = 250.∗cm
- G4double world_halfY = 250.∗cm
- G4double world_halfZ = 250.∗cm
- G4double null = 0.∗um
- G4double detectorVol_halfX = 25000.∗um
- G4double detectorVol_halfY = 500000.∗um
- G4double detectorVol_halfZ = 500000.∗um
- G4double pcb_halfX = 1000.∗um
- G4double pcb_halfY = 86800.∗um
- G4double pcb_halfZ = 86800.∗um
- G4double frame_halfX = 9500.∗um
- G4double frame_halfY = 86800.∗um
- G4double frame_halfZ = 86800.∗um
- G4double frame_hole_halfX = 9600.∗um
- G4double frame_hole_halfY = 71300.∗um
- G4double frame_hole_halfZ = 71300.∗um
- G4double topBrass_halfX = 17.5∗um
- G4double topBrass_halfY = 86800.∗um
- G4double topBrass_halfZ = 86800.∗um
- G4double topPCB_halfX = 982.5∗um
- G4double topPCB_halfY = 86800.∗um
- G4double topPCB_halfZ = 86800.∗um
- G4double topHole_halfX = 1000.∗um
- G4double topHole_halfY = 50200∗um
- G4double topHole_halfZ = 50200.∗um
- G4double active_area_halfY = 50000.∗um
- G4double active_area_halfZ = 50000.∗um
- G4double strip_halfX = 8.5∗um
- G4double strip_halfY = 75.∗um
- G4double strip_halfZ = 50000.∗um
- G4double strip_pitch = 250.∗um
- G4double glue_block_halfX = 4.∗um
- G4double glue_block_halfY = 50000.∗um
- G4double glue_block_halfZ = 50000.∗um
- G4double glue_strip_halfX = strip_halfX
- G4double glue_strip_halfY = (strip_pitch-2.∗strip_halfY)/2.
- G4double glue_strip_halfZ = strip_halfZ
- G4double insulator_block_halfX = 12.5∗um
- G4double insulator_block_halfY = 50000.∗um
- G4double insulator_block_halfZ = 50000.∗um
- G4double mesh_inner_radius = 0.0∗um
- G4double mesh_outer_radius = 12.∗um
- G4double mesh_half_width = active_area_halfY
- G4double mesh_starting_angle = 0.∗deg
- G4double mesh_spanning_angle = 360∗deg

- G4double mesh_pitch = 78.0∗um
- G4double amplification_gap = 128.∗um
- G4double drift_gap = 5000.∗um
- G4double pillar_inner_radius = 0.0∗deg
- G4double pillar_outer_radius = 200.∗um
- G4double pillar_half_width = (amplification_gap-2∗strip_halfX-mesh_outer_radius)/2.
- G4double pillar_starting_angle = 0.∗deg
- G4double pillar_spanning_angle = 360∗deg
- G4double pillar_pitch = 2500.0∗um
- G4double mylar_half_thickness = 60∗um
- G4double pcb_total_thickness = 2.∗pcb_halfX
- G4double frame_total_thickness = 2.∗(frame_halfX+topBrass_halfX+topPCB_halfX+mylar_half_thickness)
- G4double detector_half_width = pcb_halfY
- G4double detector_half_height = pcb_halfX+frame_halfX+mylar_half_thickness+topPCB_halfX+topBrass↩ _halfX
- G4String beamParticleName = "neutron"
- G4double beamEnergy = 5.1∗MeV
- G4double particleGun_Xdistance = 183850∗um

  { define the distance of the particle gun wrt to the center of the world assuming that the gun is at the center of the detector in a vertical distance of particleGun_Xdistance:}
- G4double particleGun_Ydistance = 0.0∗um

  –26cm when inclined: 2x^2=26^2 -> x=18,385cm
- G4double particleGun_Z_distance = 0.0∗um

4.3.1 Detailed Description

"Configuration" header for the package

Author

Nikolaos Karastathis < nkarast .at. cern .dot. ch >

Version

v2.0

4.3.2 Field Documentation

4.3.2.1 G4double UMConfig::active_area_halfY = 50000.∗um

4.3.2.2 G4double UMConfig::active_area_halfZ = 50000.∗um

4.3.2.3 G4double UMConfig::amplification_gap = 128.∗um

4.3.2.4 G4double UMConfig::ArMolWeight = 39.948

Gas related configuration

4.3.2.5 G4double UMConfig::ArPerCent_norm = 0.93

4.3.2.6 G4double UMConfig::ArPerCent_perCent = 93.∗perCent

4.3.2.7 G4double UMConfig::beamEnergy = 5.1∗MeV

4.3.2.8 G4String UMConfig::beamParticleName = "neutron"

Primary Generator configuration

4.3.2.9 G4double UMConfig::CO2MolWeight = 44.01

4.3.2.10 G4double UMConfig::CO2PerCent_norm = 0.07

4.3.2.11 G4double UMConfig::CO2PerCent_perCent = 7.∗perCent

4.3.2.12 G4double UMConfig::detector_half_height = pcb_halfX+frame_halfX+mylar_half_thickness+topPCB_halfX+topBrass_halfX

4.3.2.13 G4double UMConfig::detector_half_width = pcb_halfY

4.3.2.14 G4double UMConfig::detectorVol_halfX = 25000.∗um

4.3.2.15 G4double UMConfig::detectorVol_halfY = 500000.∗um

4.3.2.16 G4double UMConfig::detectorVol_halfZ = 500000.∗um

4.3.2.17 G4double UMConfig::drift_gap = 5000.∗um

4.3.2.18 G4double UMConfig::frame_halfX = 9500.∗um

4.3.2.19 G4double UMConfig::frame_halfY = 86800.∗um

4.3.2.20 G4double UMConfig::frame_halfZ = 86800.∗um

4.3.2.21 G4double UMConfig::frame_hole_halfX = 9600.∗um

4.3.2.22 G4double UMConfig::frame_hole_halfY = 71300.∗um

4.3.2.23 G4double UMConfig::frame_hole_halfZ = 71300.∗um

4.3.2.24 G4double UMConfig::frame_total_thickness = 2.∗(frame_halfX+topBrass_halfX+topPCB_halfX+mylar_half_thickness)

4.3.2.25 G4double UMConfig::glue_block_halfX = 4.∗um

4.3.2.26 G4double UMConfig::glue_block_halfY = 50000.∗um

4.3.2.27 G4double UMConfig::glue_block_halfZ = 50000.∗um

4.3.2.28 G4double UMConfig::glue_strip_halfX = strip_halfX

4.3.2.29 G4double UMConfig::glue_strip_halfY = (strip_pitch-2.∗strip_halfY)/2.

4.3.2.30 G4double UMConfig::glue_strip_halfZ = strip_halfZ

4.3.2.31 G4double UMConfig::insulator_block_halfX = 12.5∗um

4.3.2.32 G4double UMConfig::insulator_block_halfY = 50000.∗um

4.3.2.33 G4double UMConfig::insulator_block_halfZ = 50000.∗um

4.3.2.34 G4double UMConfig::mesh_half_width = active_area_halfY

4.3.2.35 G4double UMConfig::mesh_inner_radius = 0.0∗um

4.3.2.36 G4double UMConfig::mesh_outer_radius = 12.∗um

4.3.2.37 G4double UMConfig::mesh_pitch = 78.0∗um

4.3.2.38 G4double UMConfig::mesh_spanning_angle = 360∗deg

4.3.2.39 G4double UMConfig::mesh_starting_angle = 0.∗deg

4.3.2.40 G4double UMConfig::mylar_half_thickness = 60∗um

4.3.2.41 G4double UMConfig::null = 0.∗um

4.3.2.42 G4double UMConfig::particleGun_Xdistance = 183850∗um

{ define the distance of the particle gun wrt to the center of the world assuming that the gun is at the center of the detector in a vertical distance of particleGun_Xdistance:}

