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Dear Sir/Madam,

Re: How the Autumn Academy fits with my PhD project

My research focuses on the orbital evolution of embedded planets in accretion discs around young stars. The precise mechanism by which a solar system evolves from an initial disc around a young, active star to what we see today is not precisely understood on a number of levels and it is this process that my research aims to better understand.

To do this, I use well-verified computer code to perform magnetohydrodynamic simulations of a protoplanetary disc, while simultaneously solving for planetary interactions using a N-body solver. Given the relatively high resolution and long duration of the simulations, it is necessary for me to make use of the HPC facilities we have at Queen Mary. The code I use has been modified to work on computer clusters.

I am about to start the second year of my PhD. The first year very much involved learning the code and the background physics. Now that I have a working understanding of that, it will be very useful for me to be able to modify this code and add new features so that we can perform new investigations. So far, I have done a little work with OpenMP and MPI to familiarise myself with them as best as I have been able by using resources from the internet and looking at the implementation in my code. I also possess a good level of fluency in both C and FORTRAN.

In addition to these self-teaching efforts, however, it would be better for me to be taught from the ground up how to write good, fast code for the specific purpose of making use of the HPC resources available. It would save far more than two weeks of being puzzled over the duration of my PhD project and so it seems like a worthy investment.

Further to that, on a personal level, I have something of a passion for scientific computing and numerical modelling– I genuinely like writing code and getting it to work properly, particularly when it is being used to shed light on the implications of physical laws. It would be a personal achievement for me, as well as a professional one, to be able to learn how to code HPC applications properly and to be able to make useful and lasting changes to the code that I use. I'm very keen to learn everything that I can from this Academy, if I'm accepted, and I look forward to hearing from you.

Yours faithfully,

Stephen Fendyke