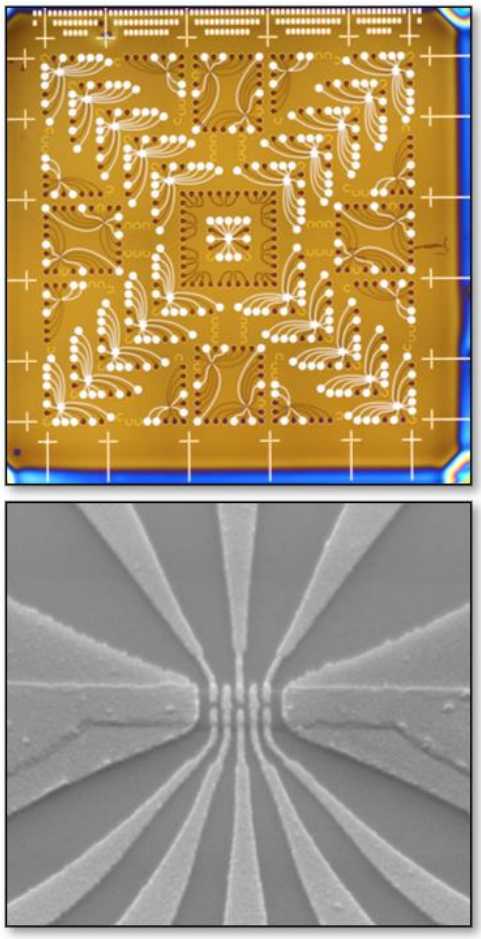
Postdoc on Electron Transport in Complex Oxide Quantum Dots



Are you passionate about experimental research in condensed matter physics, experienced in the art of clean-room fabrication, and curious about quantum information and how novel materials properties manifest in electronic quantum transport phenomena at ultra-low temperatures? Then maybe you are the one we are looking for!

Electronic quantum devices are conventionally fabricated from semiconductor GaAs/AlGaAs or Si/Ge heterostructures or III-V semiconductor nanostructures. In these materials, transport can generally be understood from a free-electron-gas picture, and electrical devices can be effectively controlled by electrostatic gating at the nanoscale.
Electron systems in oxide heterostructures are emerging as an exciting alternative class of materials where the free-electron-gas picture starts to break down due to significant electron-electron interaction. On the one hand, complex oxides offer high electron mobilities and gate-tunability, and devices can be fabricated using established semiconductor processing techniques. However, on the other hand, oxide 2DEGs are characterized by a delicate interplay of the spin, charge, and orbital degrees of freedom, and their properties are dominated by effects of strong correlations such as ferroelectricity, magnetism, or intrinsic gate-tunable superconductivity. This opens an exciting possibility to generate new functionalities in electronic quantum devices not possible with conventional semiconductors.

We have an opening for a 2-year postdoc to join an international project – IQARO – aimed at utilizing the strong Rashba spin-orbit coupling and spin-to-charge conversion of oxide heterostructures for application in spin-qubits. High-quality oxide heterostructures and nanostructures are developed within the consortium, and the main activities for the successful candidate will be clean-room device fabrication (lithography, etc.) and detailed quantum transport measurements at milli-kelvin temperatures. Gate-defined oxide quantum dots and qubits will be fabricated using DTU's on-campus state-of-the-art clean-room facilities, and quantum transport measurements will be carried out in a dedicated dilution refrigerator setup at DTU Energy.

Responsibilities and qualifications

In the section for functional oxides, we currently have a large portfolio of projects focusing on the growth of advanced oxide heterostructures. In addition to fabrication and measurements of oxide quantum devices, the candidate will be broadly involved in these activities to strengthen the link between the materials science of the section and electronic device fabrication as well as low temperature measurements.

Qualifications

- Experimental PhD in Physics, Nanoscience, Materials Science, Electrical Engineering, or similar
- A strong background in semiconductor processing (e-beam lithography, metal evaporation, etching techniques etc.)
- Experience in low-temperature quantum transport measurements is advantageous, but not a requirement.
- Ability to work independently, to plan, and carry out complicated tasks, and to be a part of a large, dynamical group.
- Good communication skills in English, both written and spoken

As a formal qualification, you must hold a PhD degree (or equivalent).

We offer

DTU is a leading technical university globally recognized for the excellence of its research, education, innovation and scientific advice. We offer a rewarding and challenging job in an international environment. We strive for academic excellence in an environment characterized by collegial respect and academic freedom tempered by responsibility.

Salary and terms of employment

The appointment will be based on the collective agreement with the Danish Confederation of Professional Associations. The allowance will be agreed upon with the relevant union.

The period of employment is 2 years with the possibility for extension.

You can read more about career paths at DTU here.

Further information

Further information may be obtained from Prof. Thomas Jespersen, tsaje@dtu.dk

You can read more about DTU Energy at www.energy.dtu.dk and www.fox.energy.dtu.dk

If you are applying from abroad, you may find useful information on working in Denmark and at DTU at DTU – Moving to Denmark.

Application procedure

Your complete online application must be submitted no later than **Monday Feb 26th at 13:00. (Danish time)**.

Apply at www.dtu.dk here: LINK