

# PRESS RELEASE

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Applied Quantum Computing at the Fraunhofer ITWM: What Is Possible?

## Staking Out the Quantum Frontiers: Results of the »Applied Quantum Computing« Project

**The project »Applied Quantum Computing« (AnQuC), funded by the Rhineland-Palatinate state government, will come to an end at the end of April 2024. The Fraunhofer ITWM's Quantum Computing working group has therefore now met with the industrial advisory board, which accompanied the project for two years, for a final summary.**

All participants agreed that groundbreaking algorithms and methods for a wide range of applications in chemistry, financial mathematics, image processing and flow and material simulation were developed during the project. In addition to new algorithms in the field of quantum machine learning, coding and decoding techniques were improved and thorough benchmarks of quantum hardware and algorithms were established. The meeting focused primarily on recent advances, such as the novel models for coding image data, which have significantly reduced the number of qubits needed and made circuits less sensitive to noise.

### Next Generation Already Doing Research

The research work of doctoral students Thomas Cheng, Tom Ewen, and Alexander Geng was also in the spotlight: from quantum transfer learning and the search for quantum architectures to innovative encryption and compression techniques, they are exploring the limits of quantum computing in their dissertations.

In order to stabilize this research, the state launched the »Quantum Initiative Rhineland-Palatinate« (QUIP) in 2023. With great success: 35 doctoral students and postdocs are already researching quantum topics, and the internships have all been filled.

### What Happens Next?

Here, too, there was unanimity among the participants: AnQuC has not only consolidated its position in the quantum world but has also set the course for future explorations. In the future, quantum informatics will increasingly come into focus.

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In the middle of the front row, framed by quantum researchers from Fraunhofer ITWM, the industrial advisory board of AnQuC (from left to right): Dr. Benjamin Speitkamp (Deutsche Bahn), Dr. Peter Deglmann (BASF) and Dr. Normann Pankratz (Debeka); Dr. Joanna Procelewska (Schäffler) participated virtually. Fraunhofer ITWM

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**FRAUNHOFER INSTITUTE FOR INDUSTRIAL MATHEMATICS ITWM****About the Fraunhofer Institute for Industrial Mathematics ITWM**

The Fraunhofer Institute for Industrial Mathematics ITWM in Kaiserslautern is one of the largest research institutes for applied mathematics in the world. We see it as our task to further develop mathematics as a key technology and to provide innovative impulses. Our focus is on the implementation of mathematical methods and technology in application projects and their further development in research projects. The close cooperation with partners from industry guarantees the high practical relevance of our work.

Their integral building blocks are consulting, implementation and support in the application of high-performance computing technology and the provision of customized software solutions. Our various areas of expertise address a wide range of customers: the automotive industry, mechanical engineering, the chemical industry, energy and the financial sector. This also benefits from our excellent networking, for example in the Simulation and Software-based Innovation Center.

**About the Fraunhofer-Gesellschaft**

The Fraunhofer-Gesellschaft, based in Germany, is the world's leading organization for application-oriented research. With its focus on future-oriented key technologies and the utilization of results in business and industry, it plays a central role in the innovation process. As a guide and driving force for innovative developments and scientific excellence, it helps to shape our society and our future. Founded in 1949, the organization currently operates 76 institutes and research facilities in Germany. More than 30,000 employees, most of whom are trained in the natural sciences or engineering, work on the annual research volume of 2.9 billion euros. Contract research accounts for 2.5 billion euros of this total.

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