MANCHESTER 1824
The University of Manchester

THE UNIVERSITY OF MANCHESTER

PARTICULARS OF APPOINTMENT

FACULTY OF SCIENCE & ENGINEERING

SCHOOL OF NATURAL SCIENCES

DEPARTMENT OF PHYSICS AND ASTRONOMY

RESEARCH ASSOCIATE IN CONDENSED MATTER THEORY AND MODELLING OF 2D QUANTUM MAGNETISM

VACANCY REF: S&E-15348

Salary:	£32,816 to £40,322 per annum, depending on relevant experience
Hours:	Full Time
Duration:	Fixed Term, from 1 January 2021 until 31 December 2023
Location:	Oxford Road, Manchester

Enquiries about the vacancy, shortlisting and interviews:
Contact: Dr. Alessandro Principi, Lecturer in Theoretical Physics
Email: alessandro.principi@manchester.ac.uk

BACKGROUND

The Department of Physics and Astronomy is one of the largest and most active in Britain with 85 academic staff, 70 postdoctoral research associates, 1150 undergraduate / postgraduate students and 180 research / support staff.

Physics and Astronomy at Manchester was ranked 13th in the world by the Academic Ranking of World Universities (ARWU) in 2015. This places it second in Europe. In 2014, Manchester was ranked third in the UK in terms of the percentage of "world-leading (4*)" rated research and first for impact, in the HEFCE Research Excellence Framework. The School values teaching highly and has a National Student Survey (NSS) score that averages 93.5% throughout the years that this survey has been carried out. P&A research is based in four topical divisions: Accelerator, Nuclear and Particle Physics; Condensed Matter (which includes Prof. Andre Geim and Prof. Konstantin Novoselov who won the 2010 Nobel Prize in Physics for their work on graphene); and Jodrell Bank Centre for Astrophysics. The activities in the Theoretical Physics Division cut across all of the above fields. Further information on the Department of Physics and Astronomy can be found at www.physics.manchester.ac.uk

The project "controlling magnetism in multilayers of van-der-Waals materials" has two main goals: (i) to develop the theories of magnetic and quantum orders, textures and topological excitations of stacks of 2D materials; (ii) to study the interplay between magnetism and

optics/electronics, to reveal such characteristics. Two Research Associates are hired to tackle each of these objectives. In the new exciting field of magnetism and quantum order in van-der-Waals materials, many fundamental questions are rapidly emerging, for example regarding the role of strain, stacking, pressure, gates and doping, as well as the coupling between magnetism, transport and optics. In particular, orders realised in 2D materials can be radically different from those found in bulk crystals, and change when these are embedded or stacked into (twisted) VdW heterostructures. In this project the Research Associates will on the one hand address the impact of external perturbations and local environment on magnetic and quantum orders and, on the other hand, investigate their interplay with optics/electronics.

Overall Purpose of the Job

The two Research Associates will contribute to the research briefly detailed above by developing theories under the guidance of Dr. Alessandro Principi and Dr. Yang Xian.

Key Responsibilities, Accountabilities or Duties

The range of duties will include:

- Deliver world leading research in magnetic/quantum-order properties of two-dimensional materials and nanostructures, as well as their interplay with optics/electronics.
- Support the experimental work carried out by experimental groups at the Department of Physics and Astronomy and the National Graphene Institute, by interpreting their experimental results and proposing new experiments.
- Report regularly new results at the theory group meetings and journal clubs.
- Publish in leading journals to disseminate the new results and present them at national and international conferences.
- To assist the supervisors in the preparation of grant applications.
- To assist in the supervision of research projects related to the proposal and carried out by PhD and Master Students.
- To act at all times in accordance with the University's policies and procedures related to Equal Opportunities, Health & Safety, and all other policies and procedures which apply to this post.
- To undertake appropriate training and development activities.
- Participating in admissions processes and outreach activities of the Department when directed to do so.
- Demonstrating a commitment to Equality, Diversity and Inclusion policies and activities and support the development and delivery of related initiatives.

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PERSON SPECIFICATION

Essential Knowledge, Skills and Experience

- Applicants should hold or be close to acquiring a PhD in Theoretical Condensed Matter Physics or related subjects.
- Research experience (proven by the publication record) in Condensed Matter Physics, preferably including Green functions and diagrammatic field theory techniques applied to quantum equilibrium and/or transport problems or modelling of magnetic, quantum-order, optical and electronic properties of 2D materials and van-der-Waals heterostructures.
- Good computational skills.
- Excellent communication and interpersonal skills.
- Excellent time management and organisational skills.
- Ability to work independently and as part of a team.
- Ability to liaise confidently and effectively with a range of individuals.
- Flexible approach to dealing with research problems as they arise.
- Willingness to learn and develop.
- Ability to present in both written and oral publications.
- Ability to meet deadlines.
- Understand equal opportunity issues as they may impact on areas of research content.