

QUREP - Quantum repeaters for long distance fibre-based quantum communication

[Project details](#) **Coordinator**

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Fact sheet: [Available on CORDIS](#)

[Project description](#)

The goal of QuRep is to develop a Quantum Repeater - the elementary building block required to overcome current distance limitations for long-distance quantum communication. Quantum Repeaters are the analogue of classical optical amplifiers that permit the cascading of successive fibre optic communication links. Quantum Repeater technology is centred around quantum light-matter interactions at the quantum level in ensembles of rare earth ions frozen in a crystal that store quantum information by coherent control of the quantum degrees of freedom. A clear and well-defined architecture and protocol for a complete Quantum Repeater can be realised with entangled photon pair sources that couple the Quantum memories to fibre optic communication systems.

By building on these recent spectacular achievements, the present project aims at carrying out exploratory research on mesoscopic CV. The proof of principle has been shown for all aspects of this approach and QuRep now aims to bridge the gap between fundamental research and industrial projects. The main technological result of the QuRep project will be a quantum repeater. The outcome of the QUREP project will serve as the basis for an industrial initiative, developing the first quantum repeater products. Considering the state of the art, potential difficulties and the chosen development approach, it is reasonable to assume that this technology could be translated into products in the next 10 years with spin-off technologies emerging in the interim period.

We bring together the leading European groups in quantum communication, quantum memories, photonic sources and rare-earth-ion spectroscopy and materials as well as a leading quantum communication technology SME to move what has been fundamental research towards commercial feasibility. There are already niche markets for quantum repeaters, should they exist, and the market is expected to grow significantly in the next 10 years.

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