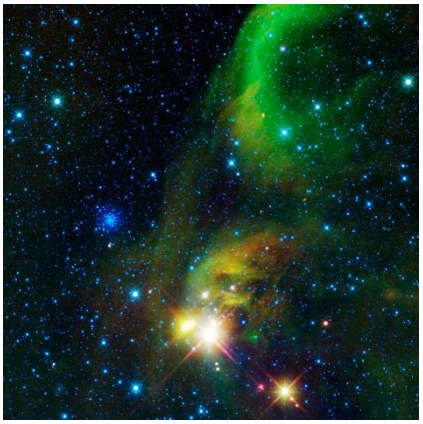
PhD Studentship project for full-time PhD study: Space & Atmospheric Physics Group, Physics Department, Imperial College London

PhD Project: Laboratory Astrophysics: Spectroscopy of astrophysically important elements and applications to astrophysics.

Research areas: atomic physics, spectroscopy, astrophysics and atmospheric physics



Background: The spectra of planetary atmospheres and stars are usually extremely complex: all the elements of the periodic table may contribute, as molecules or atoms in more than one stage of ionisation, blends of several lines are the rule rather than the exception. New high resolution spectrographs on ground- and space based telescopes give exciting spectra of stars and planetary atmospheres, but the laboratory atomic data (atomic energy levels, wavelengths etc) that are vital for the interpretation of the astrophysical spectra, are often too inaccurate and incomplete. Vast improvements are needed in many cases in knowledge of atomic spectra in the laboratory.

The Space & Atmospheric Physics group's Spectroscopy Laboratory has a Fourier Transform spectrometer which is unique - holding the short wavelength record for an instrument of its kind, and with its very high resolution and broad spectral range is ideal for studies of astrophysically important atoms and ions in the visible to ultra violet spectral range. Once an atomic spectrum has been recorded in the laboratory, an analysis of the spectrum is carried out to yield new atomic parameters over a broad spectral range (infra red through to ultraviolet) at unprecedented accuracy. We collaborate internationally on applications of the new atomic data. Examples include our work on the Gaia ESO survey of 100,000s Galactic stars to understand Galactic evolution.

Research Objectives: An STFC funded Ph.D. project is available to investigate astrophysically important atomic spectra using high resolution spectroscopy. Spectra to be studied will be carefully selected to be most relevant and urgently needed for astrophysics applications. The initial stage of the project is experimental in nature with spectra being studied in the UV and visible spectral region at Imperial College, and in the infra-red possibly at the National Institute of Standards and Technology (USA) or in Lund University (Sweden), with whom we regularly collaborate. The student would then undertake a full analysis of the spectra. We anticipate collaboration with theoretical atomic physics groups during this analysis stage. The new atomic data will then be applied in particular astrophysical spectral analyses through collaboration with astronomers. Examples of our recent research include working with teams investigating topics as diverse as Galactic evolution, time variation of the Fundamental constants, and understanding neutron star mergers.

You will gain: experimental expertise in a world-class laboratory, using unique instruments; experience undertaking experiments in laboratories abroad; learn about atomic physics; skills in theoretical analysis of spectra learning computational and analytical skills; experience working on applications of the new atomic data to analyses of particular astrophysical spectra.

The Student: The strongest candidates will have a first class degree in physics or astrophysics. This PhD suits a student who enjoys a combination of computational, analytical and experimental work.

Applications: information on how to apply can be found at - https://www.imperial.ac.uk/physics/students/admissions/postgraduate-admissions/postgraduate-research/ Please inform Prof Juliet Pickering j.pickering@imperial.ac.uk when you have submitted your online form. **Eligibility information** for Research Council studentship funding and other funding routes can be found at: http://www.imperial.ac.uk/study/pg/fees-and-funding/

Applications will be considered as they arrive, early application is recommended.

STFC Studentship starts: October 2023