

Press Release

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O-PEN Project Teaches the Basics of Quantum Communication

Quantum communication to Tinker and Test

JENA / LEIPZIG (Germany) | What is quantum communication, and how secure is it really? A two-day “Quantum Hackathon” held last week in Jena, Germany addressed this question. Together with researchers from the Fraunhofer Institutes IOF and ISI, around twenty international participants explored the limits of quantum communication systems—to gain a better understanding of this complex, cutting-edge technology. The event also marked the upcoming closing of the collaborative project [O-PEN](#), funded by the German Federal Ministry of Research, Technology, and Space (BMFTR). The online knowledge platform [Quanten-Kompass](#), and the online game [Eve on a Mission](#)—developed as part of the project as well—are now permanently available free of charge for research, teaching, and anyone interested.

On July 29 and 30, 2026, minds were literally racing at the Fraunhofer Institute for Applied Optics and Precision Engineering IOF in Jena: For two days, participants in the Quantum Hackathon worked in small groups to “hack” their way into a quantum-secure system. This was no trivial challenge, as quantum communication is considered particularly secure. Yet it is precisely the search for potential vulnerabilities that sharpens our understanding of this future technology, which remains complex even for many early-career researchers. At the same time, testing under real-world conditions lays the groundwork for designing systems that are even more robust against attacks in the future.

Highly Secure Communication Using Light

Quantum communication uses photons and their unique quantum physical properties to encrypt data with a high level of security. “Highly secure” means that if an unauthorized person attempts to access a quantum-encrypted communication, it will inevitably be detected. The encryption can then be immediately discarded and replaced with a new one.

For Fraunhofer IOF in Jena, quantum communication has been a key research focus for many years: “We are researching the technological foundations of quantum communication and developing the necessary building blocks to transfer the technology into applications,” explains Dr. Karin Burger, a quantum researcher at Fraunhofer IOF and scientific director of the O-PEN project. After all, the long-term goal is for quantum communication to move out of the lab and into real life. It is particularly relevant for governments and ministries, security agencies, and critical infrastructure.

Acceptance Comes Through Participation

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Before new systems are deployed in practice, they must be tested under realistic conditions. It is equally important to establish a solid understanding of their strengths and weaknesses within the scientific community and among the general public. "After all, the success of new technologies does not depend solely on their technical feasibility," adds Dr. Norman Bedtke, overall coordinator for the O-PEN project at Fraunhofer ISI in Leipzig, Germany. "For many people, the benefits of a new and complex technology like quantum communication are difficult to grasp at first."

The O-PEN research project, jointly implemented by the two Fraunhofer Institutes, therefore deliberately pursued a multi-pronged approach: IT and cybersecurity experts, students, and interested members of the public were able to learn about quantum technology in a low-barrier setting during hackathons and try it out for themselves.

Hackathon Participants from around the World

The recently concluded Quantum Hackathon demonstrates just how well this approach works: About 20 participants with diverse professional and national backgrounds—from Poland, Romania, China, India, Egypt, and Germany—took on the role of the hacker Eve. They attempted to intercept the quantum signal between two communication partners—Bob and Alice—and extract the transmitted information.

"We specifically designed the quantum setup for the hackathon in such a way that eavesdropping would be possible in the first place," explains Dr. Karin Burger. "The challenge for the participants was to understand and evaluate the data after intercepting it, as well as to analyze the impact of the attack on the system. In this way, the young researchers developed a deep understanding of the implementation of quantum communication and the necessary tools."

Outlook and Digital Tools for Science Communication

In addition, the O-PEN project developed digital tools—including the [Quanten-Kompass](#) (engl.: Quantum Compass) and the online game [Eve on a Mission](#)—to make quantum science accessible to a broad public. Both formats teach the fundamentals of quantum communication and provide insights into the technology's potential applications in digital communication. They are now available online free of charge and on a permanent basis.

The partner institutes, IOF and ISI, now plan to continue developing these tools. Dr. Norman Bedtke explains: "We want to establish these tools for the long term, scientifically evaluate their impact, and develop new approaches to science communication for future and key technologies." To this end, the research team plans, among other things, to launch a crowdsourcing competition in which interested parties can submit their ideas for further developing the Quantum Hackathons and digital tools via an online platform.

The collaborative project will run until the end of April 2027. It was funded by the German Federal Ministry of Research, Technology, and Space (BMFTR) as part of its program to strengthen quantum communication in Germany.

Further Information

- Learn more about the O-PEN project:
<https://www.isi.fraunhofer.de/de/competence-center/wissenstransfer/projekte/o-pen.html>
- Online knowledge platform "Quanten-Kompass":
<https://quanten-kompass.de/>
- Online game "Eve on a Mission":
<https://quanten-kompass.de/game/>

About Fraunhofer IOF

The Fraunhofer Institute for Applied Optics and Precision Engineering IOF in Jena conducts application-oriented research in the field of photonics and develops innovative optical systems for controlling light - from its generation and manipulation to its application. The institute's range of services covers the entire photonic process chain from opto-mechanical and opto-electronic system design to the production of customer-specific solutions and prototypes. At Fraunhofer IOF, about 500 employees work on the annual research volume of 40 million euros.

For more information, please visit: www.iof.fraunhofer.de/en.html

Press photos (selection)



Fig. 1 Puzzling, tinkering, and learning together: That was the goal of the Quantum Hackathon held in July at Fraunhofer IOF in Jena. © Fraunhofer IOF



Fig. 2 At the hackathon, young researchers came together with experienced quantum experts from Fraunhofer.
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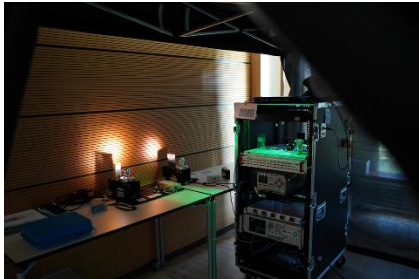


Fig. 3 The challenge: to hack a quantum-secure communication network in order to better understand the technology.
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Fig. 4 Alice and Bob represent the fictional communication partners. Eve attempts to intercept the quantum-secure channel.
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Fig. 5 Participants in the 2026 Quantum Hackathon in Jena. © Fraunhofer IOF



Fig. 6 With the online game "Eve on a Mission," even interested laypeople can become quantum hackers. © O-PEN

The Fraunhofer-Gesellschaft, headquartered in Germany, is one of the world's leading organizations for applied research. It plays a major role in innovation by prioritizing research on cutting-edge technologies and the transfer of results to industry to strengthen Germany's industrial base and for the benefit of society as a whole. Founded in 1949, the Fraunhofer-Gesellschaft currently operates 75 institutes and research units throughout Germany. Its nearly 32,000 employees, predominantly scientists and engineers, work with an annual business volume of 3.6 billion euros; 3.1 billion euros of this stems from contract research.

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