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World's first commercial source of individual photons

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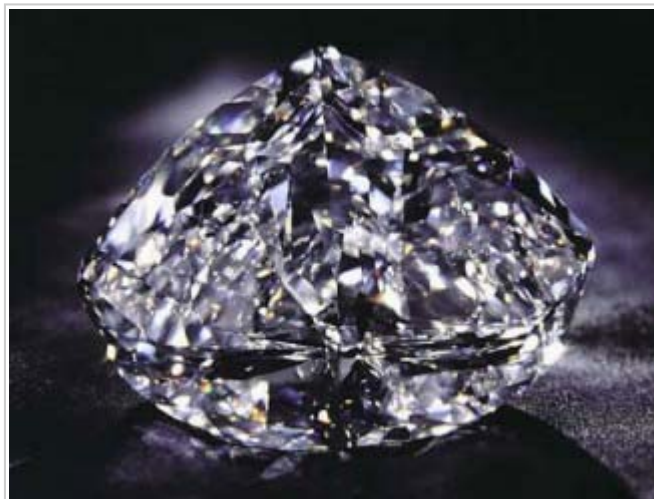
March 3, 2008 An Australian project has developed the world's first commercial source of individual photons using diamond based quantum technology. The device will greatly benefit the emerging quantum technology industry, including quantum computing, quantum cryptography and quantum imaging.

The Single Photon Source, which can be accessed with a standard optical fiber connection, can produce a particle of light at room temperature on demand. The system works by growing microscopic crystals of diamond directly onto the tips of optical fibers, allowing the single photons emitted from the diamond crystals to be channeled directly into the fiber, overcoming the issues of single photon generation in current quantum communication systems.

The organization behind the development, **Quantum Communications Victoria (QCV)**, is considering commercial partners and investors to participate in a start-up which will pursue commercialization of the Single Photon Source in various markets.

"This is a critical moment in the development of quantum based technologies for practical use," said QCV CEO Dr. Shane Huntington. "The availability of a commercial single photon source will enable many viable quantum technologies to reach the market place."

"As an initial application the Single Photon Source will be integrated into existing commercial Quantum Cryptosystems, drastically improving their performance and providing one hundred percent secure telecommunications," said Dr. Huntington.



Diamonds used to create single photon source (The Centenary Diamond - Photo © Debeers Group)

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Further applications for the technology are expected in other quantum communications areas plus microscopy and optical sensing.

Photons are one of the particles through which physicists can study quantum phenomena such as quantum entanglement and quantum superpositions. Quantum entanglement is the foundation of most quantum technology proposals, and refers to the correlation in behavior between separated particles on a sub-atomic scale. Although the objects are spatially far apart, altering the position or spin of one instantly causes the other to compensate.

When harnessed to perform operations on data, this phenomenon does not simply speed up processors, but opens the door for a completely new species of computer which could tackle calculations that cannot be physically solved with our current systems. Instead of storing information in binary form on bits, quantum computing stores information on qubits, which can hold a one, a zero and, (Schroedinger's cat style), a superposition of both. The entanglement of the qubits would also be used to instantly communicate information.

Quantum entanglement is also pivotal to the development of quantum cryptography and quantum metrology. Quantum cryptography is used to securely transmit and distribute the key to a coded message. It uses quantum entanglement as a form of communication, by having the spymasters separately manipulate two entangled particles. Privacy is ensured by the fact that nobody can observe quantum measurements without affecting them, therefore causing a would-be eavesdropper to reveal his presence and destroy the message. Quantum metrology and imaging use entanglement to determine precise information about the physical parameters of an object.

QCV is located in the School of Physics at the University of Melbourne. The Single Photon Source was recently launched at the Optical Fibre Communication Conference and Exposition in San Diego, USA.

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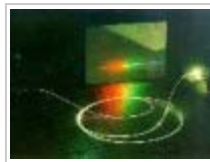
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