**Structure of Python scripts that generate the ASCOT5 hdf5 input file**

The ASCOT5 input file, which is written in the hdf5 file format, is generated by a Python script, e.g. group\_go\_728.py. These are stored in the …/ascot5/runs directory. It might be helpful to open up such a file as you read this section, which describes the overall structure of these Python scripts.

The code must provide specifications for ten major sections:

1. Magnetic equilibrium
2. Magnetic field: can be 2D or 3D.
3. Options: specify the options parameters discussed in the previous section.
4. Markers: specify the number, mass, and charge of the markers, and the initial positions and velocity vectors of the markers.
5. Profiles: specify the kinetic profiles of the thermal plasma, e.g. Ne, Ni, Te, Ti.
6. Wall: specify the wall shape. the wall can either be 2D or 3D.

I have not used the following types of data. There is ‘dummy code’ in the Python script to write dummy data into the input file.

1. Boozer: I think this section contains Boozer coordinates. Maybe this is used for orbit simulations for stellarators.
2. Neutral density
3. MHD
4. electric field

Generally, the structure in the Python script (e.g. group\_go\_728.py) for each group of data described above is as follows:

* Some parameter values are written into a Python dictionary.
* The code calls a Python script that I wrote specifically for that group of data (typically in the …/ascot/mypython directory), passing in the disctionary along with some other parameter values. For example, there is a Python script marker\_sets.py that defines the ensemble of markers, and a Python script options\_sets.py that defines the options.
* Inside the Python script e.g. marker\_sets, the code might do some calculations (for example, create the ensemble of birth marker positions) and it might define some default values for some parameter names. Then it calls an official ASCOT-provided Python script which does the actual writing of data into the ASCOT5 hdf5 file.