4.3.2.43 G4double UMConfig::particleGun_Ydistance = 0.0∗um

–26cm when inclined: 2x^2=26^2 -> x=18,385cm

4.3.2.44 G4double UMConfig::particleGun_Z_distance = 0.0∗um

4.3.2.45 G4double UMConfig::pcb_halfX = 1000.∗um

4.3.2.46 G4double UMConfig::pcb_halfY = 86800.∗um

4.3.2.47 G4double UMConfig::pcb_halfZ = 86800.∗um

4.3.2.48 G4double UMConfig::pcb_total_thickness = 2.∗pcb_halfX

4.3.2.49 G4double UMConfig::pillar_half_width = (amplification_gap-2∗strip_halfX-mesh_outer_radius)/2.

4.3.2.50 G4double UMConfig::pillar_inner_radius = 0.0∗deg

4.3.2.51 G4double UMConfig::pillar_outer_radius = 200.∗um

4.3.2.52 G4double UMConfig::pillar_pitch = 2500.0∗um

4.3.2.53 G4double UMConfig::pillar_spanning_angle = 360∗deg

4.3.2.54 G4double UMConfig::pillar_starting_angle = 0.∗deg

4.3.2.55 G4double UMConfig::pressure = 1.∗atmosphere

4.3.2.56 G4double UMConfig::strip_halfX = 8.5∗um

4.3.2.57 G4double UMConfig::strip_halfY = 75.∗um

4.3.2.58 G4double UMConfig::strip_halfZ = 50000.∗um

4.3.2.59 G4double UMConfig::strip_pitch = 250.∗um

4.3.2.60 G4double UMConfig::temperature = 273.15∗kelvin

4.3.2.61 G4double UMConfig::topBrass_halfX = 17.5∗um

4.3.2.62 G4double UMConfig::topBrass_halfY = 86800.∗um

4.3.2.63 G4double UMConfig::topBrass_halfZ = 86800.∗um

4.3.2.64 G4double UMConfig::topHole_halfX = 1000.∗um

4.3.2.65 G4double UMConfig::topHole_halfY = 50200∗um

4.3.2.66 G4double UMConfig::topHole_halfZ = 50200.∗um

4.3.2.67 G4double UMConfig::topPCB_halfX = 982.5∗um

4.3.2.68 G4double UMConfig::topPCB_halfY = 86800.∗um

4.3.2.69 G4double UMConfig::topPCB_halfZ = 86800.∗um

4.3.2.70 G4double UMConfig::world_halfX = 250.∗cm

Geometry related configuration

4.3.2.71 G4double UMConfig::world_halfY = 250.∗cm

4.3.2.72 G4double UMConfig::world_halfZ = 250.∗cm

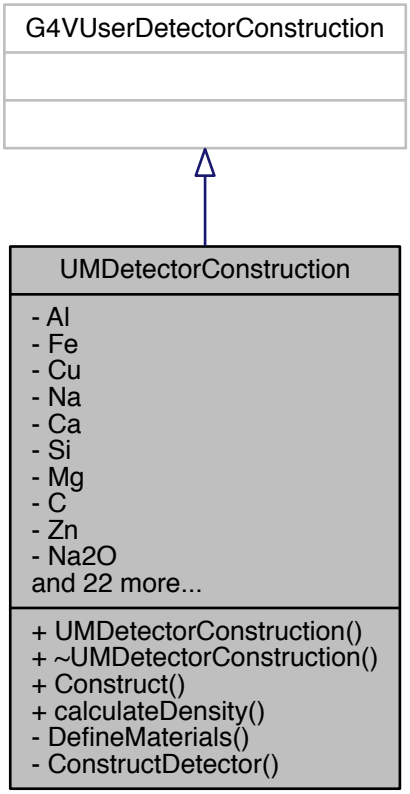
The documentation for this struct was generated from the following file:

- include/UMConfig.hh

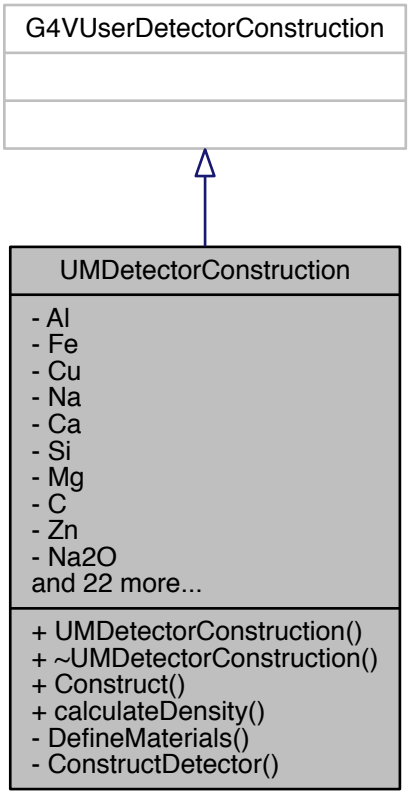
4.4 UMDetectorConstruction Class Reference

`#include <UMDetectorConstruction.hh>`

Inheritance diagram for UMDetectorConstruction:



Collaboration diagram for UMDetectorConstruction:



Public Member Functions

- UMDetectorConstruction ()
- ~UMDetectorConstruction ()

  Destructor.
- G4VPhysicalVolume * Construct ()

  Construct the detector!
- G4double calculateDensity (G4double molWeightA, G4double perCentA, G4double molWeightB, G4double perCentB)

  Calculates the density of a mixture of gasses given the relative molecular weight and the percentage.

Private Member Functions

- void DefineMaterials ()
- G4VPhysicalVolume * ConstructDetector ()

  Construct the detector.

Private Attributes

- G4Material * Al

- G4Material * Fe
- G4Material * Cu
- G4Material * Na
- G4Material * Ca
- G4Material * Si
- G4Material * Mg
- G4Material * C
- G4Material * Zn
- G4Material * Na2O
- G4Material * CaO
- G4Material * MgO
- G4Material * Al2O3
- G4Material * Cl
- G4Material * Epoxy
- G4Material * SiO2
- G4Material * Mylar
- G4Material * CO2
- G4Material * ArCO2
- G4Material * ResStripMat
- G4Material * ArgonGas
- G4Material * N2
- G4Material * Air
- G4Material * O2
- G4Material * G10
- G4Material * DryAir
- G4Material * water
- G4Material * H2
- G4Material * Kapton
- G4Material * StainlessSteel
- G4Material * Brass
- G4Material * Graphite

4.4.1 Detailed Description

Header for detector construction for the MicroMeGaS detector

```
All materials and \sa calculateDensity function is declared
```

4.4.2 Constructor & Destructor Documentation

4.4.2.1 UMDetectorConstruction::UMDetectorConstruction ( )

Source file for

See also

UMDetectorConstruction

Author

Nikolaos Karastathis < nkarast .at. cern .dot. ch >

Version

v2.0

4.4.2.2 UMDetectorConstruction::~UMDetectorConstruction ( )

Destructor.

4.4.3 Member Function Documentation

4.4.3.1 G4double UMDetectorConstruction::calculateDensity (G4double *molWeightA,* G4double *perCentA,* G4double *molWeightB,* G4double *perCentB*)

Calculates the density of a mixture of gasses given the relative molecular weight and the percentage.

user defined function to fined the density of a gas mixture mg/cm3

4.4.3.2 G4VPhysicalVolume * UMDetectorConstruction::Construct ( )

Construct the detector!

4.4.3.3 G4VPhysicalVolume * UMDetectorConstruction::ConstructDetector ( ) [private]

Construct the detector.

Define some sizes, for the user to change:

this makes the software slower but checks for overlaps during debugging phase

define rotations

define gas volumes

4.4.3.4 void UMDetectorConstruction::DefineMaterials ( ) [private]

a : standard atomic weight, z : atomic number

elements

materials

Get nist material manager

epoxy is glue

and graphite

print out the Material table

4.4.4 Field Documentation

4.4.4.1 G4Material * UMDetectorConstruction::Air [private]

4.4.4.2 G4Material* UMDetectorConstruction::Al [private]

4.4.4.3 G4Material * UMDetectorConstruction::Al2O3 [private]

4.4.4.4 G4Material * UMDetectorConstruction::ArCO2 [private]

4.4.4.5 G4Material * UMDetectorConstruction::ArgonGas [private]

4.4.4.6 G4Material * UMDetectorConstruction::Brass [private]

4.4.4.7 G4Material * UMDetectorConstruction::C [private]

4.4.4.8 G4Material * UMDetectorConstruction::Ca [private]

4.4.4.9 G4Material * UMDetectorConstruction::CaO [private]

4.4.4.10 G4Material * UMDetectorConstruction::Cl [private]

4.4.4.11 G4Material * UMDetectorConstruction::CO2 [private]

4.4.4.12 G4Material * UMDetectorConstruction::Cu [private]

4.4.4.13 G4Material * UMDetectorConstruction::DryAir [private]

4.4.4.14 G4Material * UMDetectorConstruction::Epoxy [private]

4.4.4.15 G4Material * UMDetectorConstruction::Fe [private]

4.4.4.16 G4Material * UMDetectorConstruction::G10 [private]

4.4.4.17 G4Material * UMDetectorConstruction::Graphite [private]

4.4.4.18 G4Material * UMDetectorConstruction::H2 [private]

4.4.4.19 G4Material * UMDetectorConstruction::Kapton [private]

4.4.4.20 G4Material * UMDetectorConstruction::Mg [private]

4.4.4.21 G4Material * UMDetectorConstruction::MgO [private]

4.4.4.22 G4Material * UMDetectorConstruction::Mylar [private]

4.4.4.23 G4Material * UMDetectorConstruction::N2 [private]

4.4.4.24 G4Material * UMDetectorConstruction::Na [private]

4.4.4.25 G4Material* UMDetectorConstruction::Na2O [private]

4.4.4.26 G4Material * UMDetectorConstruction::O2 [private]

4.4.4.27 G4Material * UMDetectorConstruction::ResStripMat [private]

4.4.4.28 G4Material * UMDetectorConstruction::Si [private]

4.4.4.29 G4Material * UMDetectorConstruction::SiO2 [private]

4.4.4.30 G4Material * UMDetectorConstruction::StainlessSteel [private]

4.4.4.31 G4Material * UMDetectorConstruction::water [private]

4.4.4.32 G4Material * UMDetectorConstruction::Zn [private]

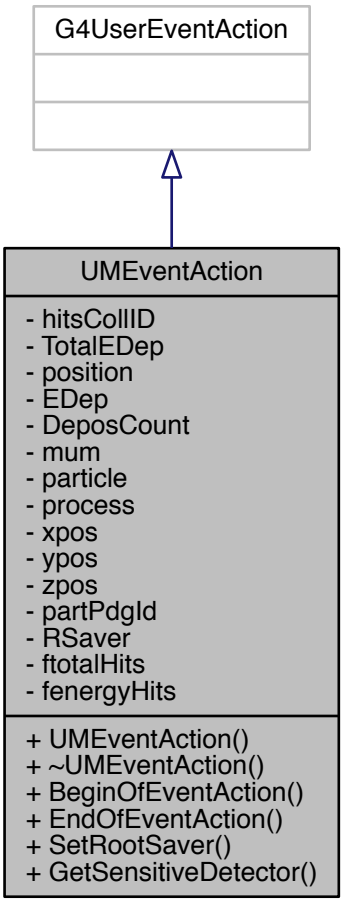
The documentation for this class was generated from the following files:

