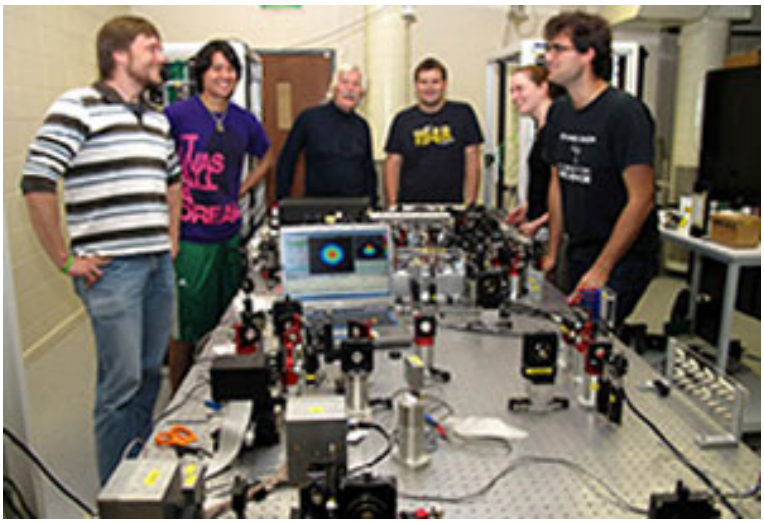
New record in quantum communications



Researchers from the Australian National University have taken a quantum leap towards developing the next generation of super-fast networks needed to drive future computing.

Seiji Armstrong, a PhD researcher from the Department of Quantum Science in the ANU College of Physical and Mathematical Sciences, has led a team which has developed a technique that allows for quantum information to travel at higher bandwidth using a beam of light and the phenomenon called entanglement. Armstrong’s research is published in *Nature Communications*.

"Broadly speaking, entanglement is when two things are correlated in some way so that by measuring one of them, you can infer information about the other. It is important because without it, it's impossible to teleport quantum information," says Armstrong.

"This quirk was discovered by Einstein in 1935 and from the late 1980s people started suggesting that entanglement might be useful for processing information. It turned out that by encoding information into systems that are entangled you can perform computations that are unfeasible for ordinary computers.

"The problem is we realized that entanglement experiments around the world were getting very complicated. Each entangled mode of light required its own laser beam, as well as a whole range of other equipment. Given that a quantum computer would need hundreds or thousands of entangled states of light, this was impossibly complicated."

Armstrong said that their research dramatically simplified this process.

"We were able to entangle eight quantum modes of light within one laser beam, a practice that used to require eight separate beams," he says.

"Our research is also a world first, as the previous best entanglement was four modes of light in the one laser in 2011. Our research shows that it is now possible to create a high bandwidth light beam with relatively a lot of quantum information on it."

Source: The Australian National University [1]

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