

How to use the Thomson Code

1. The following input files need to be in your working directory

a. Ephase_space.dat file (ASCII file)

This file is the six-dimensional phase space of the electron beam. It is arranged in columns as: x, y, t, px, py, pz, where x is the spatial co-ordinate of an electron in the direction of laser polarization, y coordinate in parallel to the magnetic field of the laser, t is the time coordinate, px, py, and pz are the transverse and longitudinal momentum components of the electron. The units are in atomic units.

b. parameters.dat file (ASCII file)

This file is the file defining typical values of the laser, the radiation yield, and the interaction geometry. The file is a two column file where the first column is the value of a physical quantity while the second represents the label to the physical quantity. This file is the file needed by the user to change values and rerun the code. An example parameters.dat file is listed below.

Listing of parameters.dat file

8.00E+02	Wavelength_(nm)_VAR_W_LENGTH
3.3E+01	Fnumber_VAR_FNUM
2.0E+16	Intensity_(W/cm^2)_VAR_I_Wcm2
3.00E+01	Pulse_duration_(fs)_VAR_T0_fs
1.80E+02	Interaction_angle_(degrees)_VAR_INT_ANG_DEG
0.00E+00	start_polar_angle_mrad_VAR_THETA_e_START
0.0E+00	End_polar_angle_mrad_VAR_THETA_e_END
1.00000	Number_of_polar_angles_VAR_NTHETA
0.00E+0	starting_phi_deg_VAR_phi_e_start_deg
0.00E+00	ending_phi_deg_VAR_phi_e_end_deg
1.000000	Number_azimuthal_angles_VAR_NPHI
1.00E+00	STARTING_FREQUENCY_index_VAR_START_FREQ_ITER
4.00E+03	Number_of_frequencies_VAR_NUMF
0.00E+00	non_paraxial_1.0_if_yes_VAR_np

2. The following executable files are necessary as well.

Since the user is intended to interact only with the parameters file. I have generated the necessary executable files namely “traject.x” and “combine.x”. You need to have these two files in your working directory as well.

3. A python script is necessary to distribute the workflow to as many processors as you wish and are able to. The file name for this python script is “setup_job.py”. You need to have this file in your working directory as well.
4. Create any directory with a name of your choice under your working directory. As an example let us say you created a directory named “JOBS”. Then copy the files “parameters.dat”, “ephase_space.dat”, “traject.x”, and “combine.x” to this directory.
5. Then you can type the following from your working directory to setup your job.

`./setup_job.py -p [electrons per processor] -e [total number of electrons] [JOBS]`

Where [electrons per processor] needs to be replaced with how many electrons a single processor should run, [total number of electrons] is replaced with the number of electrons in the phase space, and [JOBS] is the directory you created.

For example typing the following command:

`./setup_job.py -p 100 -e 10000 JOBS`

Sets up a job with a total of 10000 electrons distributed to 100 processors where each processor takes its share of 100 electrons.

6. To start your jobs, change to the directory **JOBS** and typing the command `./submit.sh` starts the job.
To monitor the progress of your job please see the screen after you submitted the job and it will tell you exactly what to do to monitor the jobs.
7. A directory named “OUTPUT” will then be created automatically under JOBS directory. if the job finishes the output file is found in the OUTPUT directory.
8. The name of the output file is “powspec_inc.dat” and is an ASCII file. It is a four column file where the 1st column is for the azimuthal angle, 2nd for the polar angle, third for the radiated photon energy (MeV), and fourth is for the spectral intensity (MeV/MeV.sr).