



University of Oxford

Postdoctoral Researcher in Theoretical Quantum Optics of Quantum Many-Body Systems

Applications are invited for a 2-year Postdoctoral position in Theoretical Quantum Optics of Quantum Many-Body Systems at the University of Oxford. **The deadline is 19 May 2013.**

The project's target is merging quantum optics and many-body physics of ultracold quantum gases, using theoretical methods of atomic and condensed matter physics. The post-holder will address phenomena, where the quantum natures of both light and ultracold matter play equally important roles.

Both quantum optics and many-body physics of the lowest achievable temperatures are very active fields of modern research. However, the interaction between them is far from being complete. For example, in the most theoretical and experimental works on ultracold atoms (e.g. in optical lattices), the role of light is reduced to a classical auxiliary tool for preparing intriguing atomic states. In contrast, the main goal of this project is to develop a theory of the phenomena, where the quantizations of light and matter are both crucial. Modern experimental studies are just entering such an ultimate quantum regime of the light-matter interaction, and willingness to collaborate with other groups in Oxford, UK and overseas is required.

In such fully quantum problems, the quantumness of the measurement procedures is typically important as well. The entanglement plays a key role, allowing for application in quantum information processing, quantum simulations and quantum metrology. The ultimate goal is to develop a theory of quantum control for strongly correlated many-body systems, which is currently unavailable. Moreover, the models developed for atoms can be applied for studying quasiparticles in conventional condensed matter systems (e.g. semiconductor structures used in quantum nanophotonics or superconductors). For more information, please, visit the group web-page at www.physics.ox.ac.uk/research/quantum-optics-of-quantum-many-body-systems

Applicants should possess (or be close to obtaining) a PhD in physics and have strong experience in theory of quantum many-body systems (in the ultracold atom or condensed matter contexts), quantum optics and measurements, as well as in numerical modelling.

To express intention to apply and for informal enquiries, please, contact the Group leader Dr. Igor Mekhov (www.physics.ox.ac.uk/contacts/people/Mekhov). Applications must be submitted online via the Department of Physics web-site, where the **Further details and application procedure** are available (vacancy ref.: 107135), **before 19 May 2013**. You are required to upload a statement of research (maximum two pages), CV and details of three referees as part of your online application.