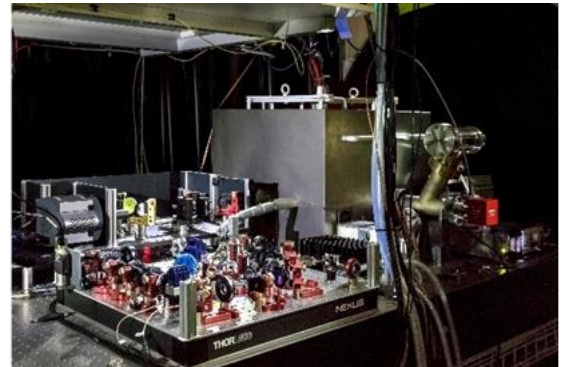


RESEARCH ON ION QUANTUM PROCESSORS WITH HIGH-PERFORMANCE COMPUTING CONNECTION IN NEW RESEARCH CONSORTIUM

PRESS RELEASE

Brussels, March 31th, 2021 – The new research consortium IQuAn is at the forefront of the development of new quantum technologies. The IQuAn¹ project involves companies, universities and research institutes sharing the common goal to research and develop a robust quantum processor platform. The project focuses on the technological development of essential components of a scalable quantum processor of up to 100 Qubits.

"The collaboration with universities and research institutes in the IQuAn project emphasizes our focus on new technology fields such as quantum technologies and high-performance computing. The scalability and quality of the computing power of ion trap quantum computers is the key to success. To this end, as an industrial partner, we bring use cases from everyday industrial and commercial life to the project through our many years of expertise in the development of control electronics for quantum optical experiments with segmented ion traps," emphasizes Derrick Zechmair, CEO AKKA Germany.



Experimental setup of an ion trap quantum processor at JGU Mainz, Image rights: Thomas Klink

As a leading European provider in the field of engineering consulting and R&D services, AKKA brings several years of expertise to the IQuan project which pursues a new scalable approach with high Qubit connectivity. AKKA will be responsible for the development of new software and hardware components for the electronic control units for quantum processors in the field of control electronics.

"The funding from the BMBF is a great recognition of the work on the development of quantum computers in Ferdinand Schmidt-Kaler's group," explains the President of Johannes Gutenberg University Mainz (JGU), Prof. Dr. Georg Krausch. "What has so far rather inspired the authors of science fiction novels is now to become reality in Mainz: A quantum computer will be made usable by connecting it to our high-performance computer. This is a milestone in the development of this innovative technology. It fills us with pride that Mainz is also at the forefront in this field of technology."

"Mainz has become an important point on the quantum computing map thanks to this funding," mentions Prof. Dr. Ferdinand Schmidt-Kaler from Johannes Gutenberg University Mainz (JGU), who is coordinating the project, building on decades of experience in the field of quantum computing. "The dynamics in quantum computing are currently enormous: among others, companies like Google and IBM are working on developing new quantum computers. But while Google and IBM rely on superconducting circuits for the processor, the researchers in the IQuAn project use the trapped ion platform. Although superconducting quantum processors currently have more computing units, the quality of the computing operations is considerably better with trapped ions. Therefore, it makes perfect sense to invest in this technology."

The quantum processor is to be connected to the Mainz MOGON II High Performance Computer with low latency, also made available to external non-research users for hybrid quantum computing. After the development of theoretical foundations and successful implementation of technologies, quantum technology is now faced with the challenge of increasing its understanding of systems to such an extent that quantum mechanics can be applied to problems from our

¹ IQuAn: Ion Quantum Processor with HPC Connection

everyday industrial and commercial lives. There are two promising systems for the realization of a quantum computer whose pioneering role has not yet been clarified. In addition to the implementation using superconducting circuits, the solution of a fully automated ion trap quantum computer offers many advantages, such as a significantly higher quality of computing operations.