- include/UMDetectorConstruction.hh
- src/UMDetectorConstruction.cc

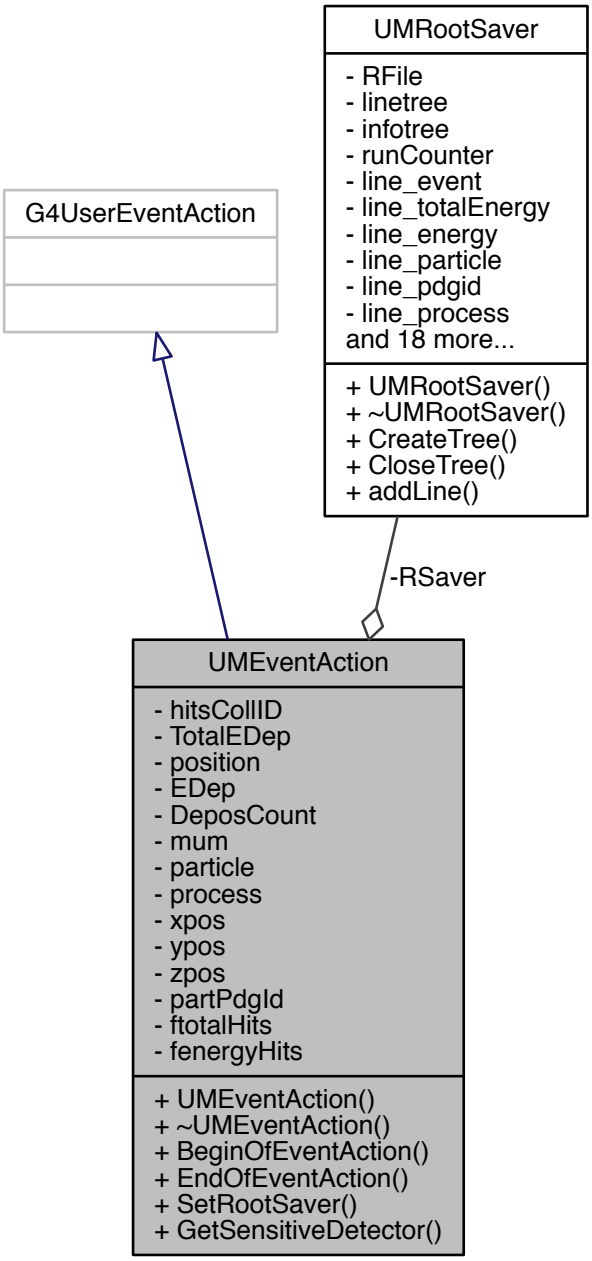
4.5 UMEventAction Class Reference

`#include <UMEventAction.hh>`

Inheritance diagram for UMEventAction:



Collaboration diagram for UMEventAction:



Public Member Functions

- UMEventAction (ofstream &totalHits, ofstream &energyHits)

  Constructor.
- ~UMEventAction ()

  Destructor.
- void BeginOfEventAction (const G4Event *anEvent)

What happens at the beginning of Event?

- void EndOfEventAction (const G4Event ∗anEvent)

  What happens at the end of an Event?

- void SetRootSaver (UMRootSaver ∗saver)

  Set up the ROOT saver.

- UMSD ∗ GetSensitiveDetector (G4String detname)

  Get the sensitive detector.

Private Attributes

- G4int hitsCollID
- G4double TotalEDep
- G4ThreeVector position
- G4double EDep
- G4int DeposCount
- G4int mum
- G4String particle
- G4String process
- G4double xpos
- G4double ypos
- G4double zpos
- G4int partPdgId
- UMRootSaver ∗ RSaver
- std::ofstream & ftotalHits
- std::ofstream & fenergyHits

4.5.1 Constructor & Destructor Documentation

4.5.1.1 UMEventAction::UMEventAction (ofstream & *totalHits,* ofstream & *energyHits*)

Constructor.

4.5.1.2 UMEventAction::∼UMEventAction ( )

Destructor.

pass

4.5.2 Member Function Documentation

4.5.2.1 void UMEventAction::BeginOfEventAction (const G4Event ∗ *anEvent*)

What happens at the beginning of Event?

At the begin of event setup the SD Manager and the hits Collection.

4.5.2.2 void UMEventAction::EndOfEventAction (const G4Event ∗ *anEvent*)

What happens at the end of an Event?

At the end of the event... loop over hits

Get the information from the hit

Attention

{should be given in mm !!!}

uncomment below to write non-serialised file line

to save up some storage save only if energy deposited within the drift gas volumn and if the energy is larger than 26eV = ionisation of Argon

Attention

{position in um, energy in keV}

4.5.2.3 UMSD * UMEventAction::GetSensitiveDetector (G4String *detname*)

Get the sensitive detector.

Get the Sensitive Detector.

4.5.2.4 void UMEventAction::SetRootSaver (UMRootSaver * *saver*) [inline]

Set up the ROOT saver.

4.5.3 Field Documentation

4.5.3.1 G4int UMEventAction::DeposCount [private]

4.5.3.2 G4double UMEventAction::EDep [private]

4.5.3.3 std::ofstream& UMEventAction::fenergyHits [private]

4.5.3.4 std::ofstream& UMEventAction::ftotalHits [private]

4.5.3.5 G4int UMEventAction::hitsCollID [private]

4.5.3.6 G4int UMEventAction::mum [private]

4.5.3.7 G4String UMEventAction::particle [private]

4.5.3.8 G4int UMEventAction::partPdgId [private]

4.5.3.9 G4ThreeVector UMEventAction::position [private]

4.5.3.10 G4String UMEventAction::process [private]

4.5.3.11 UMRootSaver* UMEventAction::RSaver [private]

4.5.3.12 G4double UMEventAction::TotalEDep [private]

4.5.3.13 G4double UMEventAction::xpos [private]

4.5.3.14 G4double UMEventAction::ypos [private]

4.5.3.15 G4double UMEventAction::zpos [private]

The documentation for this class was generated from the following files:

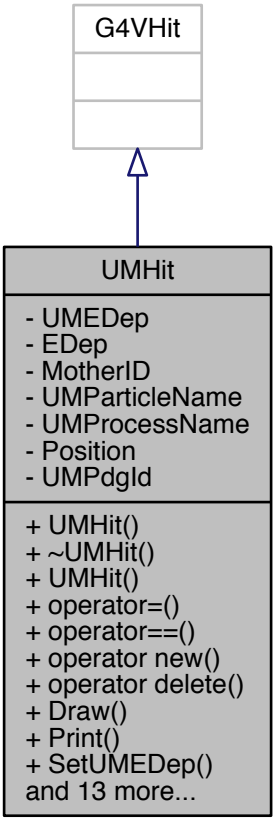
- include/UMEventAction.hh

- src/UMEventAction.cc

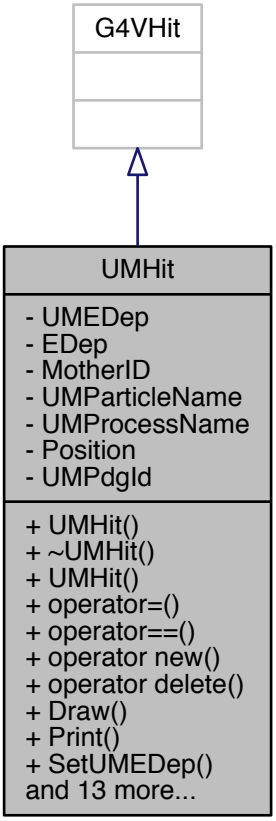
4.6 UMHit Class Reference

`#include <UMHit.hh>`

Inheritance diagram for UMHit:



Collaboration diagram for UMHit:



Public Member Functions

- UMHit ()

  Constructor and set the deposited energy to 0.
- ~UMHit ()

  Destructor - None.
- UMHit (const UMHit &right)

  Constructor.
- const UMHit & operator= (const UMHit &right)

  Define = hit operator.
- G4bool operator== (const UMHit &right) const

  Define == hit operator.
- void * operator new (size_t)
- void operator delete (void *hit)
- virtual void Draw ()
- virtual void Print ()
- void SetUMEDep (const G4double e)

  Setter for Energy Deposit.
- G4double GetUMEDep () const

- void SetPosition (const G4ThreeVector xyz)

  Setter for Position.
- G4ThreeVector GetPos () const

  Getter for position.
- void SetUMParticleName (const G4String pn)

  Setter for Particle Name.
- void SetUMProcessName (const G4String pn)

  Setter for Process Name.
- G4String GetUMParticleName () const

  Getter for Process Name.
- G4String GetUMProcessName () const

  Getter for process name.
- void SetMotherID (const G4int MID)

  Setter for mother particle.
- G4int GetMotherID () const

  Getter for mother particle.
- G4int GetUMPdgId () const

  Getter for pdg ID.
- void SetUMPdgId (const G4int pdgid)

  Setter for pdf ID.
- void AddEDep (const double e)

  Adding deposited energy to total deposited energy.
- G4double GetEDep () const

  Getter for deposited energy.

Private Attributes

- G4double UMEDep
- G4double EDep
- G4int MotherID
- G4String UMParticleName
- G4String UMProcessName
- G4ThreeVector Position
- G4int UMPdgId

4.6.1 Detailed Description

Header for Hit definition for the SD

Author

Nikolaos Karastathis < nkarast .at. cern .dot. ch >

Version

v2.0

4.6.2 Constructor & Destructor Documentation

4.6.2.1 UMHit::UMHit ( ) [inline]

Constructor and set the deposited energy to 0.

4.6.2.2 UMHit::~UMHit ( ) [inline]

Destructor - None.

4.6.2.3 UMHit::UMHit (const UMHit & *right*)

Constructor.

4.6.3 Member Function Documentation

4.6.3.1 void UMHit::AddEDep (const double *e*) [inline]

Adding deposited energy to total deposited energy.

4.6.3.2 void UMHit::Draw ( ) [virtual]

pass

4.6.3.3 G4double UMHit::GetEDep ( ) const [inline]

Getter for deposited energy.

4.6.3.4 G4int UMHit::GetMotherID ( ) const [inline]

Getter for mother particle.

4.6.3.5 G4ThreeVector UMHit::GetPos ( ) const [inline]

Getter for position.

4.6.3.6 G4double UMHit::GetUMEDep ( ) const [inline]

4.6.3.7 G4String UMHit::GetUMParticleName ( ) const [inline]

Getter for Process Name.

4.6.3.8 G4int UMHit::GetUMPdgId ( ) const [inline]

Getter for pdg ID.

4.6.3.9 G4String UMHit::GetUMProcessName ( ) const [inline]

Getter for process name.

4.6.3.10 void UMHit::operator delete (void * *hit*) [inline]

4.6.3.11 void * UMHit::operator new (size_t) [inline]

4.6.3.12 const UMHit & UMHit::operator= (const UMHit & *right*)

Define = hit operator.

