

Postdoc position in optical interfaces to electrically controlled spin qubits

Quantum Technologies Group (RWTH Aachen) conducts research in semiconductor spin-qubits and SQUID spectroscopy. It addresses issues of optimization of individual spin qubits in GaAs and Si and their scalability. It tackles problems in materials, device fabrication, qubit control electronics and automation. Peter Grünberg Institute – 9 (Forschungszentrum Jülich) conducts research in materials and devices for future information technologies including quantum computation, neuromorphic computation. The material base includes semiconductor heterostructures (III-Vs, II-Vis, Si-Ge-Sn) and nanostructures (nanowires and quantum dots) as well as 3-dimensional topological insulators and phase change materials. The state-of-the-art material growth and deposition techniques that are available in the institute are fundamental to the development of high quality devices as needed for the future information technologies.

Currently, in collaboration between the two institutes, we are looking to recruit a postdoctoral researcher to develop optical interface devices to singlet-triplet qubits in gate defined quantum dots in III-V heterostructures. High fidelity quantum state transfer between spins and photons is needed for quantum networks, with cluster quantum computing or quantum communication being examples of such networks. This collaboration is a part of a larger effort in the quantum computing program of the Forschungszentrum Jülich and the cluster of excellence ML4Q.

Applications are invited from individuals who are interested in contributing to the development of optical interface devices and algorithms for the quantum state transfer between a photon and the singlet-triplet qubit. The selected candidate is expected to focus their research on one or more of the following areas:

- Characterization of the performance of the singlet-triplet qubit with an epitaxial quantum dot serving as a photon qubit receiver in its proximity.
- Characterization of the spin-photon conversion in the epitaxial quantum dots in the device.
- Controlling the spin transfer between the quantum dots in the device.
- Design and execution of protocols for the operation of the device.
- Design of devices and their fabrication.

Application are welcome from individuals who have:

- A PhD in Physics or Engineering Sciences with focus on quantum technologies.
- Experience in electrical and/or optical characterization of devices.
- Experience in the design and execution of experiments (hardware and ideally also software).

Application Process:

Applications shall be submitted via email to b.kardynal@fz-juelich.de no later than midnight of 30th September 2019. The candidates are expected to be available for interviews in the second half of October 2019. Should you have any questions about the application process or regarding vacancies please contact Prof. B. Kardynal (b.kardynal@fz-juelich.de) or Prof. Hendrik Bluhm (bluhm@physik.rwth-aachen.de).