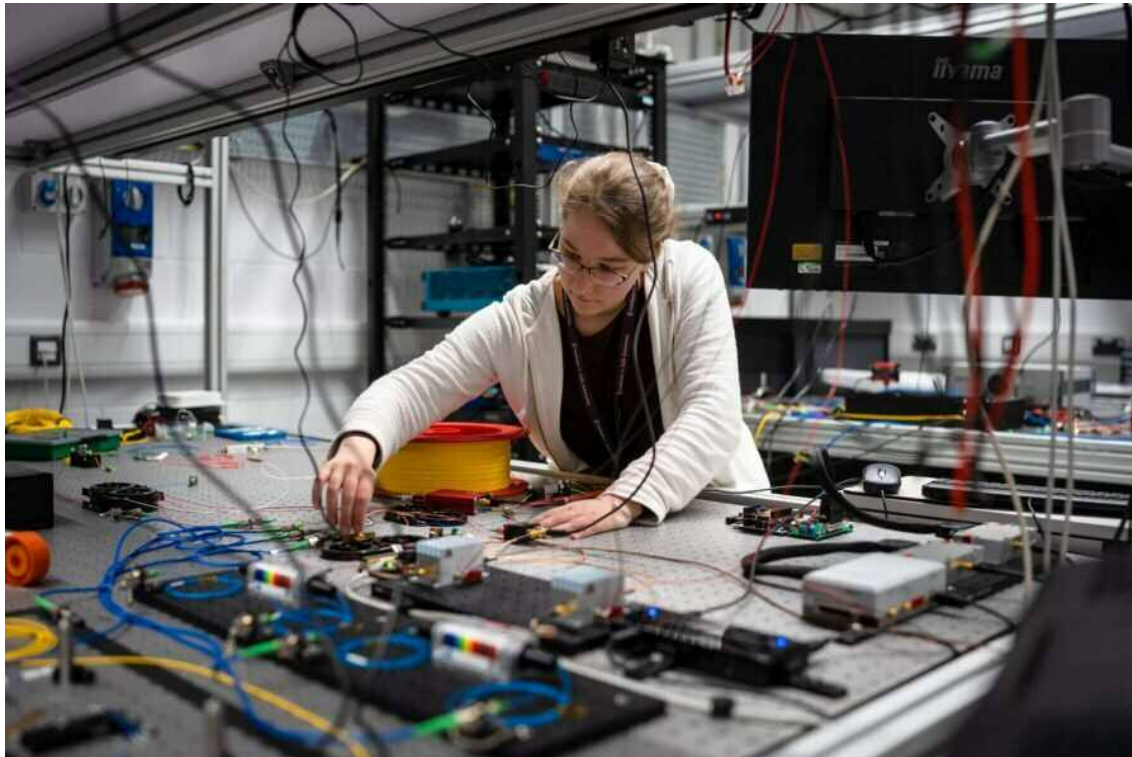


PRESS RELEASE: For the first time, researchers successfully demonstrate over euNetworks' fibre infrastructure that quantum communication is possible between the United Kingdom and Ireland



A series of experiments were conducted on euNetworks' 224km Rockabill subsea network in July, pushing the boundaries of quantum communication and paving the way for the future security of private data

London, UK – 3 October 2023 [Reposted from the euNetworks website]

Researchers from The University of York in collaboration with the Quantum Communications Hub and euNetworks Fiber UK Limited (“euNetworks”) have for the first time successfully demonstrated that quantum communication is possible over the long geographical distance that separates England from Ireland. The team, led by Professor Marco Lucamarini from the University of York, ran a series of experiments using bandwidth infrastructure provider euNetworks' subsea cable, named [Rockabill](#). This network is one of the newest commercial optical fibre systems in operation and connects Ireland to England in the United Kingdom, running 224 kilometres between Portrane and Southport cable landing stations. Until now, no quantum link has ever been established between the two countries, nor on a span stretching this length on a subsea fibre optic cable.

Quantum communication operates on the principle that particles of light can transmit data along optical cables in a highly fragile state. But the particles collapse if interfered with by someone trying to manipulate or steal private data, such as bank information, in transit.

“Many large companies and organisations are interested in quantum communications to secure their data, but it has limitations, particularly the distance it can travel,” said Professor Marco Lucamarini. “The longer the distance, the more likely it is that the photon

– the particles of light that we use as carriers of quantum information – are lost, absorbed or scattered in the channel, which reduces the chances of the information reaching its target. This presents a problem when organisations need to send private digital information to other cities or other countries, where the additional challenge could also be an ocean between the communications’ start and end point.”

To overcome this limitation, a pilot project was devised. Rockabill – a new and unique ultra-low loss fibre optic subsea cable with low latency and remarkably low average attenuation – presented an ideal environment. The 224km cable connects landing stations in Southport and Portrane without amplification or a repeating system. The series of experiments conducted on-site resulted in the successful transportation of single and entangled photons, as well as in the successful measurement of the optical phase exploited in twin-field and continuous-variable Quantum Key Distribution (QKD), over a longer continuous distance than had ever been established before in undersea optical fibres, devoid of ‘trusted nodes’ between the two endpoints of the communication channel. The success of the experiments was largely due to highly sensitive detectors deployed at the Southport endpoint of the cable to reduce environmental noise levels.

The research further develops the use of QKD, the next frontier of data encryption technology. This technology has the potential to deliver advanced levels of network security. It has a strong use case in industries and organisations looking for highly secure data encryption methods, protection and transfer. It is already being applied and tested in worldwide government, pharmaceutical and life science organisations and in the financial services sector.

Professor Lucamarini said, “This is a truly exciting step forward in realising the full potential of quantum communications and for the future of securing private data in an environment that is shaping the so-called ‘quantum internet’. This project also advances the real-world integration of quantum communication technology into existing global telecommunications and network infrastructure – taking it out of the lab into a ‘real-world’ scenario.”

“euNetworks is proud to support a critical project that pushes the boundaries of quantum technology and has implications for the future of network security,” said Paula Cogan, Chief Executive Officer of euNetworks. “The successful integration of quantum technology over commercial-grade optical fibre infrastructure at this distance is an exciting step forward. Rockabill, and euNetworks’ [Super Highway](#) network it is part of, provide the ideal platform for new and progressive technologies that will enhance and innovate future network infrastructure.”

More experiments will need to be carried out using the same cable line to pave the way for integrating the services offered by quantum technologies into standard communications for industries sending private data between the UK and Ireland and for further advances in the quantum internet.

The project, funded by the EPSRC Quantum Communications Hub, will be presented at the NATO Symposium on Quantum Technology for Defence and Security in Amsterdam on 3 October.