

Commentary on Basic Concept and the Applications of Quantum Physics

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Commentary

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ABOUT THE STUDY

Quantum physics is strange and enigmatic. Although precisely describing the dynamics of tiny entities, it defines human reasoning in terms of reality and causation. Entanglement is one of the strangest rules of quantum physics. According to the law, electrons on opposite sides of the universe can be connected and immediately transmit information. This, however, is not achievable at the macroscopic scale, where classical physics applies. In truth, all things are constrained by the universe's speed limit, which is the speed of light. Quantum physics is filled with laws that are not related to conventional physics norms.

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Applications

The lists of application for those are limitless. Among the applications for those are:

Ultra-precise clocks: Clocks are an essential element of daily life. Most clocks, on the other hand, are not exact, since they tend to lose seconds with time, making them unreliable timekeepers over time. The quantum-logic clock, the first clock ever made, is based on quantum mechanics principles. It calculates the radiation frequency necessary to transfer electrons from one energy level to the next. The clock in question is located in the United States National Institute of Standards (NIS) and Technology in Colorado, and it is known to have a degree of inaccuracy of plus or minus 1 second over a period of 3.7 billion years. The National Institute of Standards and Technology (NIST) strontium clock is reported to never gain or lose a second in 5 billion years.

Uncrackable encryption: Codes in traditional encryption can be intercepted on their way from the sender to the recipient. This encryption is vulnerable to intercept and decoding. Using the use of quantum physics, a new sort of encryption called as quantum key distribution is devised. The information about the key is delivered through a randomly polarized photon to limit its vibration to only one plane in this type of encryption. The receiver then employs filters and an algorithm to extract the key. This technique is being employed by firms such as ID Quantique, Toshiba, and Big Bang Nucleosynthesis (BBN). ID Quantique created a tamper-proof voting system for an election. Since as early as 2004, this technique has been used to safeguard bank transactions.

Biological compasses: Although this technology has yet to be invented and found, scientists have seen this occurrence on birds and believe that it is due to the birds' capacity to migrate from one location to another. Scientists think that birds' eyes include a kind of molecule called as cryptochrome, which allows them to sense the earth's magnetic field via an entangled pair of electrons.

Powerful computing machines: Machines use a pair of binary digits to store and process data (0, 1). Quantum computers, on the other hand, use superposition to store data in the form of quantum bits or qubits. Until the data is analyzed or assessed, it is either a 1 or a 0. This computer is supposed to be several times more powerful than standard computers. D-wave was the first firm to build this, with its initial 128-bit and 512-bit processors, D-wave one and D-wave two, which are still utilized and tested by NASA and Google laboratories today.

Improved microscopy: Scientists from Japan's Hokkaido University were able to improve the resolution of microscopic pictures by using entangled pairs of photons, and the newly constructed equipment was dubbed the entanglement enhanced microscope.