4.6.3.13 G4bool UMHit::operator== (const UMHit & *right*) const

Define == hit operator.

4.6.3.14 void UMHit::Print ( ) [virtual]

std::ofstream fout("hits.out",ios::app); fout << std::setw(10) << UMEDep << " " << std::setw(20) << G4Best↩ Unit(Position, "Length") << "\n";

4.6.3.15 void UMHit::SetMotherID (const G4int *MID*) [inline]

Setter for mother particle.

4.6.3.16 void UMHit::SetPosition (const G4ThreeVector *xyz*) [inline]

Setter for Position.

4.6.3.17 void UMHit::SetUMEDep (const G4double *e*) [inline]

Setter for Energy Deposit.

4.6.3.18 void UMHit::SetUMParticleName (const G4String *pn*) [inline]

Setter for Particle Name.

4.6.3.19 void UMHit::SetUMPdgId (const G4int *pdgid*) [inline]

Setter for pdf ID.

4.6.3.20 void UMHit::SetUMProcessName (const G4String *pn*) [inline]

Setter for Process Name.

4.6.4 Field Documentation

4.6.4.1 G4double UMHit::EDep [private]

4.6.4.2 G4int UMHit::MotherID [private]

4.6.4.3 G4ThreeVector UMHit::Position [private]

4.6.4.4 G4double UMHit::UMEDep [private]

4.6.4.5 G4String UMHit::UMParticleName [private]

4.6.4.6 G4int UMHit::UMPdgId [private]

4.6.4.7 G4String UMHit::UMProcessName [private]

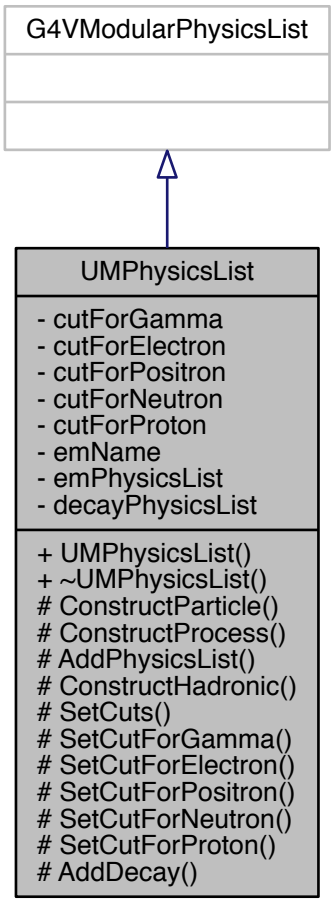
The documentation for this class was generated from the following files:

- include/UMHit.hh
- src/UMHit.cc

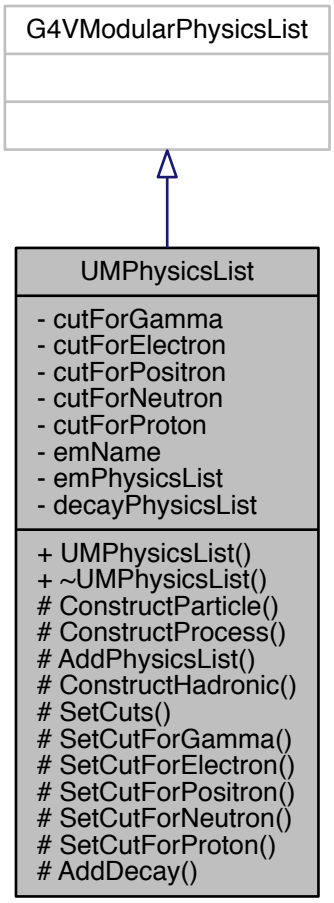
4.7 UMPhysicsList Class Reference

`#include <UMPhysicsList.hh>`

Inheritance diagram for UMPhysicsList:



Collaboration diagram for UMPhysicsList:



Public Member Functions

- UMPhysicsList ()

  Constructor.
- ~UMPhysicsList ()

  Destructor.

Protected Member Functions

- void ConstructParticle ()

  Construct particle and physics (mandatory)
- void ConstructProcess ()
- void AddPhysicsList (const G4String &name)
- void ConstructHadronic ()
- void SetCuts ()
- void SetCutForGamma (G4double)
- void SetCutForElectron (G4double)

- void SetCutForPositron (G4double)
- void SetCutForNeutron (G4double)
- void SetCutForProton (G4double)
- void AddDecay ()

Private Attributes

- G4double cutForGamma
- G4double cutForElectron
- G4double cutForPositron
- G4double cutForNeutron
- G4double cutForProton
- G4String emName
- G4VPhysicsConstructor * emPhysicsList
- G4VPhysicsConstructor * decayPhysicsList

4.7.1 Detailed Description

UMPhysicsList inherits from G4VModularPhysicsList

4.7.2 Constructor & Destructor Documentation

4.7.2.1 UMPhysicsList::UMPhysicsList ( )

Constructor.

Source file for

See also

UMPhysicsList This is used for photons!

Author

Nikolaos Karastathis < nkarast .at. cern .dot. ch >

Version

v2.0

EM physics : EmPenelope + DecayPhysics

4.7.2.2 UMPhysicsList::~UMPhysicsList ( )

Destructor.

4.7.3 Member Function Documentation

4.7.3.1 void UMPhysicsList::AddDecay ( ) [protected]

decay process

set ordering for PostStepDoIt and AtRestDoIt

4.7.3.2 void UMPhysicsList::AddPhysicsList (const G4String & *name*) [protected]

4.7.3.3 void UMPhysicsList::ConstructHadronic ( ) [protected]

4.7.3.4 void UMPhysicsList::ConstructParticle ( ) [protected]

Construct particle and physics (mandatory)

{In this method, static member functions should be called for all particles which you want to use. This ensures that objects of these particle types will be created in the program. }

4.7.3.5 void UMPhysicsList::ConstructProcess ( ) [protected]

electromagnetic physics list

4.7.3.6 void UMPhysicsList::SetCutForElectron (G4double) [protected]

4.7.3.7 void UMPhysicsList::SetCutForGamma (G4double) [protected]

4.7.3.8 void UMPhysicsList::SetCutForNeutron (G4double) [protected]

4.7.3.9 void UMPhysicsList::SetCutForPositron (G4double) [protected]

4.7.3.10 void UMPhysicsList::SetCutForProton (G4double) [protected]

4.7.3.11 void UMPhysicsList::SetCuts ( ) [protected]

pass

4.7.4 Field Documentation

4.7.4.1 G4double UMPhysicsList::cutForElectron [private]

4.7.4.2 G4double UMPhysicsList::cutForGamma [private]

4.7.4.3 G4double UMPhysicsList::cutForNeutron [private]

4.7.4.4 G4double UMPhysicsList::cutForPositron [private]

4.7.4.5 G4double UMPhysicsList::cutForProton [private]

4.7.4.6 G4VPhysicsConstructor* UMPhysicsList::decayPhysicsList [private]

4.7.4.7 G4String UMPhysicsList::emName [private]

4.7.4.8 G4VPhysicsConstructor* UMPhysicsList::emPhysicsList [private]

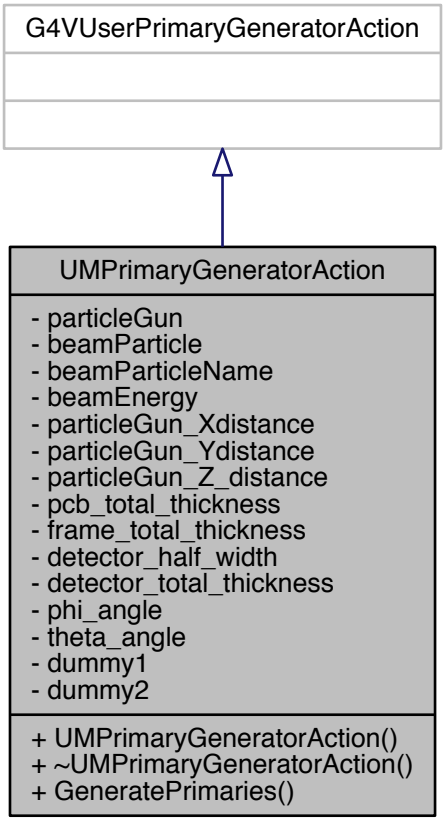
The documentation for this class was generated from the following files:

- include/UMPhysicsList.hh
- src/UMPhysicsList.cc

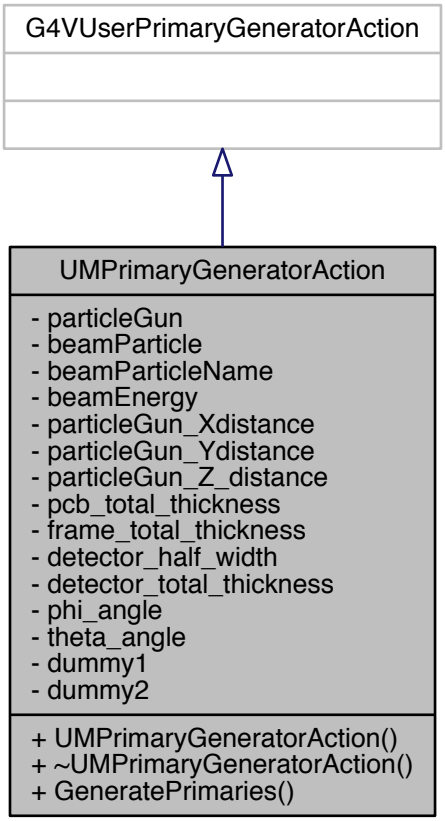
4.8 UMPrimaryGeneratorAction Class Reference

`#include <UMPrimaryGeneratorAction.hh>`

Inheritance diagram for UMPrimaryGeneratorAction:



Collaboration diagram for UMPrimaryGeneratorAction:



Public Member Functions

- UMPrimaryGeneratorAction ()
- virtual ~UMPrimaryGeneratorAction ()
- void GeneratePrimaries (G4Event *anEvent)

Private Attributes

- G4ParticleGun * particleGun
- G4ParticleDefinition * beamParticle

  some definitions
- G4String beamParticleName
- G4double beamEnergy
- G4double particleGun_Xdistance
- G4double particleGun_Ydistance
- G4double particleGun_Z_distance
- G4double pcb_total_thickness
- G4double frame_total_thickness
- G4double detector_half_width

- G4double detector_total_thickness
- G4double phi_angle
- G4double theta_angle
- G4double dummy1
- G4double dummy2

4.8.1 Constructor & Destructor Documentation

4.8.1.1 UMPrimaryGeneratorAction::UMPrimaryGeneratorAction ( )

Source file for

See also

UMPrimaryGeneratorAction

Author

Nikolaos Karastathis < nkarast .at. cern .dot. ch >

Version

v2.0

4.8.1.2 UMPrimaryGeneratorAction::~UMPrimaryGeneratorAction ( ) [virtual]

4.8.2 Member Function Documentation

4.8.2.1 void UMPrimaryGeneratorAction::GeneratePrimaries (G4Event * *anEvent*)

Attention

{CAREFULL ABOUT THE Y POSITION HERE! – This is set for ANGULAR BEAMS!}

the particle gun is particleGun_Xdistance away from the CENTER of the detector but the maximum opening distance would be aquired if we calculate the angles with respect to the first frame that the particle impacts ===>> to calculate the angles we subtract the half_width of the detector

set the momentum of X-axis towards the negative direction

now that everything is setup generate an event!

