

Quantum Entanglement

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Don't Get Your Brain Tangled: What is Quantum Entanglement?

Have you decided to learn stuff about quantum physics? Well, this article will contain plenty of that! The first word, “Quantum” means an amount of energy proportional in magnitude to the frequency of the radiation it represents. This word will get you a lot of scrabble points. Jokes aside, “Entanglement” means the state of being entangled, which means causing something to be caught or twisted in. In this case, it is when 2 things are connected. Like all things in quantum physics, quantum entanglement shows itself at small, subatomic scales. Quantum entanglement is when 2 particles become entangled, and stay entangled even from very long distances. By very long distances, I mean millions of light years. Scientists call this an, “Emergent Property,” and sometimes think of the 2 particles as a single particle. When 1 of them changes, the other one would change as well.

Joined Together: Quantum Entanglement History

In 1930, Albert Einstein and Erwin Schrödinger discovered entanglement. To them, it was spooky and disturbing how 2 particles can stay connected from such far distances. Wanting to explain this phenomenon, Albert Einstein, Boris Podolsky, and Nathan Rosen, also known as “the EPR,” claimed that hidden variables should be added to quantum mechanics. Sadly, at the time, there was no evidence for or against quantum entanglement until later. John Bell came up with the speed on which the information gets sent from one to another, and today, there is much evidence to prove that quantum entanglement is real and fundamental to nature, and in 2022, John Clauser won the nobel prize in physics with Alain Aspect and Anton Zeilinger, because he used the inequalities John Bell made and using quantum mechanics.

Gotta Go Fast: Speed of Information Travel

In 1964, John Bell, a physicist, said that some changes from particles happen instantly, even if they are very far apart. That is currently an important part of physics, but conflicts with other principles of physics. Before Bell made his proposal about this, Albert Einstein thought that information between particles cannot travel any faster than the speed of light. Once he learned Bell's proposal, Einstein was shocked, and called John Bell's proposal, “Spooky Action at a Distance.” The Spooky Action at a Distance phenomenon could be false, but there is much evidence to back it up. The second measurement will always match the first, proving that information can move faster than the speed of light. However, some people don't believe in Spooky Action at a Distance, because it may take time if information was traveling to somewhere really far, like the sun.

I Change, You Change: Here Is An Example With A Metaphor

Let's say that we have 2 boxes, each inside different houses. The boxes are entangled. There are 2 states the boxes could be in; open or closed. Until 2 people look at the box they want to look at, the box is both opened and closed (I don't know how that would look). Once the first person looks at a box and the second looks at the other, the boxes become open or closed. Once one of the boxes becomes the opposite of what it is now, the other will be too. But let's say one person looks at the box at a different angle. They could see that the box is not the same as the other person's. That is because the information on if the box is open/closed is stored in the connection, not any one ball.

Now My Brain Is Twisted: My Opinion

I think that information can move faster than the speed of light, because of the information that I provided before. I also think that quantum physics is very complicated, and a middle schooler like me is not meant to learn this at this age.

Thanks for reading. Enjoy your day!

Sources:

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