PRESS RELEASE

QSolid Project Marks a Key Milestone for Germany's Quantum Ecosystem

QSolid Quantum Computer Now Accessible to External Users

Scientists at Forschungszentrum Jülich, together with partners from the QSolid consortium, which includes the Fraunhofer Institute for Photonic Microsystems IPMS, have achieved a significant project milestone: the project team has successfully integrated the prototype of a quantum computer into the Jülich Supercomputing Centre's infrastructure, known as JUNIQ. For Fraunhofer IPMS as an active project partner, this progress represents a significant milestone on the path to a powerful and trustworthy German quantum ecosystem.

Just three and a half years after the project's kick-off, the prototype of a system-integrated quantum computer is being made available to external users for an initial two-week test phase starting on 17 November 2025. "It is an outstanding achievement by our team to have succeeded in building a complete prototype from scratch. From the chip upwards, it consists of hardware developed at Forschungszentrum Jülich. In addition, another prototype will be launched in January. The feedback from our first users will now be crucial to further optimise the quantum computer," explains Prof. Dr. Frank Wilhelm-Mauch, coordinator of QSolid.
The computer, currently operating with a capacity of 10-qubits, will be accessible via the JuDoor cloud platform. The term qubit, short for quantum bit, refers to the fundamental unit of quantum information.

Close Partner Cooperation Leads to Successful System Integration

The development and integration of the software stack, a collection of functional software components, was achieved through close collaboration between research institutions and industrial partners. The companies Qruise and Eviden, key providers in the fields of quantum firmware and high-performance computing, supplied the necessary software components, while Forschungszentrum Jülich carried out the professional system integration. "On the path from a physics experiment to a full prototype, we must always keep an eye on the compatibility and interplay of the components. This is often underestimated in research," says Dr. Paolo Bianco, head of the system engineering team at Forschungszentrum Jülich.

Fraunhofer IPMS is playing a key role in developing future generations of quantum processors as part of the QSolid project. This includes, firstly, the cryogenic characterisation of CMOS circuits in collaboration with GlobalFoundries. Secondly, as

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part of the Fraunhofer Center for Advanced CMOS and Heterointegration Saxony (CEASAX), the institute is collaborating with Fraunhofer IZM-ASSID on advanced cryogenic packaging structures, which compactly connect the quantum and control chips via an interposer. This work is crucial for efficiently transmitting signals in scalable quantum processors with larger numbers of qubits and for laying the foundation for the next generation of quantum computers.

The industrial partners ParTec, ParityQC, and HQS Quantum Simulations will be the first users outside Jülich's infrastructure to participate in the two-week test run. This pilot phase will soon be followed by another one using updated software. Hardware improvements are also planned: the team led by Prof. Dr. Rami Barends (Forschungszentrum Jülich) will soon replace the current quantum chip with another even more powerful version.

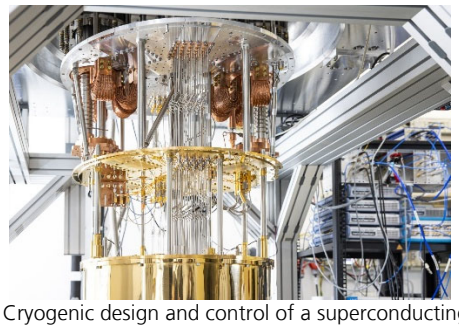
A Strong Signal for the 'High-Tech Agenda Germany'

Just two weeks after the launch event of the 'High-Tech Agenda Germany', initiated by the Federal Ministry for Research, Technology and Space (BMFTR), QSolid's success marks a significant momentum. The research project, with a total budget of €76.3 million, demonstrates that German scientists already contribute to shaping European cutting-edge research in a key technology area of the agenda. "The system integration serves as a blueprint for developing a German quantum computer. From a technical perspective, it represents an ideal starting point for the High-Tech Agenda Germany of the Federal Ministry for Research, Technology and Space," states Wilhelm-Mauch. "Zitat"

About Fraunhofer IPMS

Fraunhofer IPMS is a leading international research and development service provider for electronic and photonic microsystems in the application fields of Smart Industrial Solutions, Bio and Health, Mobility as well as Green and Sustainable Microelectronics. Research focuses on customer-specific miniaturized sensors and actuators, MEMS systems, microdisplays and integrated circuits as well as wireless and wired data communication. The institute develops systems and components on 200 and 300 mm wafers in their state-of-the-art clean rooms. Services range from consulting and design to process development and pilot series production. With the Center Nanoelectronic Technologies (CNT), Fraunhofer IPMS offers applied research on 300 mm wafers for microchip producers, suppliers, device manufacturers and R&D partners.

Images



Cryogenic design and control of a superconducting quantum computer at Forschungszentrum Jülich.
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300-mm-cleanroom at Fraunhofer IPMS.
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