4.8.3 Field Documentation

4.8.3.1 G4double UMPrimaryGeneratorAction::beamEnergy [private]

4.8.3.2 G4ParticleDefinition* UMPrimaryGeneratorAction::beamParticle [private]

some definitions

4.8.3.3 G4String UMPrimaryGeneratorAction::beamParticleName [private]

4.8.3.4 G4double UMPrimaryGeneratorAction::detector_half_width [private]

4.8.3.5 G4double UMPrimaryGeneratorAction::detector_total_thickness [private]

4.8.3.6 G4double UMPrimaryGeneratorAction::dummy1 [private]

4.8.3.7 G4double UMPrimaryGeneratorAction::dummy2 [private]

4.8.3.8 G4double UMPrimaryGeneratorAction::frame_total_thickness [private]

4.8.3.9 G4ParticleGun* UMPrimaryGeneratorAction::particleGun [private]

4.8.3.10 G4double UMPrimaryGeneratorAction::particleGun_Xdistance [private]

4.8.3.11 G4double UMPrimaryGeneratorAction::particleGun_Ydistance [private]

4.8.3.12 G4double UMPrimaryGeneratorAction::particleGun_Z_distance [private]

4.8.3.13 G4double UMPrimaryGeneratorAction::pcb_total_thickness [private]

4.8.3.14 G4double UMPrimaryGeneratorAction::phi_angle [private]

4.8.3.15 G4double UMPrimaryGeneratorAction::theta_angle [private]

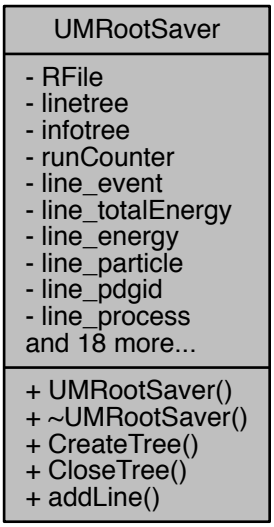
The documentation for this class was generated from the following files:

- include/UMPrimaryGeneratorAction.hh
- src/UMPrimaryGeneratorAction.cc

4.9 UMRootSaver Class Reference

`#include <UMRootSaver.hh>`

Collaboration diagram for UMRootSaver:



Public Member Functions

- UMRootSaver ()

  {The Class creates a ROOT saver object with two trees to be output}
- virtual ~UMRootSaver ()
- virtual void CreateTree ()
- virtual void CloseTree ()
- virtual void addLine (G4int event, G4double energy, G4String particleName, G4int pdgid, G4String process, G4double xpos, G4double ypos, G4double zpos)

Private Attributes

- TFile * RFile
- TTree * linetree
- TTree * infotree
- unsigned int runCounter
- int line_event = -1000
- double line_totalEnergy = 0
- std::vector< double > line_energy
- std::vector< std::string > line_particle
- std::vector< int > line_pdgid
- std::vector< std::string > line_process
- std::vector< double > line_xpos
- std::vector< double > line_ypos
- std::vector< double > line_zpos
- double line_above_resistive = 1117.0
- double line_below_mesh = 1216.0
- double line_above_mesh = 1240.0
- double line_below_drift = 6216.0
- double line_positivey = 50000.
- double line_negativey = -50000.
- double line_positivez = 50000.
- double line_negativez = -50000.
- double line_positivex = 23000.
- double line_beam_energy = 0
- double line_beam_startX = 0
- double line_beam_startY = 0
- double line_beam_startZ = 0
- double line_Argon_percent = 0
- double line_CO2_percent = 0

4.9.1 Constructor & Destructor Documentation

4.9.1.1 UMRootSaver::UMRootSaver ( )

{The Class creates a ROOT saver object with two trees to be output}

4.9.1.2 UMRootSaver::~UMRootSaver ( ) [virtual]

4.9.2 Member Function Documentation

4.9.2.1 void UMRootSaver::addLine (G4int *event,* G4double *energy,* G4String *particleName,* G4int *pdgid,* G4String *process,* G4double *xpos,* G4double *ypos,* G4double *zpos*) [virtual]

Imagine that you're writing to a plain txt file... Call this function whenever you want to add a line I'll handle the ;)

Here is where all the ROOT magic happens

4.9.2.2 void UMRootSaver::CloseTree ( ) [virtual]

this is for the last event to be written, since we add one line per `addLine` call

4.9.2.3 void UMRootSaver::CreateTree ( ) [virtual]

name this output to handle for multiple job submission

useless...

Load the configuration

set some global run info to the Run

Create the two trees and their branches

4.9.3 Field Documentation

4.9.3.1 TTree* UMRootSaver::infotree [private]

4.9.3.2 double UMRootSaver::line_above_mesh = 1240.0 [private]

4.9.3.3 double UMRootSaver::line_above_resistive = 1117.0 [private]

4.9.3.4 double UMRootSaver::line_Argon_percent = 0 [private]

4.9.3.5 double UMRootSaver::line_beam_energy = 0 [private]

4.9.3.6 double UMRootSaver::line_beam_startX = 0 [private]

4.9.3.7 double UMRootSaver::line_beam_startY = 0 [private]

4.9.3.8 double UMRootSaver::line_beam_startZ = 0 [private]

4.9.3.9 double UMRootSaver::line_below_drift = 6216.0 [private]

4.9.3.10 double UMRootSaver::line_below_mesh = 1216.0 [private]

4.9.3.11 double UMRootSaver::line_CO2_percent = 0 [private]

4.9.3.12 std::vector<double> UMRootSaver::line_energy [private]

4.9.3.13 int UMRootSaver::line_event = -1000 [private]

Some initialization is required

4.9.3.14 double UMRootSaver::line_negativey = -50000. [private]

4.9.3.15 double UMRootSaver::line_negativez = -50000. [private]

4.9.3.16 std::vector<std::string> UMRootSaver::line_particle [private]

4.9.3.17 std::vector<int> UMRootSaver::line_pdgid [private]

4.9.3.18 double UMRootSaver::line_positivex = 23000. [private]

4.9.3.19 double UMRootSaver::line_positivey = 50000. [private]

4.9.3.20 double UMRootSaver::line_positivez = 50000. [private]

4.9.3.21 std::vector<std::string> UMRootSaver::line_process [private]

4.9.3.22 double UMRootSaver::line_totalEnergy = 0 [private]

4.9.3.23 std::vector<double> UMRootSaver::line_xpos [private]

4.9.3.24 std::vector<double> UMRootSaver::line_ypos [private]

4.9.3.25 std::vector<double> UMRootSaver::line_zpos [private]

4.9.3.26 TTree* UMRootSaver::linetree [private]

4.9.3.27 TFile* UMRootSaver::RFile [private]

4.9.3.28 unsigned int UMRootSaver::runCounter [private]

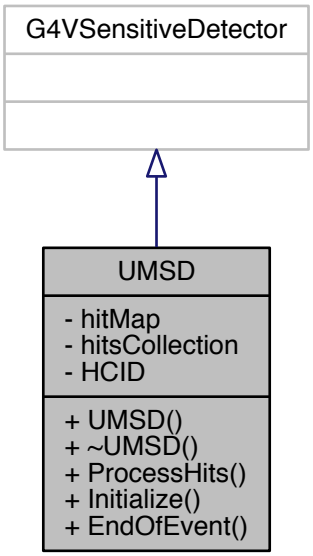
The documentation for this class was generated from the following files:

- include/UMRootSaver.hh
- src/UMRootSaver.cc

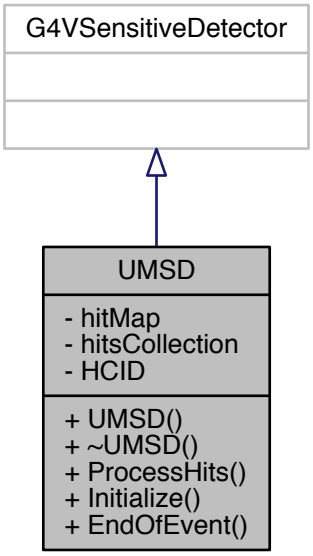
4.10 UMSD Class Reference

```
#include <UMSD.hh>
```

Inheritance diagram for UMSD:



Collaboration diagram for UMSD:



Public Member Functions

- UMSD (G4String SDname)
- ~UMSD ()
- G4bool ProcessHits (G4Step *step, G4TouchableHistory *ROhist)

  Mandatory class.
- void Initialize (G4HCofThisEvent *HCE)
- void EndOfEvent (G4HCofThisEvent *HCE)

  defines what happens at the end of each event.

