Exhibit highlights advances in quantum communication and computing

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Researchers from the Cambridge Research Laboratory of Toshiba Research Europe Limited and the Cavendish Laboratory of the University of Cambridge will today present the world's most secure chat and video conferencing network at the Royal Society Summer Science Exhibition in London. It uses quantum physics to automatically detect tapping of the network and alert users of any potential threat.

Thanks to the increasing use of internet services and commerce, more and more of our personal details, such as credit card numbers, bank details and health records are shared over optical networks. Unfortunately optical networks can be spied upon, leaving our digital information vulnerable to theft and misuse.

To prevent information theft the Cambridge team has devised a system that sends encoded light particles (single photons) along with the data on an optical fibre. The laws of quantum physics dictate that these particles cannot be intercepted without disturbing their encoding in a way that can be detected. This is used by the communications system to alert users of any unwelcome intrusion on the network. The exhibit at the Royal Society will demonstrate the ease with which information on an optical fibre can be extracted and how this can be detected and prevented using the new technology.

Commenting on the research, Dr Andrew Shields, Assistant Managing Director of Toshiba Research Europe Ltd, said "Over the past year we have developed techniques to send data and quantum signals on the same fibre and demonstrated its viability in the controlled environment of the lab. The Summer Science Exhibition will be the first demonstration of this technology in the real world. Users will be able to send quantum secure chat messages and video conference to one-another."

This is just one of a number of quantum technologies that will be demonstrated at the Royal Society Summer Science Exhibition. Visitors will be able to test if they can see a single photon and compete against the Toshiba single photon counter - the most sensitive light detector known. They will also be able to generate and image single photons using quantum light emitting diodes developed by the team.

The exhibition will discuss the first electrically-powered quantum teleporter, also developed by the Cambridge team. Quantum teleportation is a technique for moving quantum information between different locations without its physical transfer through space. It uses pairs of light particles in the two locations which possess 'quantum entanglement', giving them strangely interconnected properties although they are far apart. By interacting one of the two entangled photons with an input photon, its encoded state can be teleported onto the other photon in the entangled pair, even if it is in a distant location. The technology is important to extend the range of secure communication and for moving information around in a quantum computer.

More information: sse.royalsociety.org/2013/

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