Fraunhofer

PRESS RELEASE

German ministry and research sector join forces to launch major quantum communications initiative

The German federal government will dramatically increase its support for the field of optical quantum communications in the coming years. Speaking at a press conference in Berlin's Fraunhofer Forum, German Federal Minister of Education and Research Anja Karliczek announced the official launch of "QuNET", a major new initiative that aims to promote intensive research into photonic technologies for tap-proof quantum-based communication networks. The Fraunhofer Institute for Applied Optics and Precision Engineering IOF will lead the project consortium.

The German Federal Ministry of Education and Research (BMBF) is planning a major initiative for a tap-proof quantum network in collaboration with the Fraunhofer-Gesellschaft, the Max Planck Society and the German Aerospace Center (DLR). German Federal Minister of Education and Research Anja Karliczek announced BMBF funding for the QuNET initiative. An initial grant of 25 million euros will fund research into how the laws of quantum physics can be applied to create secure communication networks.

Minister Anja Karliczek outlined the BMBF's plans: "In the digital age, business and society are more dependent than ever on secure communication. Secure data lines are the lifelines of our age, which is why we have to make data transfer as tap-proof as possible. Quantum communications offers unique opportunities to do this. Germany and Europe must develop their own competencies in this area in order not to become dependent on others. This is why we need to advance research in this field. Germany and Europe should become the most trustworthy data space in the world, which is why I will be putting this topic on the German and European agenda. The idea behind the QuNET initiative is for leading German researchers and companies to join forces to lay the foundations for secure communication in the future. I am grateful to the participants in this unique project for their dedicated efforts in this future-oriented field."

IN COLLABORATION WITH

Bundesministerium für Bildung und Forschung

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QuNET's goal is to enable governmental organizations to communicate securely. The seven-year project is also designed to serve as a central platform for establishing a German quantum communications infrastructure and represents a groundbreaking step toward the development of a quantum internet. At the European level, the German federal government and the QuNET consortium partners are aiming to create a secure European data space.

Challenges for quantum communications

To confront this challenge, the Fraunhofer Institute for Applied Optics and Precision Engineering IOF (Jena) and the Fraunhofer Institute for Telecommunications, Heinrich Hertz Institute, HHI (Berlin) have joined forces with the German Aerospace Center (DLR) and the Max Planck Institute for the Science of Light (Erlangen). Industry partners from telecommunications, system and component development, security and satellite operations are also participating in the project, including companies such as Deutsche Telekom AG, ADVA Optical Networking and Tesat-Spacecom. The heavy involvement of German industry is intended to ensure rapid transfer of the solutions developed in the QuNET project.

Fraunhofer President Professor Reimund Neugebauer explained the Fraunhofer-Gesellschaft's strategy: "QuNET is an opportunity to work side by side with outstanding partners from research, business and government to lay the foundations for developing a uniform and secure European information and communication infrastructure. This project will further boost Germany's pioneering role and technology leadership in this strategically important area. In the long term, we plan to connect the quantum-based communication infrastructure with International Data Spaces in order to unite data sovereignty and data security at the highest levels in the European data space."

New opportunities for a digital society

The initiative is being launched in the face of the growing capabilities of digital technologies that are impacting today's data networks and posing an increasing threat to the security of our modern information-based society. This requires many organizations to rethink and revise their security infrastructures, in particular government agencies, banks and businesses that play a critical security role.

Professor Andreas Tünnermann, director of the Fraunhofer IOF and initiator of the QuNET project, explains the benefits: "The initiative will generate synergies by combining the complementary skills of top-tier German research institutes in the area of quantum communications. The project strategically addresses the development of new heterogeneous quantum communication networks that will enable multi-user operations. QuNET will thus make an important contribution to providing physically secure communications in Germany and Europe." In addition, Professor Gerd Leuchs, director emeritus of the Max Planck Institute for the Science of Light highlighted the technical potential of optical quantum communication: "One of the characteristics of quantum

measurements is that they only ever reveal part of the existing information, and never all of it. This paves the way for exciting applications ranging from the perfect random number generator to the detection of eavesdroppers. Both are important for secure communication."

The project, which has been divided into three phases, will officially begin in the fall of 2019. First, the researchers will develop the hardware components; then, in the second phase, they will formulate the technological foundations of multi-user operations in heterogeneous networks. In the third phase, they will collaborate with industry and the German federal network operators to implement the quantum technology-based network for government agencies.

About the QuNET consortium partners

Fraunhofer Institute for Applied Optics and Precision Engineering IOF
The Fraunhofer Institute for Applied Optics and Precision Engineering IOF develops optical systems to control light – from its generation to its application. The institute's services cover the entire photonics process chain, ranging from system design to the manufacture of customized solutions and prototypes. Fraunhofer IOF comprises the following business units: Optical Components and Systems, Precision Engineering Components and Systems, Functional Optical Surfaces and Coatings, Photonic Sensors and Measuring Systems, and Lasers.

DLR – Institute of Communications and Navigation (KN)
The Institute of Communications and Navigation at the German Aerospace Center (DLR) works on the conception and analysis of communication and navigation systems involving satellites or designed for applications in aeronautics, transport and security. Its activities range from fundamental research to technology demonstrations. In 2011, institute staff carried out a particularly remarkable demonstration in collaboration with Ludwig Maximilian University of Munich (LMU). For the first time ever, the team of engineers and scientists successfully exchanged a quantum key between an aircraft and a ground station – an important step toward worldwide tap-proof data communication. The institute is contributing its expertise in the field of satellite-based quantum communication to QuNET.

Fraunhofer Institute for Telecommunications, Heinrich Hertz Institute, HHI
Fraunhofer HHI is a global leader in research into mobile and optical communication networks and in encoding and processing video signals. Photonic integrated circuits developed at HHI are used around the world for high data rate transmission through fiber optic networks. Fraunhofer HHI's contributions to the QuNET project include its expertise in photonic integrated circuits (PICs) for quantum networks as well as in the testing and management of fiber optic networks.

Max Planck Institute for the Science of Light MPL
Part of the Max Planck Society, the Max Planck Institute for the Science of Light covers a wide spectrum of research topics including non-linear optics, quantum optics, nanophotonics, photonic crystal fibers, optomechanics, quantum technologies, biophysics and links between physics and medicine. MPL will play a leading role in the QuNET consortium, injecting its quantum communications expertise into the overall concept and security analysis by addressing key interdisciplinary issues. This includes fundamental research in quantum optics as well as aspects of information theory and technology. At the same time, MPL will be working together with the other partners to develop novel quantum sources, technologies for efficient coupling to quantum gates and systems for quantum key distribution that work together efficiently with traditional telecommunication technologies.