

Candidate Information

Position:	Research Fellow in Theoretical Atomic/Condensed Matter Physics
School/Department:	School of Mathematics and Physics
Reference:	19/107108
Closing Date:	Tuesday 19 February 2019
Salary:	£33,199 - £39,610 per annum (potential to progress to £43,266 per annum through sustained exceptional contribution)
Anticipated Interview Date:	Thursday 28 February 2019
Duration:	3 years

JOB PURPOSE:

The Research Fellow will work as a key member of the project team delivering the research programme "ANTI-ATOM: Many-body theory of antimatter interactions with atoms, molecules and condensed matter" funded by a prestigious 5-year European Research Council grant.

The aim of the ANTI-ATOM project is to develop theoretical and computational methodologies to investigate the fundamental interactions of positrons and positronium with atoms, molecules and condensed matter. A specific focus will be the development of (diagrammatic) many-body theory approaches to study the effects of positron-atom/molecule and positron-electron correlations on the processes of positron binding, scattering and annihilation in such systems. We will remain mindful of the potential impact of the insights gained on the development of positron-based technologies, materials diagnostic techniques, medical imaging etc.

The Research Fellow will specifically work to incorporate positrons into a state-of-the-art many-body theory based electronic structure code, to enable ab initio calculations of positron and positronium interactions with atoms, molecules and condensed matter. The balance of focus on atomic/molecular and condensed matter physics can be decided with the successful candidate based on their strengths and interests.

MAJOR DUTIES:

1. To develop and deliver the research objectives of the ANTI-ATOM ERC-funded research programme, under the direction of the Principal Investigator.
2. Read academic papers, journals and textbooks to keep abreast of developments in own specialism and related disciplines and to maintain awareness of the context of the research programme.
3. To understand and convey material of a specialist or highly technical nature and present regular progress reports on research to members of the research group or to external audiences to disseminate and publicise research findings.
4. To publish high quality outputs, including papers for submission to peer-reviewed journals and papers for presentation at conferences and workshops under the direction of the Principal Investigator.
5. Contribute to and assist in the preparation and development of funding proposal applications to external bodies.
6. May assist with supervision of PhD students, and undertake lecturing/teaching duties within the post holder's area of expertise and under the direct guidance of a member of academic staff, for the purposes of their career development.
7. Carry out routine administrative tasks associated with the research project/s to ensure that project/s are completed on time and within budget.

Planning and Organising:

1. Plan own day-to day activity within framework of the agreed research programme.
2. Plan to meet specific objectives of research programme (up to a year in advance) and to meet deadlines for journal publications and to prepare presentations and papers for conferences.
3. Coordinate and liaise with other team members and international collaborators to achieve progress against objectives.

Resource Management Responsibilities:

1. Ensure research resources are used in an effective and efficient manner.
2. Provide guidance as required to support staff and any students who may be assisting with research.

Internal and External Relationships:

1. Liaise with and sustain regular contact with colleagues, students and other team members, especially to facilitate progress against objectives.
2. Build internal and external contacts and participate in networks for the exchange of information and to form relationships for collaboration.
3. Join external networks to share information and ideas.
4. Contribute to the School's outreach programme by establishing links with local community groups, industries etc.

ESSENTIAL CRITERIA:

1. Have or be about to obtain a PhD in theoretical/computational physics or chemistry, or a closely related subject, e.g., computational materials science.
2. At least 3 years research experience (including time to complete PhD).
3. Have experience in any of: atomic/molecular structure and scattering theory, electronic structure of condensed matter, QED/quantum field theory, many-body theory, diagrammatic Monte Carlo, theoretical chemistry (first-principles calculations of molecular structure). We will also consider candidates with expertise in a closely related topic that will enable them to meaningfully contribute to the research programme.
4. A willingness to learn and apply many-body theory and develop computer codes that implement it.
5. Proven experience and skills in developing codes for scientific computing, in Fortran, C++ etc.
6. Must have published paper(s) in quality journals to a level commensurate with their research experience.
7. Be highly motivated with ability to work independently on own initiative and to strict deadlines.
8. Evidence of excellent communication skills, including ability to communicate complex information clearly in both written and spoken English.
9. Evidence of strong presentation skills and ability to prepare clear and concise presentation materials.

DESIRABLE CRITERIA:

1. Sufficient breadth and depth of specialist knowledge to contribute to the ERC research programme, evidenced by a track record of high quality research commensurate with career stage in more than one of the following topics: many-body theory, atomic structure and scattering theory and computation, theory and computation of condensed matter, many-body theory, calculations of electronic structure of condensed matter, diagrammatic Monte Carlo, or related topics.
2. Experience in developing electronic structure codes for molecules or condensed matter, in particularly many-body theory based codes (that implement GW and Bethe Salpeter etc).
3. Experience with B-spline or Gaussian basis approaches to calculations describing quantum mechanical properties/processes.
4. Previous postdoctoral experience in one of the relevant topics, or evidence of successful independent research experience.
5. Experience in developing and running modular and parallel computer programs on computing clusters.
6. Previous experience of developing project funding or Fellowship proposals from competitive sources for own research or outreach activities.
7. Experience in working on multidisciplinary projects.
8. A track record of presenting research at conferences, symposia, or meetings, commensurate with career stage.
9. Experience of promoting science to the general public.
10. Willingness to contribute to the development and implementation of an outreach programme, under the direction of the Principal Investigator.
11. Willingness to develop new funding applications, whether driven by the outcomes of the ERC research or otherwise.
12. 1st-class undergraduate degree in physics, chemistry, materials science or related subject.
13. Evidence of participation in training/mentoring of students or junior staff.
14. Willingness to attend meetings and conferences nationally and internationally as requested, i.e. is prepared to travel.
15. Ability to interact constructively with others including senior academic staff and collaborators.