

**THE UNIVERSITY OF MANCHESTER**  
**PARTICULARS OF APPOINTMENT**  
**FACULTY OF SCIENCE & ENGINEERING**  
**SCHOOL OF NATURAL SCIENCES**  
**DEPARTMENT OF PHYSICS & ASTRONOMY**  
**RESEARCH ASSOCIATE IN CONDENSED MATTER THEORY AND**  
**MODELLING OF QUANTUM 2D MATERIALS (2 P0STS)**

**VACANCY REF: SAE-018755**

**Salary:** Grade 6, £33,309 to £40,927 per annum, depending on relevant experience

**Hours:** Full Time

**Duration:** Fixed term from 1 July 2022 until 31 August 2023

**Location:** Oxford Road, Manchester

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**Enquiries about the vacancy, shortlisting and interviews:**

Name: Vladmir Falko

Email: [Vladmir.falko@manchester.ac.uk](mailto:Vladmir.falko@manchester.ac.uk)

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**Background**

**Condensed Matter Physics Group**

The group comprises 12 academics and dozens of researchers and post-graduate students. It is highly collaborative and internationally-leading across the major thematic areas: graphene and 2D materials, superconductivity, plasmonics, spintronics, nanofluidics and superfluidity. The flagship activities focus on freestanding 2D crystalline materials, including graphene, hexagonal boron nitride, and MoS<sub>2</sub>, and their applications. The experimental research benefits from world-class cryogenic and nanofabrication facilities; active theoretical support is provided by theorists in the Department. Building on the Nobel prize-winning discoveries made at Manchester, many of these activities are based in the National Graphene Institute and the Henry Royce Institute - the international hubs for graphene and 2D materials research.

**Overall Purpose of the Job:**

This is an opportunity for talented researchers in condensed matter theory to study physical

properties (electronic band structure, electronic transport, optical and thermoelectric) of two-dimensional materials, their heterostructures, and devices based on such materials.

They are based at the National Graphene Institute (NGI), a world-class science and technology Centre with a broad scope of research in two-dimensional materials.

We seek theorists with experience (proven by publications record) in physics of two-dimensional materials, quantum transport studies, or in strongly correlated quantum systems. Skills in field-theory methods in condensed matter theory or *ab initio* modelling using density functional theory will be equally welcome.

Funding is provided by the EC funded Graphene Flagship Core 3 project, which involves collaboration with experimental groups at the NGI and Cambridge Graphene Centre.

### **Key Responsibilities, Accountabilities or Duties:**

#### **Overall purpose of role:**

You will contribute to research at the National Graphene Institute funded by EC grant Graphene Flagship.

#### **Main responsibilities**

You will be responsible for the following:

- Delivering world leading research in electronic, magnetic, optical and thermoelectric properties of two-dimensional materials (2DM) and 2DM-based nanostructures.
- Support of experimental work carried out by experimental groups at the National Graphene Institute, by interpreting their experimental results and proposing new experiments.
- To report regularly new results at the theory group meetings, to contribute towards writing papers disseminating the new results in publications in refereed journals, and to report them at conferences.
- Publishing in leading journals and presenting at international conferences.

#### **General duties**

- To assist Professor Falko in the supervision of condensed matter theory and materials theory research projects 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.
- Participation in outreach activities when directed.
- Contribute to the social responsibility agenda of the University and demonstrate a commitment to Equality, Diversity and Inclusion policies and activities and support the development and delivery of related initiatives.

### **PERSON SPECIFICATION**

Essential Knowledge, skills and experience:

- Applicants should hold or be close to acquiring a PhD or equivalent in theoretical condensed matter physics, or in computational physics (e.g., *ab initio* modelling using density functional theory).
- Research experience (proven by the publication record) in solid state theory, including Green functions and diagrammatic field theory techniques applied to quantum transport problems or

modelling of optical properties of semiconductors, or atomistic modelling of materials (e.g., density functional theory).

- Computational skills.
- Good communication skills, both written and spoken.
- A strong personal commitment to equality, diversity, inclusion and accessibility.