

Photonic quantum technologies could be only light years away

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Photonic quantum information science could soon move out of the laboratory and be used in future technologies like quantum computers thanks to a grant of over £1 million.

The EPSRC five-year grant has been awarded to Dr Jeremy O'Brien, Reader in Research in the Department of Electrical and Electronic Engineering and Department of Physics at the University of Bristol as part of the Challenging Engineering programme.

Quantum mechanics tells us how the world works at its most fundamental level. It predicts very strange behaviour that can typically only be observed when things are very cold and very small.

The project aims to develop each of the building blocks for photonic quantum technologies, technologies that harness quantum mechanics for vastly improved performance. Single particles of light - photons - are ideal for storing quantum information because they suffer from almost no noise, but as yet high efficiency single photon sources, detectors and circuits have not been realised.

The research hopes to develop single photon sources based on atom-like colour centres in diamond, optical wires on optical chips, and superconducting single photon detectors. It also aims to integrate all of these components on a single optical chip.

Quantum information science has emerged in the last decades to look at

what additional power and functionality can be utilised by quantum mechanical effects in the encoding, transmission and processing of information.

Anticipated future technologies include quantum computers with tremendous computational power, quantum metrology which promises the most precise measurements possible, and quantum cryptography, which offers perfect security and is already being used in commercial communication systems.

Dr Jeremy O'Brien said: "I am delighted to have received the grant. There have already been a number of impressive proof-of-principle demonstrations of photonic information science.

"However, photonic quantum technologies have reached a roadblock, they are stuck in the research laboratory. I hope my research will change this."

Source: University of Bristol

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