Job Description

Post Doctoral Research Associate

Salary: Grade 7
Contract: Full time, fixed term starting 1st July 2025 and ending 30th June 2028
School/Department: School of Engineering, Mathematics and Physics, Department of Physics and Astronomy
Location: Canterbury campus
Responsible to: Dr P J Wozniakiewicz

Job purpose

The position is for a post-doctoral researcher to work on an STFC-funded project titled `Exploring the fundamentals of impact capture to maximize future dust collections'.

Dust is a fundamental component of our solar system, providing a snapshot of the source composition and a valuable window into the processes by which these bodies or regions have formed and evolved. Collection of this dust in space is, however, performed via high-speed capture into a variety of media, resulting in high pressures and temperatures that can alter particles. This project aims to determine the most appropriate methods to collect cosmic dust for three mission scenarios relating to space mission/experiment concepts currently in development:

- The collection of dust from the volcanic plumes of Io,
- The collection of dust from icy plumes of Enceladus,
- The opportunistic collection of dust in the Near-Earth environment by space hardware.

These will be investigated by simulating dust capture using the two-stage light gas gun at the University of Kent, and studying the samples that are generated.

Key accountabilities

- The successful candidate will work with Dr Penny Wozniakiewicz (Physics and Astronomy), Dr Jon Tandy (Chemistry and Forensic Sciences), Dr Gary Robinson (Biosciences), Dr Luke Alesbrook (Physics and Astronomy) and Prof (Emeritus) Mark Burchell (Physics and Astronomy) to investigate the modification of materials subjected to impact reflecting sample collection missions being considered at Io, Enceladus and Lunar Gateway. This work will culminate in reports summarising the effects of impact on the materials in question, as well as discussing the optimum capture medium for each mission scenario.

Key duties

The following are the main duties for the job. Other duties, commensurate with the grading of the job, may also be assigned from time to time.

- Prepare projectiles for use in analogue work: For Io samples, this will include grinding down bulk samples and sieving resulting powders. For Enceladus samples, this will include working with chemicals, biomolecules and microbes.
- Produce impact analogues using the light gas gun facility: The gun is maintained and operated by Dr Luke Alesbrook, but the researcher is responsible for the setup and retrieval of their samples (pre- and post-shot

respectively) and is expected to assist with the setup and cleaning of the gun. The opportunity also exists (for those who are keen) to learn to operate it during the course of the project.

- Analyse pre- and post-impact analogue samples using a range of analytical instrumentation including optical microscopes (mineralogical and biological), scanning electron microscopes, GC-MS, MP-AES and Raman spectroscopy, and methods appropriate for bio-related samples such as PCR and NMR.
- Interpret data.
- Use computer modelling to determine the peak shock pressures and temperatures experienced during an impact to aid interpretations i.e., use of python, spreadsheets etc, will be required.
- Present findings through presentations and publications.
- As well as planning the shot programmes, the role comes with a research budget, and one of the duties will be to source consumables/standards etc. deemed necessary for the analysis techniques used, but to stay within budget

Internal & external relationships

Internal: The successful candidate will work with Dr Penny Wozniakiewicz, Dr Jon Tandy, Dr Gary Robinson, Prof Mark Burchell and Dr Luke Alesbrook on a day-to-day basis. They will be provided with a shared office and make use of laboratory spaces shared with other researchers within Physics and Astronomy, Chemistry and Forensic Science and Biosciences.

External: The project has links with groups in the US and Europe who are leading mission proposals to Io and Enceladus. The successful candidate may be required to attend meetings with these groups as required.
Health, safety & wellbeing considerations

This job involves undertaking duties which include the following health, safety and wellbeing considerations:

- Regular use of Screen Display Equipment
- Repetitive limb movements (e.g. typing, use of power tools, microscopy, preparation of samples, etc.)
- Working with machinery (please specify any vibration hazards)
- Working with chemicals (inc. requirement to wear latex gloves and inc. work with CO2 or N2 gasses)
- Potential exposure to asbestos or other dusts
- Working in a laboratory which uses gunpowder to fire a gun.
- Biological Agents/Scientific Hazards (experiments/lasers etc, and waste/sewage)
- Working in confined spaces
- Prolonged physical/manual work/manual handling (inc. human beings)
- Working in isolation
- Pressure to meet important deadlines such as might be inherent in high profile projects
- There may be a requirement to work evenings and weekends
- Overseas travel is a requirement of the role

Person specification

The person specification details the necessary skills, qualifications, experience or other attributes needed to carry out the job. Applications will be measured against the criteria published below.

Selection panels will be looking for clear evidence and examples in an application, or cover letter (where applicable), which back-up any assertions made in relation to each criterion.

Essential Criteria:

- PhD (obtained or near completion) or equivalent research experience in planetary sciences, Earth sciences, materials sciences, chemistry or similar. Priority will be given to those with skills/experience/interests particularly relevant to the topic of this project. (A)

- Experience working in a scientific laboratory environment (A,I,T)
- Evidence of research excellence, including publications in internationally competitive journals and conference presentations (A,I,T)
- Good IT skills, particularly Microsoft Office packages (A)
- Ability to be an effective team worker (A,I)
- Enthusiasm, self-motivation and tenacity (I,T)
- Innovation and creativity within the research process (A,I)
- Firm commitment to achieving the University's vision and values, with a passion for a transformative student experience and multidisciplinary, impactful research (I)
- Commitment to deliver and promote equality, diversity and inclusivity in the day to day work of the role (I)

Desirable Criteria:

- Practical knowledge of SEM, GC-MS, MP-AES and/or Raman spectroscopy, including sample preparation, data analysis and interpretation (A,I,T).
- Familiarity with computational methods e.g. Python, LabVIEW, hydrocodes or similar (A,I,T)
- Familiarity with impact facilities such as gas guns, dust accelerators and/or experience with ballistics (A,I,T).
- Experience of completing health and safety and risk assessment documentation in a laboratory environment (A,I)
- Experience handling chemical and/or biological samples (A,I)
- Experience in budgeting and project planning (A)

Assessment stage: A - Application; I - Interview; T - Test/presentation at interview stage