Universität Basel

Research Project

QLSI : Quantum Computing – Large-Scale Integration

Third-party funded project

Project title QLSI : Quantum Computing – Large-Scale Integration
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Organisation / Research unit
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Department
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We propose a 4-year project QLSI, Quantum Large Scale Integration in Silicon, which objective is to demonstrate that silicon spin qubits are a compelling platform for scaling to very large numbers of qubits. Our demonstration relies on four ingredients: •Fabrication and operation of 16-qubit quantum processors based on industry-compatible semiconductor technology; •Demonstration of high-fidelity (>99%) single- and two-qubit gates, read-out and initialization; •Demonstration of a quantum computer prototype, with online open-access for the community (up to 8 qubits available online); •Documentation of the detailed requirements to address scalability towards large systems >1000 qubits. To achieve these results, our consortium brings together an unrivalled multidisciplinary team of European groups in academia, RTOs and industry working on silicon-based quantum devices. These groups are committed to playing an active part in developing the industrial ecosystem in silicon-based quantum technologies. QLSI is structured in three enabling toolboxes and one demonstration and scalability activity: - the semiconductor toolbox brings together skills from the semiconductor industry such as fabrication, high throughput test and CAD (computer aided design) with the expertise of the physics community; - the quantum toolbox gathers skills from the physics community on spin and quantum properties of Si based nanostructures and on quantum engineering from theory and experience perspectives; - the control toolbox gathers teams with instrumentation skills ranging from RF signal generation, automation and set up of high throughput characterization at low temperature. The toolboxes will generate stand-alone beyond the state-of-the-art results and will generate inputs to feed the demonstrator and scalability activity, which will integrate devices, hardware and software solutions to create an online open access demonstrator, to perform hybrid computation and to analyze scalability.

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