[What’s the work?](#what_is_work)

In this section I describe where ‘the work is’, i.e. what are the major challenges and time-sinks for the ASCOT simulations.

1. Compiling the code: I’m not conversant with build scripts (makefiles) at NERSC. It took Libby Tolman some time with help from NERSC to get the code built the first time, and it seems to take me a while to recompile every time ASCOT releases a new version. But I did write down a set of instructions on how to compile … hope they are complete.
2. Compile switches and run-time switches: these are very mysterious to me, but important because they can have a big effect on CPU speed. John Wright and the experts at NERSC are good resources.
3. Validating that the simulations are ‘correct’: this is an ongoing effort and requires a considerable amount of Python coding, e.g. to generate new plots that address particular concerns.
4. A sub-component of the previous one: choosing the largest time step that still yields accurate orbit calculations.
5. Implementing 3D wall/limiter shapes: ASCOT needs a wall shape that is defined by a large number of triangles. I have Python code to do this (triangulate\_torus.py) but it is written for a particular ‘family’ of limiter shapes. It might be nice to develop a workflow that translates a SPARC CAD model for the PFCs into the format required by ASCOT. But this is not as easy as it sounds, because (1) if the size of individual area elements (aka triangles) is too big then the wall shape is not a good representation of the actual wall shape, leading to over-estimate of the ripple losses, and (2) if the size of the triangles is too small then we get poor statistics on the computed surface power density.
6. I have done nothing yet on computing the alpha positional and energy / pitch-angle distribution function nor on a workflow that would allow it to be used in e.g. MHD stability codes.
7. I have only highly approximate calculations of the loss of RF tail ions. As John Wright has been saying for some time, we need a way to allow the fast ions to be given a `kick’ by the RF wavefield as the ions pass thru the resonance.