Private Types

- typedef std::map< G4int, UMHit * > hitMap_t

Private Attributes

- hitMap_t hitMap

  Helper mapping layer number with hit.
- UMHitsCollection * hitsCollection
- G4int HCID

  Collection of hits in the gas.

4.10.1 Detailed Description

Defines the SD of the detector construction stores the hits in the Hit Collection of this Event.

4.10.2 Member Typedef Documentation

4.10.2.1 typedef std::map<G4int,UMHit*> UMSD::hitMap_t [private]

4.10.3 Constructor & Destructor Documentation

4.10.3.1 UMSD::UMSD (G4String *SDname*)

Source for the

See also

UMSensitiveDetector

Author

Nikolaos Karastathis < nkarast .at. cern .dot. ch >

Version

v2.0

{'collectionName' is a protected data member of base class G4VSensitiveDetector. Here we declare the name of the collection we will be using.}

{Note that we may add as many collection names we would wish: ie

4.10.3.2 UMSD::~UMSD ( ) [inline]

4.10.4 Member Function Documentation

4.10.4.1 void UMSD::EndOfEvent (G4HCofThisEvent * *HCE*)

defines what happens at the end of each event.

do nothing -

See also

EndOfEventAction will take care of that

4.10.4.2 void UMSD::Initialize (G4HCofThisEvent * *HCE*)

To insert the collection, we need to get an index for it. This index is unique to the collection. It is provided by the GetCollectionID(...) method (which calls what is needed in the kernel to get this index).

4.10.4.3 G4bool UMSD::ProcessHits (G4Step * *step*, G4TouchableHistory * *ROhist*)

Mandatory class.

Get the track for the step

Generate the info for this track (position, energy, particle, etc)

Generate a new UMHit and store the information

then insert the hit into the Hits Collection

4.10.5 Field Documentation

4.10.5.1 G4int UMSD::HCID [private]

Collection of hits in the gas.

4.10.5.2 hitMap_t UMSD::hitMap [private]

Helper mapping layer number with hit.

4.10.5.3 UMHitsCollection* UMSD::hitsCollection [private]

The documentation for this class was generated from the following files:

- include/UMSD.hh
- src/UMSD.cc

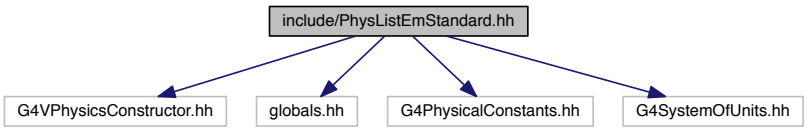
Chapter 5

File Documentation

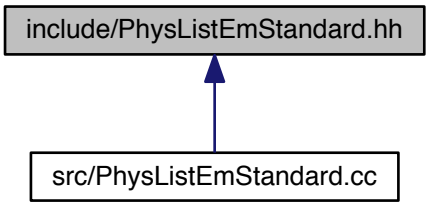
5.1 include/PhysListEmStandard.hh File Reference

```
#include "G4VPhysicsConstructor.hh"
#include "globals.hh"
#include "G4PhysicalConstants.hh"
#include "G4SystemOfUnits.hh"
```

Include dependency graph for PhysListEmStandard.hh:



This graph shows which files directly or indirectly include this file:



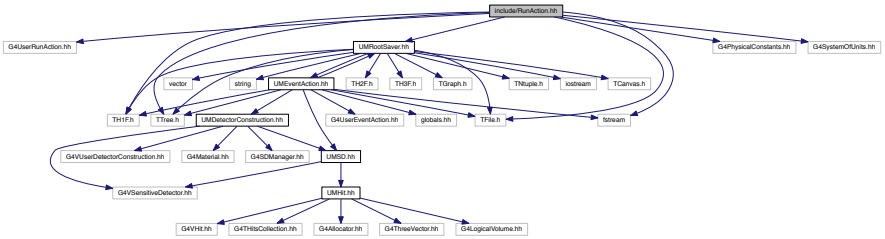
Data Structures

- class PhysListEmStandard

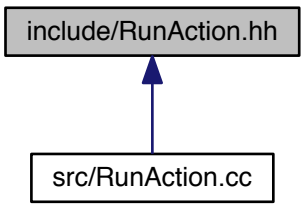
5.2 include/RunAction.hh File Reference

```
#include "G4UserRunAction.hh"
#include "TFile.h"
#include "TH1F.h"
#include "TTree.h"
#include "UMRootSaver.hh"
#include "G4PhysicalConstants.hh"
#include "G4SystemOfUnits.hh"
#include <fstream>
```

Include dependency graph for RunAction.hh:



This graph shows which files directly or indirectly include this file:



Data Structures

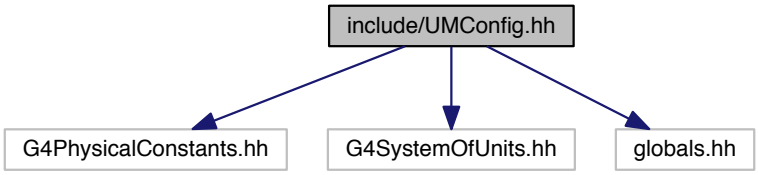
- class RunAction

  The user-defined Run action class At the.

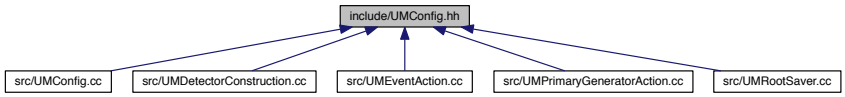
5.3 include/UMConfig.hh File Reference

```
#include "G4PhysicalConstants.hh"
#include "G4SystemOfUnits.hh"
#include "globals.hh"
```

Include dependency graph for UMConfig.hh:



This graph shows which files directly or indirectly include this file:



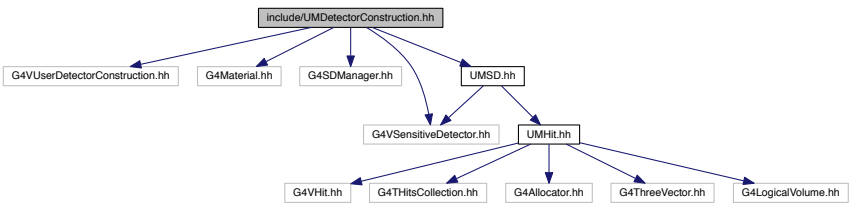
Data Structures

- struct UMConfig

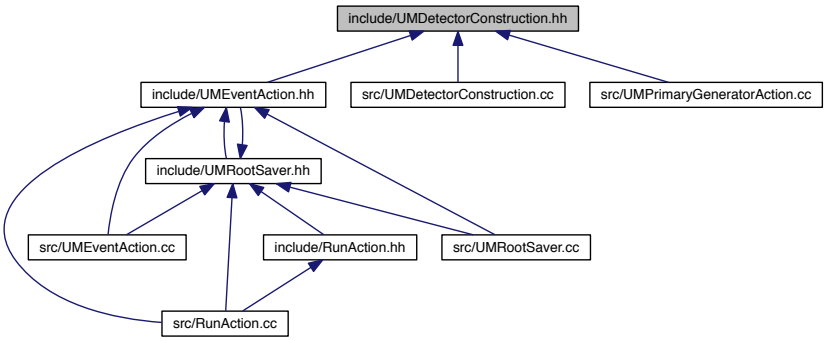
5.4 include/UMDetectorConstruction.hh File Reference

```
#include "G4VUserDetectorConstruction.hh"
#include "G4Material.hh"
#include "G4SDManager.hh"
#include "G4VSensitiveDetector.hh"
#include "UMSD.hh"
```

Include dependency graph for UMDetectorConstruction.hh:



This graph shows which files directly or indirectly include this file:



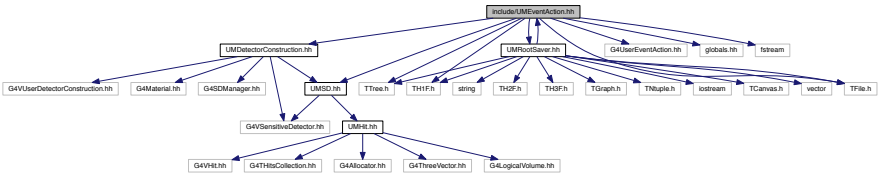
Data Structures

- class UMDetectorConstruction

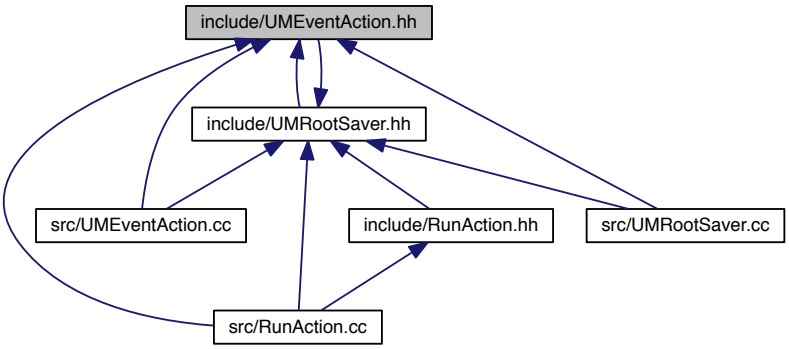
5.5 include/UMEventAction.hh File Reference

```
#include "UMDetectorConstruction.hh"
#include "UMSD.hh"
#include "UMRootSaver.hh"
#include "G4UserEventAction.hh"
#include "globals.hh"
#include "TH1F.h"
#include "TFile.h"
#include "TTree.h"
#include <fstream>
```

Include dependency graph for UMEventAction.hh:



This graph shows which files directly or indirectly include this file:



