
Quantum Entanglement

One of the biggest problems of sending satellites and rovers into space is communication delay. For relatively short distances, like the Earth and the moon, this does not pose much of a problem. Communicating with satellites and/or rovers on the moon has a relatively small delay of approximately one second. On the other hand, deep space communication is a huge problem due to its slow response time. It's worse than playing online video games on a dial-up connection! Communicating with satellites and rovers in deep space is extremely slow, relative to the instant communication we are accustomed to. Even for something like Mars, which is relatively close compared to other planets, communication can take anywhere from 4 to 24 minutes; and that's just one way (Ormston, 2012). Just imagine how frustrating it would be if your phone took 24 minutes to open Facebook or Snapchat. This is what engineers, scientists, and astronomers experience when working with machines in outer space. In addition, the problem only gets worse for planets that are further away. Communicating with planets as far away as Saturn and Jupiter can take an hour and sometimes more (Radowitz, 2017). Troubleshooters and technicians need immediate feedback to see what works and what doesn't – especially in an unknown environment that is thousands of kilometers away on a completely different planet. If information could be sent instantly across planets, then exploring space would be significantly easier. Astronomers would be able to send and receive information instantly, and engineers would be able to troubleshoot instantly. Unfortunately, something like this doesn't exist, yet – but it could in the future. With enough research and funding, Quantum Entanglement could be used for instantaneous communication.

Quantum entanglement is when a pair of particles, such as photons, are ‘cosmically connected’ (Tate, 2013). For instance, if the spin on a photon is up, then the entangled photon will have a down spin (Tate, 2013). Einstein called this, “spooky action at a distance”. The transfer of state between the entangled photons is instantaneous, regardless of distance (Tate, 2013). Unfortunately, scientists cannot currently force a state on an entangled particle without breaking the entanglement. But, with enough research and development, forcing states on an entangled particle without breaking state could be possible. A break through like this will make space exploration significantly easier and quicker. Communicating with satellites and rovers will be instant. These machines will be able to instantly send information, such as pictures, videos, sound, diagnostic data, etc., in an instant. Scientists will be able to see planets, live. Furthermore, quantum communication will allow astronauts to browse the web with little to no delay. Normally, when astronauts explore space, they download their favorite sites on a solid-state/flash drive in order to use it offline. With quantum communication, they will be able to use the internet as they normally do on earth. Another benefit to funding and researching quantum entanglement is spin-offs. The tech can be used to improve life on earth by improving computational speed and making the internet accessible to everyone at ultra-high speeds.

In order for this to work, three machines with varying degrees of functionalities are required. The first machine reads the binary data from a storage medium and converts the spin of the entangled particle based on the binary digit. If the bit is 1, then the spin of the particle will be up. If the bit is 0, then the spin of the particle won’t be up. Then, a machine on Earth will analyze the other half of the entangled particles, read their state and convert it into binary; a numeric system that can be read by modern computers.

References

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