

Physicists investigate quantum entanglement using starlight

Random number generators are fine for experiments. But if you replace randomly zachytávanými photons from stars, so it's to test Bell's inequality, that quantum entanglement, even better.

Quantum linking, or entanglement, at first glance rather from the realm of science fiction. It lies in the fact that pairs or groups of particles in certain circumstances constitutes a system that has as a whole a single quantum state, although its components divided by a large distance. For Einstein, it was like a sci-fi horror and called it "spooky action at a distance" (English spooky action at a distance). Quantum entanglement is still a common prop quantum mechanics, which since its establishment has to fight for a place in the sun, probably due to the fact that they often come into conflict with "common sense" and "everyday experience".

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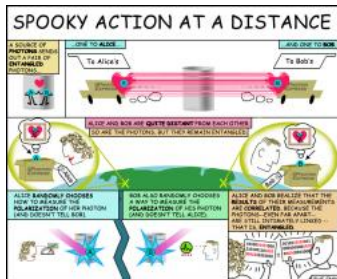
Anton Zeilinger (2011). Credit: Jaqueline Godany / Austrian Academy of Sciences.

Einstein and other greatest physicists quantum mechanics to promote the principle of local realism, which combines to exceed the speed of light with the assumption that for each particle always possible to measure in advance must be a value which then reveals measurements.

Local realism and quantum mechanics can be checked in tests of Bell's inequality, which in 1964 proposed a physicist John Stewart Bell. Such experiments have been a number of physicists and many times they found that the observed particles are indeed quantum entanglované. Tests of Bell's inequality, however, are very complicated and difficult to contain gaps or limitations of the theoretical assumptions, which are called "loopholes" and which question the reliability of test results.

A team of researchers at the Massachusetts Institute of Technology (MIT), the University of Vienna and other institutions under the leadership of the Viennese physicist Antona Zeilinger focused on one of the known loopholes in tests of Bell's inequality, which is associated with the freedom of the experimental setup, a "freedom-of-choice loophole." And solve it radically. The problem is that scientists do have freedom of choice in experimental design, but there may be some other factors or hidden variables that could be arranged so badly that the results of Bell's test will look favorably on quantum entanglement, yet it will just a coincidence.

Physicists are trying to solve this problem with freedom of choice through an extremely rigorous experimental arrangement. In these experiments entanglovaných form a pair of photons from a single source, which then are sent to two different detectors. The detector measures the characteristics of the photon and detect whether entanglované. To researchers as possible to suppress the problem with freedom of choice, used for detection random number generators, which will decide on the selection of the measured characteristics of photons. It is still in the game but a slight chance that some hidden variables or non-quantum phenomena affect random number generators.



Spooky action at a distance. Credit: NASA / JPL.

In an effort to even better address the problem with freedom of choice in 2014 Alan Kaiser, Andrew Friedman and Jason Gallicchio they designed an experiment in which earthly random number generators to replace generators cosmic numbers, based on the captured photons from distant astronomical sources such as stars or quasars. If in the development of such photons reflected some hidden variables or phenomena, so it happened long ago and far away. And right now, this procedure was first used in the experiment, researchers MIT, the University of Vienna, and colleagues. Installed a source entanglovaných pairs of photons on the roof of a university laboratories in Vienna and in each round of



Quantum mechanics to support the star. Credit: Public Domain CC0.

EINSTEIN ATTACKS QUANTUM THEORY

Scientist and Two Colleagues Find It Is Not 'Complete' Even Though 'Correct.'

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1935: Einstein's leading media war against quantum mechanics. Credit: Wikimedia Commons.

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The idea of

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the experiment, they "fired" entangled pair photons in opposite directions to detectors on the roofs of several blocks away.

For both detectors simultaneously installed telescopes equipped with extremely fast radiation detectors stars, the nearest of which is 600 light years away, which are able to capture photons from stars in periods shorter than a nanosecond. Always a few microseconds before a pair of photons entangled reached his detectors, telescopes lightning detectors measured wavelength being trapped photon space of stars and determine whether it is higher or lower than a predetermined wavelength. From the data thus obtained detectors then see which variables, namely the experimental photon polarization parameters are measured.

