

# Re: PHYSICS NEWS UPDATE -- Number 754 November 16, 2005 by Phillip F. Schewe, Ben Stein

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*Source:* <http://sci.tech-archive.net/Archive/sci.physics/2005-11/msg01107.html>

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- *From:* "Lefty" <Ye@xxxxxxx>
  - *Date:* Thu, 17 Nov 2005 21:24:04 -0800
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Comes as no surprise. Afterall – for any two points A and B in the universe, there is a path of zero distance from A to B.

They are simply measuring a single particle which appears to be in two separate places at once, which it's not.

"Sam Wormley" <swormley1@xxxxxxxxxx> wrote in message  
[news:BzLef.543810\\$x96.530854@xxxxxxxxxxxxxxxx](mailto:news:BzLef.543810$x96.530854@xxxxxxxxxxxxxxxx)

- > PHYSICS NEWS UPDATE
- > The American Institute of Physics Bulletin of Physics News
- > Number 754 November 16, 2005 by Phillip F. Schewe, Ben Stein
- >
- > HYPER-ENTANGLED PHOTON PAIRS. Physicists at the University of
- > Illinois have demonstrated for the first time the entanglement of
- > two objects not merely in one aspect of their quantum natures, such
- > as spin, but in a multitude of ways. Entanglement is the quantum
- > affinity between or among particles (such as atoms or photons) in
- > which the measurement of some property for one particle
- > automatically and instantaneously determines the corresponding
- > property of the other particle. Take the case of two photons
- > entangled with respect to polarization, the orientation of the
- > electric field associated with the photon.
- > The photons, until detected, have no spin orientation; this is the
- > principle of quantum indeterminacy. Indeed, both photons are said
- > to be in a superposition of arbitrary -- but
- > parallel -- polarization states. Consequently, each photon has a
- > 50% likelihood of being measured to have any polarization
- > state---e.g., +45 or -45 degrees. If now one photon's polarization
- > is measured to be +45, then its entangled twin will surely also be
- > polarized along +45 owing to the way the photons are made in this
- > setup. One of the chief hopes of entanglement research is to
- > exploit the superposition idea and the entanglement idea for

- > performing unusually fast quantum computation.
- > In the Illinois experiment, two photons, produced in a
- > "down-conversion" process whereby one photon enters an optical
- > crystal and sunders into two lesser-energy correlated daughter
- > photons, are entangled not just in terms of polarization, but also
- > in a number of other ways: energy, momentum, and orbital angular
- > momentum (see <http://www.aip.org/pnu/2005/split/721-3.html>).
- > Actually, the photon pair can be produced in either of two crystals,
- > and the uncertainty in the production details of the individual
- > photons is what provides the ability to attain entanglement in all
- > degrees of freedom. Is it better to entangle two particles in ten
- > ways or ten particles in two ways? They're probably equivalent,
- > says, Paul Kwiat, leader of the Illinois group, but for the purpose
- > of quantum computing or communication it might be of some advantage
- > if multiple quantum bits (or qubits) of information can be encoded
- > in a single pair of entangled particles. Kwiat (217-333-9116,
- > kwiat@xxxxxxxx) says that his lab detects a record two million
- > entangled photon pairs per second with ample determination of
- > numerous properties, allowing a complete characterization of the
- > entanglement produced. (Barreiro et al., Physical Review Letters,
- > upcoming article)
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- > NORTH PACIFIC "BOING" ATTRIBUTED TO MINKE WHALES. Human singers
- > send their voice into the supporting medium of air. Whales send
- > their songs into ocean water. One particular song, a sort of
- > fluttering echo, or "boing," sound first heard by human listeners in
- > the North Pacific Ocean in the 1950s (and recorded by US Navy
- > submarines) baffled scientists. Where was it coming from? Only now
- > have the sounds been identified as coming from minke whales.
- > Shannon Rankin and Jay Barlow, scientists at the National Marine
- > Fisheries Service in La Jolla, California, have gathered hydrophone
- > data in the body of ocean between Mexico and Hawaii and combined
- > this with visual sightings of the marine mammals. Not only has the
- > source been traced to minke whales, but the songs seem to be
- > somewhat different on either side of a certain longitude. To the
- > east, the boing sound is issued at a frequency of about 92 Hz and an
- > average duration of 3.6 seconds. The west boing, by contrast,
- > consists of a 135-Hz vocalization with a duration of about 2.6
- > seconds. The acoustic trace is both frequency modulated (FM) and
- > amplitude modulated (AM). (Journal of the Acoustical Society,
- > November 2005; numerous whale sounds, including the boing, can be
- > accessed at <http://swfsc.nmfs.noaa.gov/PRD/PROGRAMS/CMMP/accsurv.html>)
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- > QUANTUM SOLVENT. Scientists at the Ruhr-Universitat Bochum in
- > Germany have performed high-precision, ultracold chemical studies of
- > nitrogen oxide (NO) molecules by inserting them into droplets of
- > liquid helium (see figure at <http://aip.org/png/2005/240.htm>). NO,
- > Science magazine's "molecule of the year" for 1992, is important
- > because of its role in atmospheric chemistry and in signal
- > transduction in biology. A radical is a molecular entity
- > (sometimes charged and sometimes neutral) which enters into chemical

- > reactions as a unit. To sharpen our understanding of this important
- > molecule and its reactions, it would be desirable to cool it down,
- > the better to observe its complex spectra of quantum levels
- > corresponding to various vibrational and rotational states. In the
- > new experiment, liquid helium is shot from a cold nozzle into
- > vacuum. The resultant balls, each containing about 3000 atoms, are
- > allowed to fall into a pipe where NO molecules are lurking. The NO
- > is totally enveloped and, within its superfluid-helium cocoon at a
- > temperature of about 0.4 K, it spins freely. The helium acts
- > provides a cold environment but does not interact chemically with
- > the NO molecules. Because of this a high-resolution infrared
- > spectrum of NO in fluids could be recorded for the first time. NO
- > has been observed before in the gas phase, but never before has such
- > a high resolution spectrum be seen in the helium environment.
- > (Haeften et al., Physical Review Letters, 18 November 2005; contact
- > Martina Havenith, [martina.havenith@xxxxxxxxxxxxxxxxxxxx](mailto:martina.havenith@xxxxxxxxxxxxxxxxxxxx); lab website
- > at [http://www.ruhr-uni-bochum.de/pc2/helium\\_short\\_en.html](http://www.ruhr-uni-bochum.de/pc2/helium_short_en.html))
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• **Follow-Ups:**

- ◆ ***Re: PHYSICS NEWS UPDATE -- Number 754 November 16, 2005 by Phillip F. Schewe, Ben Stein***  
◇ From: donstockbauer

• **References:**

- ◆ ***PHYSICS NEWS UPDATE -- Number 754 November 16, 2005 by Phillip F. Schewe, Ben Stein***  
◇ From: Sam Wormley

- Prev by Date: ***Re: recent NOVA show on Newton; in defense of Newton***
- Next by Date: ***Re: Sci Am proposes SR wrong and Aether exists***
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