

PRESS RELEASE

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Quantum computing: Achieving a breakthrough by pooling our expertise

Fraunhofer IAO, Fraunhofer IPA and the IAT of the University of Stuttgart are pooling their research expertise to set up the cross-institute Fraunhofer Lab “flaQship”. The lab focuses on applied quantum computing in Stuttgart and Heilbronn.

The flourishing research landscape in the field of quantum computing provides the ideal conditions for utilizing this new key technology for industrial applications in the near future. But how can progress in research and innovation be achieved even more efficiently? The quantum team from the Fraunhofer Institute for Manufacturing Engineering and Automation IPA is focusing on exploiting the potential of synergies: Together with the IAT at the University of Stuttgart and the Fraunhofer Institute for Industrial Engineering IAO, the teams are pooling their research expertise in the new flaQship research lab.

The flaQship builds bridges between theory and practice with the help of internationally networked, outstanding research. With a particular focus on Stuttgart and Heilbronn, the lab brings applied research to companies along the entire value chain. It thus acts as a central contact point for business, research and politics. “We look forward to working together to establish Stuttgart and Heilbronn as a center for applied quantum computing. By deepening our long-standing cooperation, we are opening up new opportunities in research and technology transfer,” says Marco Roth, head of the Quantum Computing team at Fraunhofer IPA.

Applied quantum computing research at the forefront

The lab focuses on applied quantum computing research and thus the utilization of quantum computing for industry. “Quantum computing will revolutionize the way we solve complex problems, but only if hardware, software and application development go hand in hand. Our aim is to develop quantum computing in a technology and demand-driven way that creates real added value for companies and society alike,” says Prof. Katharina Hölzle, director of the Institute of Human Factors and Technology Management IAT at the University of Stuttgart and of Fraunhofer IAO. The focus areas include quantum machine learning, material simulation and quantum chemistry, error correction and hybrid computations. The teams also conduct research in the areas of quantum service engineering, high-performance computing and quantum computing business models, and develop innovative formats for the related knowledge transfer.



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Two central projects are the focus of the flaQship:

At the Competence Center Quantum Computing Baden-Württemberg (KQCBW), the two quantum computing teams have been developing applied quantum algorithms with a focus on hardware-efficient implementation since 2020. As part of a systematic project evaluation, the consortium presented its interim results in February 2025, which will be introduced to the public at the international trade fair "Quantum Effects" in October.

The ongoing collaboration between the institutes in the recently established Fraunhofer Research and Innovation Centers in Heilbronn (HNFIZ) focuses on applied quantum AI. Dr. Christian Tutschku, head of the Quantum Computing team at Fraunhofer IAO, explains: "In a competitive world, it is important to embrace innovative forms of collaboration, build strong partnerships and create networked knowledge hubs for research topics. Together, we are far more than the sum of our parts."



The team of the recently founded Fraunhofer Lab "flaQship".

Source: Fraunhofer IAO/Picture: Ludmilla Parsyak

Symposium ML4QT in Heilbronn: Strong global networking through international collaboration

One of the first steps in the project involves the flaQship organizing the symposium "Machine Learning to Accelerate Quantum Technologies (ML4QT)" in cooperation with the University of Waterloo from July 7 to 8, 2025, at the experimenta in Heilbronn. The symposium will bring together international experts to explore how today's ML methods can advance quantum technology research in a multi-faceted way.

More Information:
www.flaqship.eu/

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Founded in 1949, the Fraunhofer-Gesellschaft currently operates 76 institutes and research units throughout Germany. Its nearly 32,000 employees, predominantly scientists and engineers, work with an annual business volume of 3.4 billion euros; 3.0 billion euros of this stems from contract research, which is divided into three funding pillars. Fraunhofer generates a share of this from industry and license-fee revenue, totaling 836 million euros. This high proportion of industrial revenue is Fraunhofer's unique selling point in the German research landscape. Another share of contract research revenue comes from publicly funded research projects. The final share is base funding supplied by the German federal and state governments and enables our institutes to develop solutions now that will become relevant to the private sector and society in a few years.