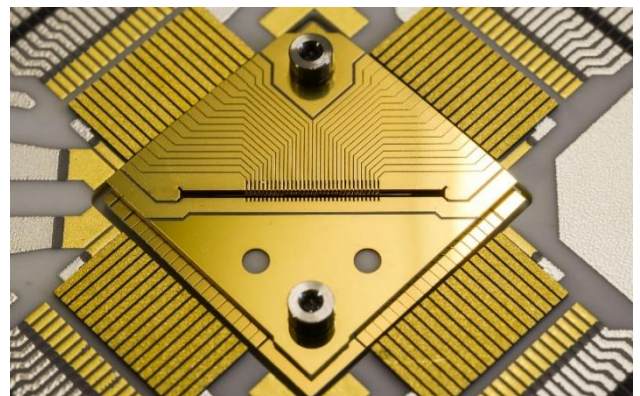
The project partners are very positive about the launch of the new consortium: *"The technological approach pursued here, combining an ion trap quantum computer with computing operations of high quality with high algorithmic flexibility, offers promising new application possibilities for both scientific and industrially relevant problems. In order to tap this potential in the IQuAn network with our academic and industrial partners, we are contributing our experience in the field of compiling quantum algorithms anyway the efficient characterization and optimization of quantum processors,"* **explains Prof. Markus Müller as head of the Theoretical Quantum Technology research group at Jülich Research Centre.**

"An essential prerequisite for bringing the fundamentals of quantum computing into application is the miniaturization of the complex optical setups and their integration into robust microsystems. To this end, the Fraunhofer IOF is contributing many years of experience in the realization of compact micro-optical solutions to the project, which we were also able to develop through basic developments on addressing units for ion-based Qubits in the EU flagship project AQTION," **commented Prof. Dr. Uwe Zeitner from the Fraunhofer Institute for Applied Optics and Precision Engineering IOF.**

"At the Fraunhofer ILT, laser-based processing methods - including, for example, micro- and nano structuring with ultrashort pulse lasers (UKP lasers) and selective laser-induced etching (SLE) - are used to create highly precise structures and component groups that are used in the field of quantum computing. Ion traps with microscopically dimensioned electrodes are a core element in the scaling of quantum processors. As part of the project, the Fraunhofer ILT is developing new manufacturing technologies and processes for the production of fully integrated ion trap modules made of quartz glass", **added Prof. Dr. Arnold Gillner, Competence Area Manager Ablation and Joining, Fraunhofer Institute for Laser Technology ILT.**

Dr. Wilhelm Kaenders, CEO of TOPTICA Photonics AG, explains: *"TOPTICA has been offering high-quality laser systems for research and industry, especially for the field of quantum technologies, for almost 25 years. Within the IQuAn project we can contribute our experience and knowledge of complex laser systems to this ambitious project. We are also using our know-how to develop novel interfaces between the laser source and the quantum processor. On the one hand, this should enable the necessary quality of the quantum gates in industrial application environments and, on the other hand, combine scalability and reliability with low maintenance."*

The IQuAn project, funded by the Federal Ministry of Education and Research (BMBF), has a project volume of 12 million euros over a three-year period. The project is coordinated by the Institute of Physics at the Johannes Gutenberg University Mainz. Other participants in the project consortium besides AKKA are the Fraunhofer Institute for Applied Optics and Precision Engineering IOF, the Fraunhofer Institute for Laser Technology ILT, the Jülich Research Centre and TOPTICA Photonics AG.



Quantum computation with ions, Image rights: QUANTUM@Uni Mainz



PASSION FOR
TECHNOLOGIES

PRESS RELEASE

ABOUT AKKA

AKKA is a European leader in engineering consulting and R&D services. Our comprehensive portfolio of digital solutions combined with our expertise in engineering, uniquely positions us to support our clients by leveraging the power of connected data to accelerate innovation and drive the future of smart industry. AKKA accompanies leading industry players across a wide range of sectors throughout the life cycle of their products with cutting edge digital technologies (AI, ADAS, IoT, Big Data, robotics, embedded computing, machine learning, etc.) to help them rethink their products and business processes. Founded in 1984, AKKA has a strong entrepreneurial culture and a wide global footprint. Our 20,000 employees around the world are all passionate about technology and share the AKKA values of respect, courage and ambition. The Group recorded revenues of €1.5 billion in 2020. AKKA Technologies (AKA) is listed on Euronext Paris and Brussels – segment A – ISIN code: FR0004180537.

For more information, please visit: <https://www.akka-technologies.com/>

AKKA CONTACT

Media Relations AKKA Germany

Jürgen Ströbele

Director Marketing & Communications

Tel.: +49 (0)151 746 1236

juergen.stroebele@akka.eu

Anne Friedrich

Deputy Director Marketing & Communications

Tel.: +49 (0)151 746 3470

anne-k.friedrich@akka.eu