Centre for Fusion, Space and Astrophysics: PhD projects for 2017

Research at Warwick University’s Centre for Fusion, Space and Astrophysics (CFSA) focuses on plasma physics applied to the grand challenges of fusion energy, space physics, solar physics, and astrophysics. Our work spans fundamental theory, observation, and the analysis of experimental data, combined with high performance computing. For more details of the CFSA see [http://go.warwick.ac.uk/cfsa](http://go.warwick.ac.uk/cfsa)

Active research collaborations with large facilities and space observatories are a distinctive feature of PhD research within CFSA.

**Fusion Plasma Physics Projects**

**Simulations of transport effects in laser-driven pellets for fusion energy.**

**Supervisor: Professor Tony Arber**

Experiments in the US and EU are currently trying to assess the feasibility of firing lasers directly at the deuterium-tritium fuel pellet to drive implosion and ultimately initiate fusion. This is all with a long-term goal of developing a laser driven fusion power source. One possible route forward is so called shock ignition. Here the laser power is kept low while the pellet is being compressed, to avoid deleterious plasma instabilities, and then the power is ramped up at the end to drive a final igniting shock. Crucial to understanding and designing experiments for shock ignition is a well-tested suite of computational codes. This project will begin by testing various algorithms for treating plasma thermal conduction in the regime relevant for shock ignition. Once the best scheme is identified and implemented the code will be used to model shock ignition experiments. The code (Odin) is being developed in the UK as part of a national collaboration so you would be joining a team of about 10 developers. It is hoped that the simulations from the final code will be used to help design and diagnose experiments on the Omega laser facility in New York. This project is also sponsored by industry and offers the opportunity to work with industrial collaborators.

You should be interested in computer programming and of course have an interest in fusion research. The PhD will train you for work in many industries and research facilities where HPC skills are critical in addition to opening the possibility of joining international teams working towards IFE. This is an especially exciting time for IFE with major facilities in the US, France and Japan just beginning to make significant progress towards ignition.