To not tensioned longer, the researchers made a total of two three-minute experiments. In each of these experiments measured the roughly 100,000 pairs of photons entangled. Results of the experiments showed conclusively that photons in entangled pairs are highly correlated precisely in such a way that quantum mechanics predicts. Scientists at the Vienna roofs greet Einstein and he announced that, in the case that local realism and quantum mechanics was really about outside.

Video: Physics @ FOM Veldhoven 2016 Anton Zeilinger - Quantum teleportation and entanglement



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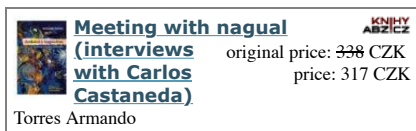
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MIT News 6. 2. 2017, Physical Review Letters, 118: 06040, arXiv: 1611.06985.

Author: **Stanislav Mihulka**

Date: February 7, 2017

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Discussion:

Petros Pd, 02/08/2017 6:09:29 p.m.

On Entanglement is not really anything strange, it proves that the universe is not materialistic but information system that particles communicate and share information. It could be understood even then that the universe is a supercomputer such a neural network made up of particles.



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Particles also share a word at a time postpravdivostní

Josef Hrcirik, 02/08/2017 6:36:58 p.m.

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Re:

Milan Krnic, 02/08/2017 7:18:54 p.m.

Or is it possible that the whole complex is cycled. I.e. The universe must be one "string", which consist of parts / ce higher and higher to the universe. Who knows.

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Moreover, the word at the same time everywhere.

Josef Hrcirik, 02/08/2017 7:54:26 p.m.

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Re:

Marcel Brocade, 02.09.2017 9:53:15

Přeesněěéé. It's in this world thinkers wanted your shot, after all, it's going from bad to worse!

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Freedom of choice

Milan Krnic, 02/08/2017 11:30:55

Free choice of scientists would not specify if they had freely pulled into the car. See causality. Freedom of choice is only certain for something useful concept.

This example ..

Pavel Krtouš - Causality, determinism and direction of the passage of time (MFF FDP April 14, 2016)

<https://www.youtube.com/watch?v=-NSCSRu9ue4>

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Re: Free choice

Milan Krnic, 02/08/2017 11:32:18

* Would

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Entanglement

Jandak Josef, 02/08/2017 11:14:54

Entanglement author has in his head, if not speak Czech, so be it better not write anything.

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Re: Entanglement

Milan Krnic, 02/08/2017 11:28:03

Here we are at the tabloid site. So if you have any specific comment, please address it to ja@osel.cz

Thank you

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Random Number Generator

Petr Petr, 02/08/2017 11:09:44

If I use stellar random number generator (instead of eg. A pseudorandom generator), so it logically proves nothing. By analogy, if I use such random numbers eg. Encryption (needs a random number generator), so it does not prove the security of the encryption algorithm. It is necessary but not sufficient condition. So realizing experiment with the exclusion of one loop hole is completely useless (Publish or Perish). It has to do everything together (or otherwise experiment encryption does not work). Just drivel again and many people believe it ...

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Re: Random Number Generator

Josef Hrcirik, 02/08/2017 5:41:07 p.m.

The fact that entanglované photons have opposite polarization doubt about Einstein.

Certainly no doubt about it yet I do.

What's revolutionary experiment?

Surely it worked well, even if Bob flirting simultaneously with Anco from Andromeda through entanglovačky (pimps) Cecilie on Proxima.

It also works 14.II.

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There was a tax evasion? Kolikanásobnému?

Josef Hrcirik, 02/08/2017 7:43:01 p.m.

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Figure 3 is for me a little spooky

Josef Hrcirik, 02/09/2017 9:45:56 p.m.

Spooky would be if the status changes, and instantly changed status B.

Compelling would be if those changes could be freely forward state between A and B (infinite speed) or would not need PHOTONEXPRESS.

It would come unfeigned horror and Vodafone.

I am not saying, however, that spooky action there, but certainly not too spooky consequences.

Spooky me rather comes to handling polarizers spooky fading correlation measurements or rather strict negation between? Entanglovaných photon spins and ev. why not do it.

Completely spooky by the system to encrypt and decrypt "the public and at the same time secret communications" between B and A.

And I've read before crack article PB from 1 November 2015 and I thought it was generally understood.

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Perhaps this is explained in the video, but an outline of ideas should be in the text.

Josef Hrcirik, 02/09/2017 9:49:53 p.m.

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