

## **Joint PhD in numerical plasma physics on nonlinear minimal states in fusion and astrophysical conditions**

**COVENTRY UNIVERSITY (UK)  
THE UNIVERSITY OF WARWICK (UK)**

Applications are invited to apply for a PhD studentship in numerical plasma physics. The project is a joint effort between the Applied Mathematics Research Centre, Coventry University and the Centre for Fusion, Space and Astrophysics, The University of Warwick.

Plasma physics is a rich scientific field with a broad range of applications such as astrophysical plasmas and magnetically confined fusion devices. The qualitative structure of plasmas varies in space and time, with quiescent states giving way to turbulent states in a process that is poorly understood and often not well-described by linear physics. As a result, stable plasma regimes can violently change when subject to small disturbances.

In all plasmas, nonlinear couplings are responsible for mixing the linear states available in the system. While linear modes can often be analytically determined, both linear non-normal coupling and nonlinear interactions act to quantitatively change the nature of the dynamics. As a result, the eigenvalue spectrum is a misleading guide to the system behaviour near the equilibrium point. Instead, a formalism has been developed to systematically define a minimal state which defines when a transitions between phases might occur. These minimal states can only be fully explored in numerical simulation of such complex plasma systems, but analytical progress may still be possible in some regimes.

The doctoral student will be in charge of developing the numerical code that will determine the minimal state for nonlinear plasma systems, by coupling it to a drift wave turbulence or Alfvén turbulence solver. The novel approach will allow the description of various problems in plasma physics. The student is expected to work with both advisers on the project, as well as to interact with scientists at the Culham Centre for Fusion Energy and other international research centers.

Successful candidates are expected to hold a MSc or equivalent in fluid mechanics, plasma physics or a related discipline (Physics/ Engineering/ Mathematics) and have a pronounced taste for numerical methods. The student will receive a tax-free bursary in excess of £13.5k per annum (approx. £17k Euros). Please note that this position is available to EU citizens only.

To apply, please forward a CV and academic records to Bogdan Teaca (Coventry University, [bogdan.teaca@coventry.ac.uk](mailto:bogdan.teaca@coventry.ac.uk)) or/and Ben McMillan (The University of Warwick, [B.F.McMillan@warwick.ac.uk](mailto:B.F.McMillan@warwick.ac.uk)). Informal enquiries are welcome. The position will be open until a suitable candidate is found.