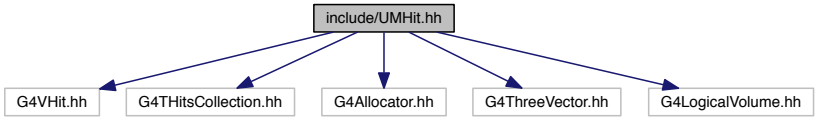
Data Structures

- class UMEventAction

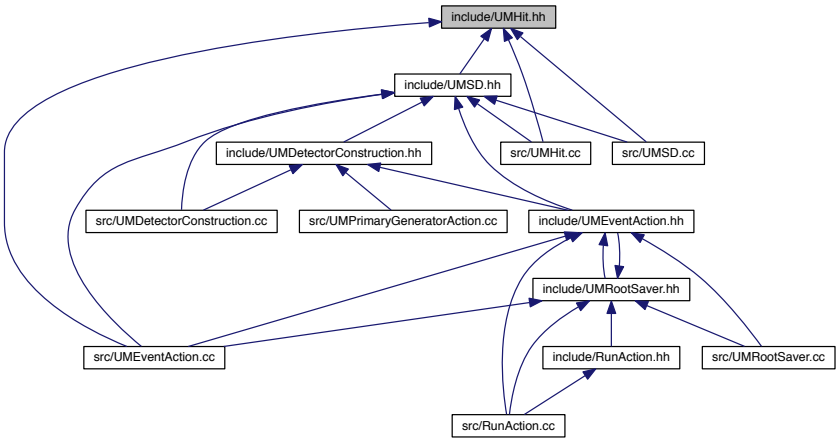
5.6 include/UMHit.hh File Reference

```
#include "G4VHit.hh"
#include "G4THitsCollection.hh"
#include "G4Allocator.hh"
#include "G4ThreeVector.hh"
#include "G4LogicalVolume.hh"
```

Include dependency graph for UMHit.hh:



This graph shows which files directly or indirectly include this file:



Data Structures

- class UMHit

Typedefs

- typedef G4THitsCollection< UMHit > UMHitsCollection

  Define the "hit collection" using the template class G4THitsCollection:

Variables

- G4Allocator< UMHit > UMHitAllocator

  new and delete overloaded operators:

5.6.1 Typedef Documentation

5.6.1.1 typedef G4THitsCollection<UMHit> UMHitsCollection

Define the "hit collection" using the template class G4THitsCollection:

5.6.2 Variable Documentation

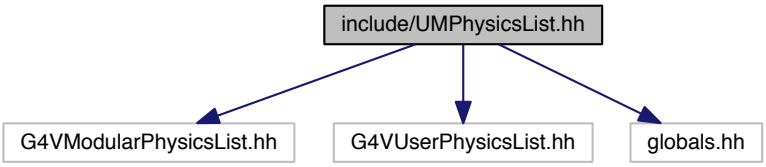
5.6.2.1 G4Allocator<UMHit> UMHitAllocator

new and delete overloaded operators:

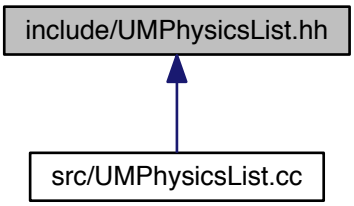
5.7 include/UMPhysicsList.hh File Reference

```
#include "G4VModularPhysicsList.hh"
#include "G4VUserPhysicsList.hh"
#include "globals.hh"
```

Include dependency graph for UMPhysicsList.hh:



This graph shows which files directly or indirectly include this file:



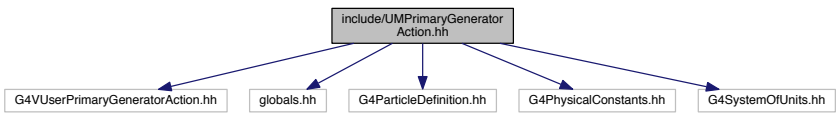
Data Structures

- class UMPhysicsList

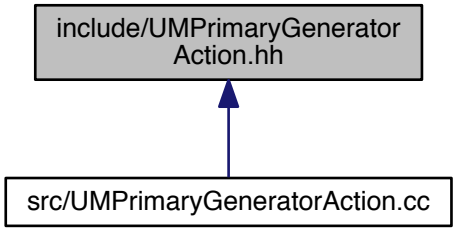
5.8 include/UMPrimaryGeneratorAction.hh File Reference

```
#include "G4VUserPrimaryGeneratorAction.hh"
#include "globals.hh"
#include "G4ParticleDefinition.hh"
#include "G4PhysicalConstants.hh"
#include "G4SystemOfUnits.hh"
```

Include dependency graph for UMPrimaryGeneratorAction.hh:



This graph shows which files directly or indirectly include this file:



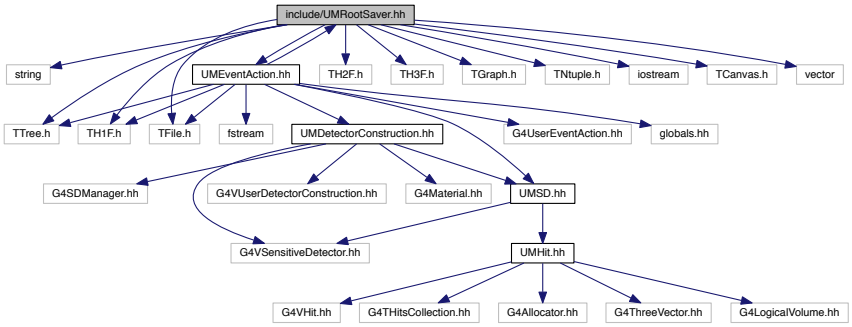
Data Structures

- class UMPrimaryGeneratorAction

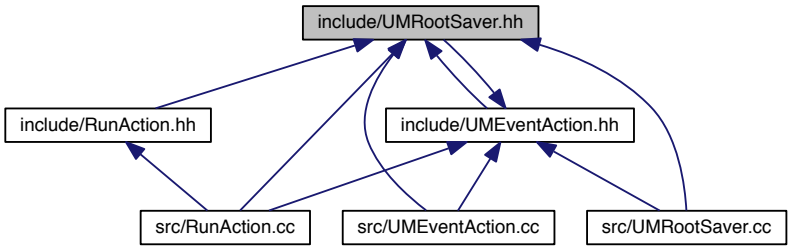
5.9 include/UMRootSaver.hh File Reference

```
#include <string>
#include <TTree.h>
#include <TH1F.h>
#include <TH2F.h>
#include <TH3F.h>
#include <TFile.h>
#include "TGraph.h"
#include "UMEventAction.hh"
#include "TNtuple.h"
#include <iostream>
#include "TCanvas.h"
#include <vector>
```

Include dependency graph for UMRootSaver.hh:



This graph shows which files directly or indirectly include this file:



Data Structures

- class UMRootSaver

Variables

- double const Pi = 3.141592
- double const enchannel =10/1024.

5.9.1 Variable Documentation

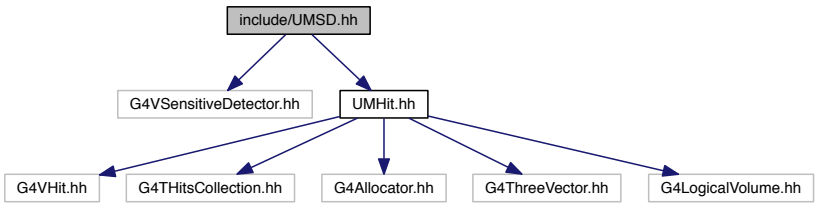
5.9.1.1 double const enchannel =10/1024.

5.9.1.2 double const Pi = 3.141592

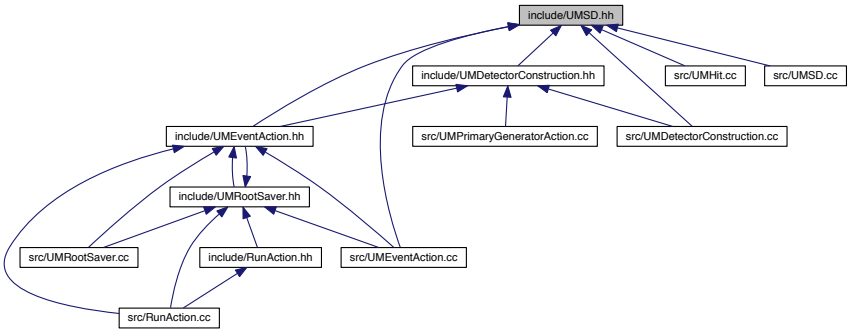
5.10 include/UMSD.hh File Reference

```
#include "G4VSensitiveDetector.hh"
#include "UMHit.hh"
```

Include dependency graph for UMSD.hh:



This graph shows which files directly or indirectly include this file:



Data Structures

- class UMSD

5.11 include/UMVisManager.hh File Reference

5.12 src/PhysListEmStandard.cc File Reference

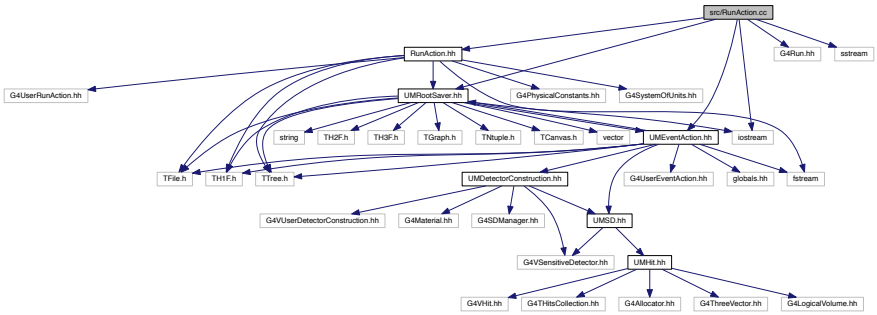
```
#include "PhysListEmStandard.hh"
#include "G4ParticleDefinition.hh"
#include "G4ProcessManager.hh"
#include "G4ComptonScattering.hh"
#include "G4GammaConversion.hh"
#include "G4PhotoElectricEffect.hh"
#include "G4eMultipleScattering.hh"
#include "G4UrbanMscModel.hh"
#include "G4eIonisation.hh"
#include "G4eBremsstrahlung.hh"
#include "G4eplusAnnihilation.hh"
#include "G4MuMultipleScattering.hh"
#include "G4MuIonisation.hh"
#include "G4MuBremsstrahlung.hh"
#include "G4MuPairProduction.hh"
#include "G4hMultipleScattering.hh"
#include "G4hIonisation.hh"
#include "G4hBremsstrahlung.hh"
#include "G4hPairProduction.hh"
#include "G4ionIonisation.hh"
#include "G4IonParametrisedLossModel.hh"
#include "G4NuclearStopping.hh"
#include "G4EmProcessOptions.hh"
#include "G4MscStepLimitType.hh"
```

