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A New Study May Have Confirmed Quantum Entanglement By Using Light From Quasars That Are Billions Of Years Old

The new research on quantum entanglement in relation to ancient quasars gives further evidence of what Einstein once referred to as 'spooky action at a distance.'

SCIENCE

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Kristine Moore

A new study was just published today that is the culmination of a long period of research into quantum entanglement by physicists from MIT, the University of Vienna, the University of California at San Diego, Harvey Mudd College, and the Austrian Academy of Sciences, which uses ancient quasars to help confirm what Einstein once referred to as “spooky action at a distance.”

As *MIT News* reports, this research gives a great deal of support for the idea that two particles can be linked to one another regardless of how far away they may be from each other with regard to both time and space, which is something that goes against everything we know about classical physics.

To illustrate how very strange the notion of quantum entanglement is when it comes to classical physics, picture in your mind two particles that sit across the universe from each other.

By using the theory of quantum mechanics, the only way that these two particles could be legitimately entangled would be if they shared physical properties in a manner which made it so that if you were to measure one of the particles it would immediately "convey information about any future measurement outcome of the other particle."

Physicists have questioned whether quantum entanglement might be a feature of some obscure form of classical physics and have looked into the so-called “freedom of choice” loophole which is “the possibility that some hidden, classical variable may influence the measurement that an experimenter chooses to perform on an entangled particle, making the outcome look quantumly correlated when in fact it isn’t.”

In February, MIT physicists analyzed 600-year-old starlight to determine if there was indeed some unknown classical mechanism at play with quantum entanglement and discovered that if this was the case, then it was something which would have had to have begun 600 years ago, long before the experiment had even been conjured up and, of course, before

the star first emitted light.

The new study on quantum entanglement has gone even further than the previous one in February, and this time physicists looked at entangled photons in relation to two different quasars, one whose light has finally reached us after 7.8 billion years with the second one even more ancient at 12.2 billion years.

After observing the quantum entanglement of 30,000 pairs of photons, MIT co-author Alan Guth noted that if classical physics were to account for this phenomenon, then it was something which would have had to start 7.8 billion years ago, which seems very unlikely.

> “If some conspiracy is happening to simulate quantum mechanics by a mechanism that is actually classical, that mechanism would have had to begin its operations — somehow knowing exactly when, where, and how this experiment was going to be done — at least 7.8 billion years ago. That seems incredibly implausible, so we have very strong evidence that quantum mechanics is the right explanation.”

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MIT’s David Kaiser stated that considering the fact that the

Earth is 4.5 billion years old, it seems quite unlikely that there could be another explanation for this quantum entanglement in relation to quasars outside of quantum mechanics.

> “The Earth is about 4.5 billion years old, so any alternative mechanism — different from quantum mechanics — that might have produced our results by exploiting this loophole would’ve had to be in place long before even there was a planet Earth, let alone an MIT. So we’ve pushed any alternative explanations back to very early in cosmic history.”

The new study that used two very distant quasars to help confirm quantum entanglement has been published in *Physical Review Letters*.