

Quantum Entanglement and Mind to Mind Connection

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Abstract

A physical proof of mind to mind connection may be based on quantum entanglement, a physics term in quantum mechanics. It implies the existence of matter to matter connection. Accounts showing this feature at the fundamental and atomic level of matter are present. If human brain is considered as the matter form of mind, quantum mechanical approach may play a big part in shedding light on mind-wise connection.

Key words: Quantum mechanics, entanglement, mind-wise connection.

1. Introduction

Non relativistic Quantum Mechanics describes micro world, i.e. atom. Description is done by a wave function that represents the structure. Physical meaning starts to emerge when the wave function is thought together with its complex conjugate. It exhibits probability density based on position. The wave function is normalized so that total probability must be equal to 1 which corresponds to 100% probability. The wave function of the atom is obtained by solving the Schrödinger equation in the spherical coordinates. The centripetal nature of electrical potential energy in the atomic structure simplifies significantly the task of finding the solutions of the equation.

Quantum entanglement is one of the consequences of the quantum mechanics. Einstein calls it “spooky action at a distance” [1]. The entanglement known as “nonlocal correlations” may be explained as two particles keeping their connection even after they are separated for a long distance. In addition, when one of the particles is acted on, somehow the other particle senses it and stays under influence.

The experimental studies on the observation of the quantum entanglement are ongoing projects and can be classified depending on the quanta used in the study. The quanta can be fundamental or composite in nature. Photons, electrons, atoms, molecules or even small diamonds have been used to demonstrate the phenomenon [2-4]. Among them, photon entanglement experiments take the lead. It is reported that different types of particles can also be entangled [5]. In another report, entanglement between billions of atoms in two gas chambers was succeeded and demonstrates multi particle entanglement [6]. Recently, it is shown that two photons exist at different times can also be entangled [7].

Theoretically, there is no upper limit on the distance for the quantum entanglement. However, experimentally the highest record is up to 144 km using entangled photons [8].

2. Photon Entanglement Experiment

Entanglement experiments with photons are carried out on the basis of a method called spontaneous parametric down-conversion (SPDC) where the photons are split into pairs of photons. In a typical setup a laser beam is sent to a beta-barium crystal (Fig. 1).

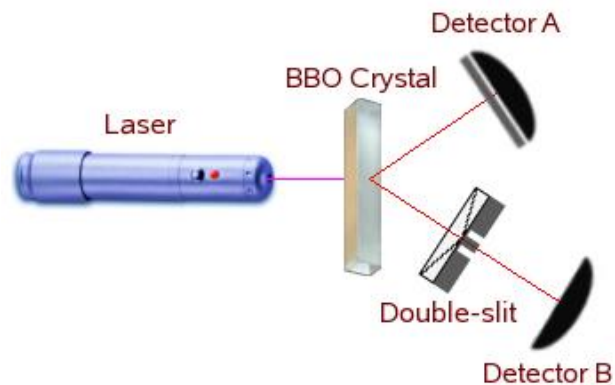


Figure 1. Entanglement setup [9].

Most of the time the photons pass through directly; however, every once in a while SPDC is observed. The resultant pair has opposite polarization. If one of them is polarized in counter clockwise (CCW) then the other one will be polarized in clockwise (CW) or vice versa. The entangled photons are sent to detectors. A rotatable filter before one of the detectors and a double slit before the other one are placed. In addition, these slits have a feature that filters the polarization. As a result, slit 1 and slit 2 will pass the photons with CCW and CW polarizations, respectively. In the beginning, no interference pattern is seen at both detectors (Fig. 2a).

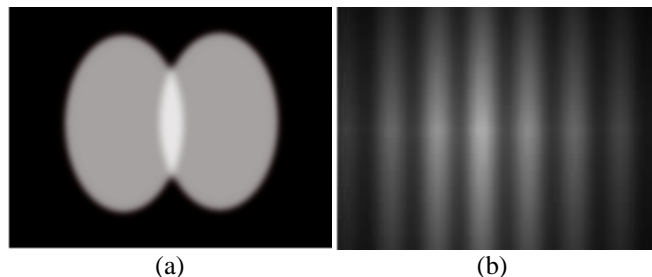


Figure 2. Typical non-interference (a) and interference (b) patterns [9].

However, when polarization is changed by rotating the filter before detector A to a degree that CCW and CW are not distinguishable, interference pattern emerges at both detectors (Fig. 2b).

Normally, one expects to observe a change only at detector A since the filter is placed in front of it. However, the interference is observed also at the detector B where no action is done at all. How did the photons at detector B side sense the polarization changes done on the detector A side? How the information is conveyed between the photons at two sides? What is the mediator? This is where the spookiness arises. The answers are yet to come. On the other hand, the experiment clearly demonstrates the existence of an undeniable connection between the entangled photons.