Include dependency graph for PhysListEmStandard.cc:

5.13 src/RunAction.cc File Reference

```
#include "RunAction.hh"
#include "UMEventAction.hh"
#include "UMRootSaver.hh"
#include "G4Run.hh"
#include <sstream>
#include <iostream>
```

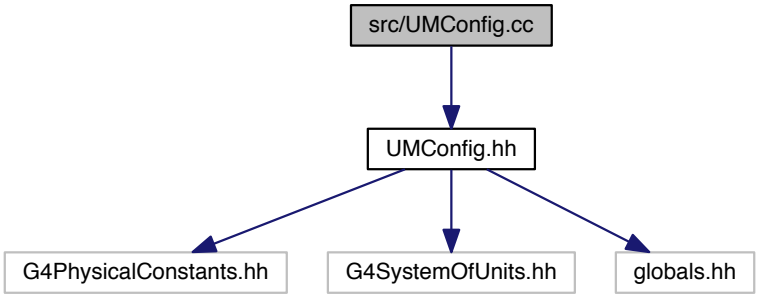
Include dependency graph for RunAction.cc:



5.14 src/UMConfig.cc File Reference

```
#include "UMConfig.hh"
```

Include dependency graph for UMConfig.cc:



Variables

- struct UMConfig config

5.14.1 Variable Documentation

5.14.1.1 struct UMConfig config

Dummy source for

See also

UMConfig

Author

Nikolaos Karastathis < nkarast .at. cern .dot. ch >

Version

v2.0

5.15 src/UMDetectorConstruction.cc File Reference

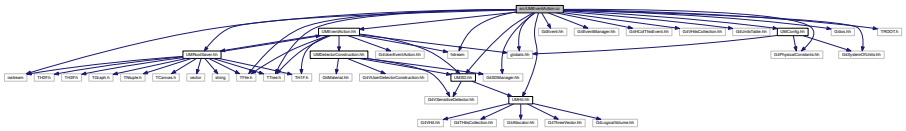
```
#include "UMDetectorConstruction.hh"
#include "G4Box.hh"
#include "G4Tubs.hh"
#include "G4LogicalVolume.hh"
#include "G4VPhysicalVolume.hh"
#include "G4PVPlacement.hh"
#include "G4PVReplica.hh"
#include "globals.hh"
#include "G4ThreeVector.hh"
#include "G4Material.hh"
#include "G4VSolid.hh"
#include "G4ExtrudedSolid.hh"
#include "G4SubtractionSolid.hh"
#include "G4NistManager.hh"
#include "G4VisAttributes.hh"
#include "G4Colour.hh"
#include "G4ios.hh"
#include "G4SDManager.hh"
#include "G4VSensitiveDetector.hh"
#include "UMSD.hh"
#include "G4PhysicalConstants.hh"
#include "G4SystemOfUnits.hh"
#include "G4PVParameterised.hh"
#include "UMConfig.hh"
```

Include dependency graph for UMDetectorConstruction.cc:

5.16 src/UMEventAction.cc File Reference

```
#include "UMEventAction.hh"
#include "UMRootSaver.hh"
#include "UMHit.hh"
#include "UMSD.hh"
#include "G4Event.hh"
#include "G4EventManager.hh"
#include "G4HCofThisEvent.hh"
#include "G4VHitsCollection.hh"
#include "G4SDManager.hh"
#include "G4UnitsTable.hh"
#include "globals.hh"
#include "G4PhysicalConstants.hh"
#include "G4SystemOfUnits.hh"
#include "G4ios.hh"
#include "UMConfig.hh"
#include <fstream>
#include <iostream>
#include "TROOT.h"
#include "TFile.h"
#include "TTree.h"
```

Include dependency graph for UMEventAction.cc:



5.17 src/UMHit.cc File Reference

```
#include "UMHit.hh"
#include "UMSD.hh"
#include "G4ios.hh"
#include "globals.hh"
#include "G4PhysicalConstants.hh"
#include "G4SystemOfUnits.hh"
#include "G4VVisManager.hh"
#include "G4Circle.hh"
#include "G4Colour.hh"
#include "G4UnitsTable.hh"
#include "G4VisAttributes.hh"
#include <iostream>
#include <fstream>
```

Include dependency graph for UMHit.cc:

Variables

- G4Allocator< UMHit > UMHitAllocator

  new and delete overloaded operators:

5.17.1 Variable Documentation

5.17.1.1 G4Allocator<UMHit> UMHitAllocator

new and delete overloaded operators:

5.18 src/UMPhysicsList.cc File Reference

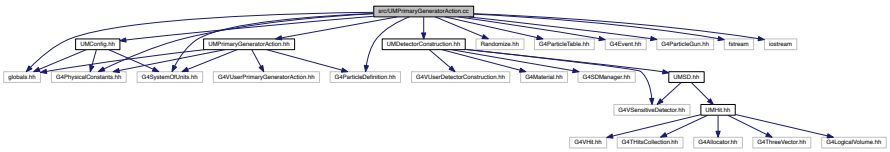
```
#include "UMPhysicsList.hh"
#include "globals.hh"
#include "G4PhysicalConstants.hh"
#include "G4SystemOfUnits.hh"
#include "G4EmPenelopePhysics.hh"
#include "G4DecayPhysics.hh"
#include "G4LossTableManager.hh"
#include "G4ProcessManager.hh"
#include "G4ParticleTypes.hh"
#include "G4ChargedGeantino.hh"
#include "G4Geantino.hh"
#include "G4Gamma.hh"
#include "G4OpticalPhoton.hh"
#include "G4MuonPlus.hh"
#include "G4MuonMinus.hh"
#include "G4NeutrinoMu.hh"
#include "G4AntiNeutrinoMu.hh"
#include "G4Electron.hh"
#include "G4Positron.hh"
#include "G4NeutrinoE.hh"
#include "G4AntiNeutrinoE.hh"
#include "G4PionPlus.hh"
#include "G4PionMinus.hh"
#include "G4PionZero.hh"
#include "G4Eta.hh"
#include "G4EtaPrime.hh"
#include "G4KaonPlus.hh"
#include "G4KaonMinus.hh"
#include "G4KaonZero.hh"
#include "G4AntiKaonZero.hh"
#include "G4KaonZeroLong.hh"
#include "G4KaonZeroShort.hh"
#include "G4Proton.hh"
#include "G4AntiProton.hh"
#include "G4Neutron.hh"
#include "G4AntiNeutron.hh"
#include "G4Alpha.hh"
#include "G4Deuteron.hh"
#include "G4Triton.hh"
#include "G4He3.hh"
#include "G4GenericIon.hh"
#include "G4Decay.hh"
```

Include dependency graph for UMPhysicsList.cc:

5.19 src/UMPrimaryGeneratorAction.cc File Reference

```
#include "UMPrimaryGeneratorAction.hh"
#include "UMDetectorConstruction.hh"
#include "Randomize.hh"
#include "globals.hh"
#include "G4PhysicalConstants.hh"
#include "G4SystemOfUnits.hh"
#include "G4ParticleDefinition.hh"
#include "G4ParticleTable.hh"
#include "G4Event.hh"
#include "G4ParticleGun.hh"
#include "UMConfig.hh"
#include <fstream>
#include <iostream>
```

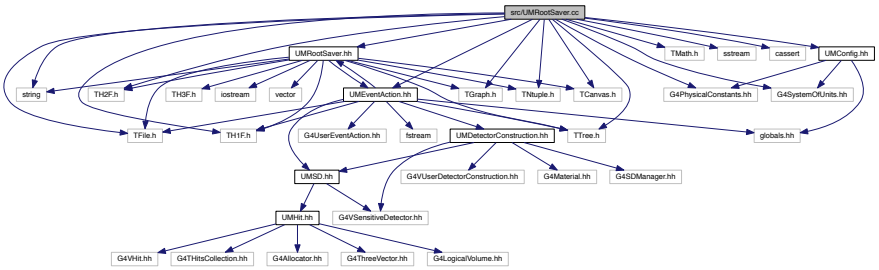
Include dependency graph for UMPrimaryGeneratorAction.cc:



5.20 src/UMRootSaver.cc File Reference

```
#include "UMRootSaver.hh"
#include "UMEventAction.hh"
#include "G4PhysicalConstants.hh"
#include "G4SystemOfUnits.hh"
#include "TNtuple.h"
#include "TFile.h"
#include "TTree.h"
#include "TGraph.h"
#include "TCanvas.h"
#include "TH1F.h"
#include <TH2F.h>
#include "TMath.h"
#include <sstream>
#include <cassert>
#include <string>
#include "UMConfig.hh"
```

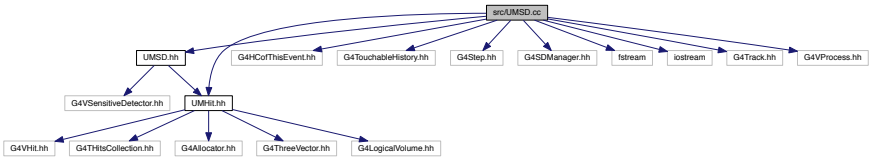
Include dependency graph for UMRootSaver.cc:



5.21 src/UMSD.cc File Reference

```
#include "UMSD.hh"
#include "UMHit.hh"
#include "G4HCofThisEvent.hh"
#include "G4TouchableHistory.hh"
#include "G4Step.hh"
#include "G4SDManager.hh"
#include <fstream>
#include <iostream>
#include "G4Track.hh"
#include "G4VProcess.hh"
```

Include dependency graph for UMSD.cc:



5.22 src/UMVisManager.cc File Reference

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