



UNIVERSITY OF LEEDS

CANDIDATE BRIEF

Research Fellow in Atomic-Scale Simulation in Planetary Cores,
Faculty of Environment



Salary: Grade 7 (£33,797 – £40,322 p.a.) due to funding restrictions we are unlikely to offer a starting salary of more than £34,804 p.a.

Reference: ENVEE1388

Fixed term until 30 June 2023 (external funding)

We will consider job share/flexible working arrangements

Research Fellow in Atomic-scale Simulation in Planetary Cores

School of Earth and Environment, Faculty of Environment

Are you an ambitious researcher looking for your next challenge? Do you have a background in atomic-scale simulation or condensed-matter physics and an interest in applying your skills to understand the dynamics and evolution of planetary interiors? Do you want to further your career in one of the UK's leading research intensive Universities?

We are seeking a Research Fellow to fulfil a key role in our project by developing atomic-scale simulations of crystal nucleation in iron alloys to establish the conditions under which solids form and grow in Earth's core, then using these results to develop new models of the thermal and magnetic evolution of the Earth's core over the past 4.5 billion years. You will be based in the [deep Earth research group](#) within the [School of Earth and Environment](#) (SEE) at the University of Leeds and work closely with Dr. [Andrew Walker](#) and Dr [Chris Davies](#). You will also collaborate closely with Dr. [Monica Pozzo](#) and Prof. [Dario Alfè](#) at University College London (UCL). This work is part of the NERC-funded project "[Resolving the Inner Core Nucleation Paradox](#)" with the University of Leeds and UCL.

You will begin by using molecular dynamics to simulate crystallisation of iron alloys in Earth's core, generalising recent work by the group that has demonstrated the importance of crystal nucleation processes ([Davies, Pozzo, Alfè, Earth. Planet. Sci. Lett., 2019](#)). You will conduct simulations across a large range of pressure-temperature-composition conditions relevant to the Earth's deep core and produce detailed analyses of the processes of crystal nucleation and growth. This work will constrain the supercooling required to form crystals at Earth's centre. You will then incorporate these results into models that describe the long-term thermal and magnetic evolution of Earth's core. Using a Markov Chain Monte Carlo approach, you will provide robust bounds on key unknown quantities in deep Earth geophysics such as the age of the solid inner core and the present-day heat loss from the core.

You will have a PhD or be close to completion i.e. the initial thesis needs to have been handed in at the point of application in geophysics, physics or a similar highly numerical discipline with a strong background in computational modelling and atomic-



scale simulation. You will also have the ability to conduct independent research and a developing track record of publications in international journals. In addition, you will have excellent communication, planning, and team working skills.

What does the role entail?

As Research Fellow, your main duties will include:

- Designing, planning and undertaking a program of research in collaboration with Dr Chris Davies, Dr. Andrew Walker and co-investigators at UCL as part of the Natural Environment Research Council (NERC) funded project "[Resolving the Inner Core Nucleation Paradox](#)";
- Using molecular dynamics to simulate crystallisation of iron alloys in Earth's core, generalising recent work by the group ([Davies, Pozzo, Alfè, Earth. Planet. Sci. Lett., 2019](#));
- Generating and pursuing original research ideas in the appropriate subject area;
- Preparing papers for publication in leading international journals and disseminating research results through other recognised forms of output;
- Working both independently and also as part of a larger team of researchers, engaging in knowledge-transfer activities where appropriate and feasible;
- Maintaining your own continuing professional development and acting as a mentor to less experienced colleagues as appropriate;
- Contributing to the research culture of the School, where appropriate;
- Contributing to the training of both undergraduate and postgraduate students, where appropriate, including assisting with the supervision of projects in areas relevant to the project.

These duties provide a framework for the role and should not be regarded as a definitive list. Other reasonable duties may be required consistent with the grade of the post.

What will you bring to the role?

As a Research Fellow you will have:

- A PhD or be close to completion i.e. the initial thesis needs to have been handed in at the point of application in geophysics, physics or a similar highly numerical discipline;



- A strong background in atomic-scale simulation, preferably in molecular dynamics of molten metals;
- Experience of using High-Performance Computing facilities;
- Evidence of a strong commitment to publishing scientific results at an international level;
- Excellent written and verbal communication skills including presentation skills;
- Good time management and planning skills, with the ability to meet tight deadlines, manage competing demands and work effectively under pressure without close support;
- A proven ability to work well both individually and in a team;
- A strong commitment to your own continuous professional development.

You may also have:

- Knowledge and experience in applying the results of atomic-scale simulations to understand properties and processes of planetary interiors;
- Knowledge of the properties and processes in planetary cores;
- A track record of successful, high quality, research outputs;
- Experience of software development to enable research;

How to apply

You can apply for this role online; more guidance can be found on our [How to Apply](#) information page. Applications should be submitted by 23.59 (UK time) on the advertised closing date.

Contact information

To explore the post further or for any queries you may have, please contact:

Name of Hiring Manager: [Dr. Chris Davies](#)

Tel: +44 (0)113 343 1140

Email: c.davies@leeds.ac.uk

Additional information

Find out more about the [Faculty of Environment](#).

Find out more about our [School](#).



Find out more about our [Research and associated facilities](#).

Find out more about Athena Swan in the [Faculty](#).

Working at Leeds

You can find out more about our generous benefits package and more about what it is like to work at the University and live in the Leeds area on our [Working at Leeds](#) information page.

Candidates with disabilities

Information for candidates with disabilities, impairments or health conditions, including requesting alternative formats, can be found on our [Accessibility](#) information page or by getting in touch with us at disclosure@leeds.ac.uk.

Criminal record information

Rehabilitation of Offenders Act 1974

A criminal record check is not required for this position, however, all applicants will be required to declare if they have any 'unspent' criminal offences, including those pending.

Any offer of appointment will be, in accordance with our Criminal Records policy. You can find out more about required checks and declarations in our [Criminal Records](#) information.

