# PhD Studentship in Space Plasma Physics

LANCASTER UNIVERSITY

**Lancaster University's Department of Communication Systems is pleased to invite applications for a 3-year funded PhD studentship.**

The Space Plasma Environment and Radio Science (SPEARS) Group at Lancaster University is internationally-recognised and is at the forefront of the interdisciplinary field of space research. A PhD with the SPEARS team promotes critical and creative thinking and is an opportunity to make a significant contribution to cutting-edge science in a field that is both exciting and economically relevant.

Here are samples of available research projects; for further details and additional projects see our website (http://www.dcs.lancs.ac.uk/spears/phd):

**Space Weather prediction**: STEREO (Solar TErrestrial RElations Observatory) is a joint NASA/ESA mission that has revolutionised our ability to monitor the effect of the Sun on the Earth. It provides the first ever, 3-D "stereo" images of the sun and transient features in the solar wind. Earth directed plasma eruptions on the Sun drive geomagnetic storms which greatly affect satellite operations, communications, power grids as well as influencing changes in atmsopheric chemistry. This project will use STEREO in conjunction with Earth-based facilities, particularly the Lancaster-led Global Riometer Array (GLORIA), to advance our understanding of how space weather affects different regions of the Earth. Ultimately this will enhance our ability to predict the effect of space weather and mitigate against the potentially huge societal and economic impact.

**Dusty plasma on the Moon:** A dusty plasma is a system consisting of electrons, ions and charged dust grains; this phenomenon is found throughout the universe, most notably in the Earth's own middle atmosphere and on the moon. Lunar dust is charged by its interaction with the surrounding plasma; the moon's orbit carries it through the solar wind and the Earth's own magnetotail. In this project we will study the effect of presence of dust particles on various plasma instabilities and fluctuations and then apply the theoretical results to the dusty plasma environment of the lunar surface. This is an important topic for future lunar missions; understanding how the charged dust behaves is essential for ensuring the continued safe operation of equipment and long-term manned exploration.

**Dusty plasmas on Earth:** Charged dust occurs naturally in the Earth's upper atmosphere from meteor showers; the study of this important substance is in its infancy. This project employs the world-leading EISCAT high-power radar facility in the Norwegian arctic to study the properties of the dusty plasma, in particular the charge level of dust grains as a function of plasma temperature. There is a large scope for active experimentation and making major inroads at the forefront of this young field of research.

**Artificial auroras:** Using high powered radio waves (from facilities in Norway, Alaska and the Caribbean) it is possible to manipulate localized regions in the Earth's ionosphere, accelerating electrons to high energies and produce light emissions. Observations of these artificial aurora provide a powerful tool for understanding how energy is transferred within a plasma on scales much larger than are possible in plasma laboratories. Thus the artificial aurora program is a unique method for probing fundamental physics and understanding processes that affect a substance that makes up the vast bulk of the visible universe.

**Application together with two references should be recieved by 5 pm Wednesday 25th March 2009.**

***Informal enquiries should be directed to Prof. Farideh Honary (f.honary@lancs.ac.uk). For further information regarding the application process, please contact Sandra Irving (email: s.irving@lancs.ac.uk or telephone 01524510390)***