# A High Coherence, High Fidelity Quantum Repeater

Available Technologies

## An enabling technology for the quantum internet

### As our lives are increasingly dependent on internet communications, it is increasingly important to prevent the interception and decoding of encrypted messages.

The quantum internet is one potential solution where quantum information is exchanged between distant parties and the security is guaranteed by the fundamental laws of physics.

However, an essential component to realise a functioning quantum internet is a reliable quantum repeater that enables the required long-distance transmission of quantum information. No practical quantum repeater yet exists.

## Technology overview

The quantum engineering group at the University of Cambridge has developed a control protocol for quantum dots that allows them to accurately and reliably store quantum information. This is done by transforming a source of noise – the nuclear states – into a reliable quantum register. Since quantum registers are the necessary memory units of a quantum repeater, this technology is a key step towards realising a quantum internet.

## Benefits



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- Improved quantum information storage in quantum dots
- Transfer of quantum information within quantum dots
- Extended storage times from up to 100us

## Applications

- Information storage within a quantum repeater
- Multi-dimensional photon entanglement for photonic quantum computing