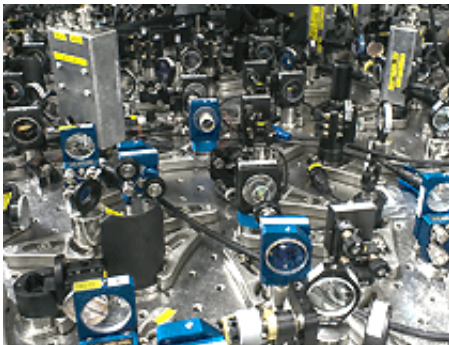


Beam me up ... Quantum teleporter breakthrough

April 15 2011



Beam me up ... the teleporter in the lab of Professor Akira Furusawa at the University of Tokyo

(PhysOrg.com) -- Researchers have achieved a breakthrough in quantum communications and computing using a teleporter and a paradoxical cat.

The breakthrough is the first-ever transfer, or [teleportation](#), of a particular complex set of quantum information from one point to another, opening the way for high-speed, high-fidelity transmission of large volumes of information, such as [quantum encryption](#) keys, via quantum communications networks.

The research was published in the April edition of the journal *Science*.

Teleportation – the transfer of quantum information from one location

to another using normal, "classical" communications - is one of the fundamental quantum communication techniques.

The cat in the equation was not a living, breathing feline but rather "wave packets" of light representing the famous "thought experiment" known as Schrodinger's Cat. Schrodinger's Cat was a paradox proposed by early 20th century physicist Erwin Schrodinger to describe the situation in which normal, "classical" objects can exist in a quantum "superposition" - having two states at once.

Professor Elanor Huntington, in the School of Engineering and Information Technology at UNSW's Canberra campus at the Australian Defence Force Academy (ADFA), was part of a team led by University of Tokyo researchers. She said the team's achievement was another step towards building a super-powerful quantum computer and transmitting quantum information.

"One of the limitations of high-speed quantum communication at present is that some detail is lost during the teleportation process. It's the *Star Trek* equivalent of beaming the crew down to a planet and having their organs disappear or materialise in the wrong place. We're talking about information but the principle is the same – it allows us to guarantee the integrity of transmission.

"Just about any quantum technology relies on quantum teleportation. The value of this discovery is that it allows us, for the first time, to quickly and reliably move quantum information around. This information can be carried by light, and it's a powerful way to represent and process information. Previous attempts to transmit were either very slow or the information might be changed. This process means we will be able to move blocks of [quantum information](#) around within a computer or across a network, just as we do now with existing computer technologies.

"If we can do this, we can do just about any form of communication needed for any quantum technology."

The experiments were conducted on a machine known as "the teleporter" in the laboratory of Professor Akira Furusawa in the Department of Applied Physics in the University of Tokyo.

Professor Huntington, who leads a research program for the Centre for Quantum Computation and Communication, developed the high-speed communication part of the teleporter at UNSW's Canberra campus with PhD student James Webb.

More information: www.sciencemag.org/content/332/6027/330.full

Provided by University of New South Wales

Citation: Beam me up ... Quantum teleporter breakthrough (2011, April 15) retrieved 20 March 2024 from <https://phys.org/news/2011-04-quantum-teleporter-breakthrough.html>

<p>This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.</p>
--