

## Job Description

### Research Associate (Software Engineering)

<b>Salary:</b>	Grade 7
<b>Contract:</b>	Full time, fixed term (10 months)
<b>School/Department:</b>	School of Engineering, Mathematics and Physics (Physics and Astronomy)
<b>Location:</b>	Canterbury Campus
<b>Responsible to:</b>	Dr Gunnar Möller

#### Job purpose

We are seeking a motivated Research Associate with strong software engineering skills and interest in computational physics, condensed matter physics or high-performance scientific computing to join an international physics collaboration focused on the sustainability, modernisation, and interoperability of scientific software used to simulate strongly correlated quantum systems.

The successful candidate will take the lead in implementing the software engineering objectives of the Software Sustainability Institute funded project Code modernisation of the DiagHam library and roadmap for modular multi-method integration of high-performance physics simulations for strongly correlated materials. The post holder will work closely with physicists, research software engineers, and international collaborators, to deliver the planned modernisation of the DiagHam software ecosystem through improved software infrastructure, automated testing, continuous integration, packaging, documentation, support for high-performance computing environments and interoperability with the internationally recognised ALPS (Algorithms and Libraries for Physics Simulations) project. The project also provides opportunities to explore modern software engineering approaches, including, where appropriate, AI-assisted development tools that support software maintenance, documentation, testing and code modernisation.

Applicants will normally hold a degree in Physics, Computer Science, Mathematics, Engineering or a related discipline, or demonstrable equivalent professional experience in software development. The successful candidate should be comfortable working with quantitative scientific software and numerical algorithms. Applications are welcomed from candidates with backgrounds in either research or industry.

For further information about the project please see:

DiagHam project – <https://nick-ux.org/diagham/>

ALPS project – <https://alps.comp-phys.org>

#### Key accountabilities and duties

- Deliver the software engineering objectives of the DiagHam–ALPS project within agreed milestones and timescales.
- Improve the maintainability, reliability, sustainability and reproducibility of the DiagHam software ecosystem.
- Contribute to the long-term development of research software through the adoption of modern software engineering practices.
- Develop interoperability between DiagHam and the ALPS software ecosystem.
- Work collaboratively with project partners to ensure high-quality, well-documented and maintainable software outputs.

- Contribute to project dissemination, training activities and community engagement.
- Develop and maintain research software using C++, Python and related technologies.
- Support migration of software infrastructure to modern version-control systems, build systems and development workflows.
- Develop automated testing, validation and continuous integration pipelines.
- Support software packaging, deployment and cross-platform distribution across Linux, Windows and macOS where appropriate.
- Develop interfaces and interoperability tools using standard scientific data formats (e.g. HDF5).
- Participate in software design discussions, code review and collaborative development activities.
- Support the development, deployment, testing and optimisation of computational physics software within high-performance computing environments where appropriate.
- Prepare technical documentation, tutorials and training materials and code releases.
- Organise, document and report software-development progress to the project team and funding body as required.
- Present project outputs at workshops, seminars and conferences.
- Build productive relationships with collaborators, users and the wider open-source community.
- Undertake appropriate professional development to maintain knowledge of software engineering and research software practices.

## Internal & external relationships

**Internal:** Project Lead, academic investigators, wider Physics of Quantum & Materials research group, technical staff, Research & Innovation Services, Research Software Community of Practice, students where appropriate.

**External:** DiagHam developers, ALPS collaborators, Flatiron Institute collaborators, Software Sustainability Institute, external researchers, open-source software communities and project users.

## 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
- Pressure to meet important deadlines such as might be inherent in high profile projects
- Occasional evening or weekend work associated with workshops or project deadlines.
- Ability to travel occasionally within the UK.
- Working in isolation

## 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:

- Degree in Physics, Computer Science, Mathematics, Engineering or a related discipline, or demonstrable equivalent professional software-development experience (A)
- Demonstrable software-development experience using C++, Python or closely related programming languages (A,I,T)

- Experience using modern version control systems (e.g. Git) as part of software development, including experience working with complex software projects (A,I,T)
- Experience developing software within Linux or other Unix-based environments (A,I,T)
- Experience of software testing, validation, quality assurance and/or continuous integration workflows (A,I,T)
- Demonstrated ability to develop, understand and validate software involving quantitative or numerical concepts, together with the ability to learn unfamiliar technical domains and solve complex technical problems (A,I,T)
- Ability to communicate effectively and work collaboratively with colleagues from different disciplinary or professional backgrounds (I)
- A firm commitment to fostering a working and learning environment that is respectful, inclusive and values diversity, including diversity of thought, and which enables staff and students from a wide range of backgrounds to thrive (I)

**Desirable Criteria:**

- Experience of scientific, engineering or research software development. (A,I)
- Experience with build systems (e.g. CMake), software packaging, deployment workflows, cloud infrastructure, or supporting software across multiple operating systems. (A,I,T)
- Experience developing, deploying, profiling or maintaining software in high-performance computing environments, including familiarity with parallel programming technologies (e.g. MPI, OpenMP, or GPU computing). (A,I)
- Knowledge of computational science, numerical simulation, computational physics or related technical disciplines. (I)
- Evidence of contributions to publicly available software, software releases, open-source projects, technical documentation, software publications, tutorials or other community resources. (A,I)
- Interest in, or experience with, AI-assisted software engineering tools and their application to software development, testing, documentation or maintenance. (A,I)

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