3. Entanglement and Telepathy

Quantum entanglement experiments may be viewed as the tangible evidence for matter to matter connection since it establishes a hidden link between two quanta. The sizes and the masses of the quanta used in such experiments increase gradually and are now as big as small diamonds as mentioned above [4]. Entanglement with much massive and bigger objects would be expected based on the current trend. Likewise, quantum entanglement may also provide hard evidence for mind-matter interactions and mind to mind connections. These terms are known as psychokinesis and telepathy, respectively. These metaphysical concepts are covered in psychology and referred as a hot potato, too hard to deal with, emphasizing their complexities [10]. Human brain can be conceived as the materialistic part of mind. Based on this idea, telekinesis and telepathy can be assessed on equal footing with matter to matter connection [11]. Here, mind-to-mind connection is concentrated on.

Case studies and experiments regarding the connections between two entangled minds can be found in the literature. The inventor of electroencephalogram (EEG), Hans Berger has such experience with his sister. When he was cavalry he faced a dangerous situation and horrified. His sister somehow senses his brother's emotion from far away [12]. A case study demonstrates matching tendencies of twins raised by different families [10]. First experiment published in this subject studied the EEG correspondences of twins raised separately. It was reported that when one twin was asked to close his or her eyes triggering the alpha rhythms of the subject's brain, an increase on the alpha rhythms of the other twin was detected, an effect not observed on the unbound pairs of brains. [13]. A similar study conducted this time with functional magnetic resonance imaging (fMRI) gave the exact location of the activity occurred in the brain [14].

4. Conclusions

Based on the cases above, one can deduce that telepathy changes proportionally to the degree of the entanglement between a pair of brains. One can also deduce that entanglement has degrees and correlates strongly with common history between the pairs. Common history is to be maximum between the twins. Since members of a family (apart from twins) have common histories less than twins, the degree of entanglement will be lower and therefore, telepathy between any of the two in the family can occur less often. A quantitative model can be suggested for the relations established above using quantum mechanics.

References

- [1] Einstein A, Podolsky B, Rosen N., Can quantum-mechanical description of physical reality be considered complete? *Phys. Rev.* 1935;47(10): 777–780.
- [2] Markus Arndt, Olaf Nairz, Julian Vos-Andreae, Claudia Keller, Gerbrand van der Zouw & Anton Zeilinger, Wave–particle duality of C60 molecules, *Nature* 1999;401: 680-682.
- [3] Nairz O, Arndt M, Zeilinger A, Quantum interference experiments with large molecules, *American Journal of Physics* 2003;71:319-325.
- [4] Lee K. C., Sprague M. R., Sussman B. J., Nunn J., Langford N. K., Jin X.- M., Champion T., Michelberger P., Reim K. F., England D., Jaksch D., Walmsley I. A. Entangling macroscopic diamonds at room temperature. *Science* 2011;334 (6060):1253–1256.
- [5] Blinov B. B., Moehring D. L., Duan L.- M., Monroe C., Observation of entanglement between a single trapped atom and a single photon, *Nature* 2004;428:153-157.
- [6] Krauter H., Salart D., Muschik C. A., Petersen J. M., Heng Shen, Fernholz T. & Polzik E. S., Deterministic quantum teleportation between distant atomic objects, *Nature Physics* 2013;9:400-404.
- [7] Megidish E, Halevy A, Shacham T, Dvir T, Dovrat L, Eisenberg HS, Entanglement swapping between photons that have never coexisted, *Phys. Rev. Lett.* 2013;110:210403
- [8] Scheidl T, Ursin R, Kofler J, Ramelow S, Ma XS, Herbst T, Ratschbacher L, Fedrizzi A, Langford NK, Jennewein T, Zeilinger A, Violation of local realism with freedom of choice, *Proceedings of the national academy of sciences of the United States of America* 2010;107(46): 19708-19713.
- [9] <http://davidjarvis.ca/entanglement/spookiness.shtml>, last accessed on April, 15th 2015.
- [10] Radin D. *Entangled minds : extrasensory experiences in a quantum reality.* London: Simon Schuster; 2006.
- [11] Meijer DKF, Cyclic information flow in a quantum physical realm, *Neuro Quantology* 2014;12(2):180-200.
- [12] Bender H, Hans Berger and an energetic theory of telepathy. *Zeitschrift fur Parapsychologie und Grenzgebiete der Psychologie* 1963; 6(2/3): 182-191.
- [13] Duane TD, Behrendt T. Extrasensory electroencephalographic induction between identical twins. *Science* 1965;150:367.
- [14] Standish LJ, Johnson LC, Richards T, Kozak L, Evidence of Correlated functional MRI signals between distant human brains. *Alternative Therapies in Health and Medicine* 2003;9: 122–128.