

The Science of Mula Francis

The blog of Francisco R. Villatoro

News in brief quantum physics that may interest you



10 Comments



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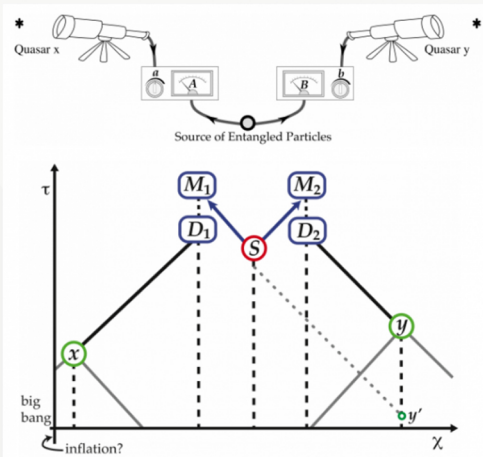
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Cosmic Bell experiment. Debate between Einstein and Bohr on the possibility of a hidden variable theory could explain quantum entanglement was solved by the theorem of John Bell. Quantum mechanics violates some inequalities that no hidden variable theory can violate. However, his argument has some gaps (*loopholes*). The most important is "free will" (*free will loophole*). In the past two intertwined systems may share a common history (hidden). How can you avoid this gap?

The most obvious is to use two objects from the beginning of the Big Bang have always been separated as two quasars placed on opposite sites of the sky. The theoretical physical [David Kaiser](#) (MIT) and two colleagues propose to perform a Bell-type experiment in the Canary Islands using two separate entangled photons 144 km (distance between La Palma and Tenerife) and photons produced in two very distant quasars observed by each other and two telescopes. The practical implementation of this theoretical experiment is not easy, but could eliminate the gap of free will in the theorem of Bell. Of course, does not rule out other gaps of quantum physics that Bell's theorem is not able to decide (as the existence of hidden variables superdeterministas).

The white paper is Jason Gallicchio, Andrew S. Friedman, David I. Kaiser, "Testing Bell's Inequality with Cosmic Photons: Closing the Loophole Setting-Independence," Physical Review Letters, Accepted Mar 2014, [arXiv: 1310.3288](#) [quant-ph]. I also recommend reading Charles Q. Choi, "Quasar Experiment May Shed Light on Quantum Physics and Free Will," [NBCNews, 6 Mar 2014](#), and Zeeya Merali, "Cosmic light-quantum weirdness Could close loophole. Distant quasars would choose Whether quantum entanglement is an illusion," [Nature News, February 25, 2014](#).