

Re: Entanglement breaks new record

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From: Sam Wormley (swormley1_at_mchsi.com)

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sid myers wrote:

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> Source: <http://physicsweb.org/article/news/8/6/18>

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> *Entanglement breaks new record*

> *30 June 2004*

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> *Physicists have succeeded in entangling five photons for the first time.*

> *Although four photons have been entangled before, five is the minimum*

> *number needed for universal error correction in quantum computation.*

> *Moreover, the same team has demonstrated a process called*

> *"open-destination teleportation" for the first time (Z Zhao et al. 2004*

> *Nature 430 54). The results represent a major breakthrough in efforts to*

> *exploit the laws of quantum mechanics in quantum information processing.*

>

> *By taking advantage of quantum phenomena such as entanglement,*

> *teleportation and superposition, a quantum computer could, in principle,*

> *outperform a classical computer in certain computational tasks.*

> *Entanglement allows particles to have a much closer relationship than is*

> *possible in classical physics. For example, two photons can be entangled*

> *such that if one is horizontally polarized, the other is always vertically*

> *polarized, and vice versa, no matter how far apart they are. In quantum*

> *teleportation, complete information about the quantum state of a particle*

> *is instantaneously transferred by the sender, who is usually called Alice,*

> *to a receiver called Bob. Quantum superposition, meanwhile, allows a*

> *particle to be in two or more quantum states at the same time.*

>

> *Jian-Wei Pan at the University of Heidelberg in Germany and colleagues at*

> *the University of Science and Technology of China in Hefei and the*

> *University of Innsbruck in Austria began by producing a high intensity and*

> *ultra-stable source of entangled photons. Next they used two entangled*

> *pairs of photons to generate a four-photon entangled state, which they*

> *then combined with a single-photon state. They were able to produce a*

> *five-photon entangled state by detecting the coincidence of five photons.*

>

> *To demonstrate open-destination teleportation, Pan and co-workers first*

> *teleported the unknown quantum state of a single photon onto a*

> *superposition of three photons. They were then able to read out this*

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- > *teleported state at any one of the three photons by performing a*
- > *measurement on the other two photons.*
- >
- > *"Although our experiment might seem to be only a modest step forward, the*
- > *implications are profound," Pan told PhysicsWeb. They plan to use their*
- > *five-photon set-up to demonstrate "bit-flip error rejection" for quantum*
- > *communication and to make a non-destructive controlled-NOT gate for*
- > *quantum computation.*
- >
- > *Author*
- > *Belle Dumé is Science Writer at PhysicsWeb*

Posted here last month Physics News Update
Number 690 #2, June 30, 2004 by Phil Schewe and Ben Stein
<http://www.aip.org/pnu/2004/split/690-2.html>

But it's always nice to read another account. :-)