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# Possibility of Quantum Entanglement

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## Editorial Note

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## EDITORIAL NOTE

Quantum entanglement is one of the precious puzzles for modern physics. Recent achievements from experimental ground for entanglement have shown us a good possibility of its existence.

Basically, QE is a phenomenon in which pair or cluster of particles share spatial proximity in a way that the quantum state of individual particle of the pair or cluster cannot be defined independently, even if the particles are separated by large distance. Measurements of physical properties like position, momentum, spin, and polarization performed on entangled particles can, in some cases, be found to be perfectly correlated. For instance, if a pair of entangled particles is generated such their total spin is understood to be zero, and one particle is found to possess clockwise spin on a primary axis, then the spin of the opposite particle, measured on an equivalent axis, is found to be counter clockwise. However, this behaviour gives rise to seemingly paradoxical effects: any measurement of a particle's properties leads to an irreversible wave function collapse of that particle and changes the first quantum state. With entangled particles, such measurements affect the entangled system as an entire.

As an example of entanglement: an elementary particle decays into an entangled pair of other particles. The decay events obey the varied conservation laws, and as a result, the measurement outcomes of 1 daughter particle must be highly correlated with the measurement outcomes of the opposite daughter particle (so that the entire momenta, angular momenta, energy, then forth remains roughly an equivalent before and after this process). As an example, a spin-zero particles could decay into a pair of spin-½ particles. Since the entire spin before and after this decay must be zero (conservation of angular momentum), whenever the primary particle is measured to be spin abreast of some axis, the other, when measured on an equivalent axis, is usually found to be spin down. (This is named the spin anti-correlated case; and if the prior probabilities for measuring each spin are equal, the pair is claimed to be within the singlet state).

The special property of entanglement is often better observed if we separate the said two particles. Let's put one among them within the White House in Washington and therefore, the other in Buckingham Palace (think about this as an idea experiment, not an actual one). Now, if we measure a specific characteristic of 1 of those particles (say, for instance, spin), get a result, then measure the opposite particle using an equivalent criterion (spin along an equivalent axis), we discover that the results of the measurement of the second particle will match (in a complementary sense) the results of the measurement of the primary particle, therein they're going to be opposite in their values.

The above result may or might not be perceived as surprising. A classical system would display an equivalent property, and a hidden variable theory would definitely be required to try to so, supported conservation of momentum in classical and quantum physics alike. During a sense to be discussed below, the quantum system considered here seems to accumulate a probability distribution for the result of a measurement of the spin along any axis of the opposite particle upon measurement of the primary particle. This probability distribution is generally different from what it might be without measurement of the primary particle. This might certainly be perceived as surprising within the case of spatially separated entangled particles.