Possible Explanation for the Quantum Entanglement of Photons

Hasmukh K. Tank

Indian Space Research Organization, 22/693 Krishna Dham-2 Ahmedabad 380015 India

e-mail: tank.hasmukh@rediffmail.com, hasmukh.tank1@gmail.com

Abstract:

Quantum entanglement of pair of particles is now an established fact as described in [1]. But its theoretical explanation is yet to be found. So this letter attempts to propose one possible explanation, based on the previous works. In a paper titled: "Some conjectures on the nature of energy and matter" [2], and its latest version titled: " On the emergence of physical world from the ultimate reality" [3] it was proposed that 'space' or 'vacuum' can be viewed as a 'super flexible continuum (SFC), and 'particles' of 'matter' as 'spherical standing wave patterns' of fluctuations generated in SFC. Einstein tried to do-away with ether in his special theory of relativity, but when he had to assign curvature to space, he told: " Well, in that sense, there exists an ether" But majority of scientists still stick to emptiness of space, and are facing understanding observations like quantum entanglement and collapse of the quantum-mechanical wave-function. In this manuscript space is assumed to be a super-flexible-continuum, and you will find that it helps gaining an insight into the quantum entanglement and collapse of q-m wave-function. Since, in a continuum, when a labeled dot moves from point A to A', as shown in the figure1 here, the point B behind it has to move from B to B'; and this chain of displacements has to complete a closed circular path, whose radius can be as small as a few nano-meters or as large as a few thousand kilometers. Since there is no preferred axis about which the point A should orbit, it moves partly about x-axis, partly about y-axis and partly about z-axis; forming a small circle on the spherical shell. This motion of point A, of completing a small circle on the surface of a spherical shell, takes some time *t*, giving rise to a wave in the radial directions. The propagation of this wave in the radial directions is at the speed of light; whereas the displacements of points on the surface of spherical shell are instantaneous and simultaneous; because of the continuum nature of 'space'. When such a wave of fluctuations moves in radial direction its mirror-wave, of the same frequency and amplitude, has to move in radially opposite direction, giving rise to a pair of pulses moving apart in radial directions. Since, the spin and polarization of 'photons' are

perpendicular to the direction of photon's motion, they are in the tangential-direction of the spherical shell, on which displacements of points take place instantaneously. Therefore, when spin, or polarization, of one photon is measured the spin and polarization of the mirror-particle gets instantaneously affected, because of the instantaneous displacement of points on the surface of the spherical shell. Similarly, when a photon is absorbed by one atom on the spherical shell, the wave collapses, because of simultaneous displacement of points on the spherical shell. Thus, the observed entanglement of photons, and other particles, imply the presence of an underlying 'super flexible continuum' (SFC), as was anticipated in [2] in the year 1988.

Key Words: Quantum mechanics, Quantum entanglement, Super-flexible-continuum (SFC)

Introduction:

Quantum entanglement is described in Wikipedia page as: [1]

"Quantum entanglement is a physical phenomenon that occurs when pairs (or groups) of particles are generated (or found) to interact in ways such that the quantum state of each particle cannot be described independently—instead, a quantum state may be given for the system as a whole.

Measurements of physical properties such as position, momentum, spin, polarization, etc. performed on entangled particles are found to be appropriately correlated. For example, if a pair of particles is generated in such a way that their total spin is known to be zero, and one particle is found to have clockwise spin on a certain axis, then the spin of the other particle, measured on the same axis, will be found to be counterclockwise. Because of the nature of quantum measurement, however, this behavior gives rise to effects that can appear paradoxical: any measurement of a property of a particle can be seen as acting on that particle (e.g. by collapsing a number of superimposed states); and in the case of entangled particles, such action must be on the entangled system as a whole. It thus appears that one particle of an entangled pair "knows" what measurement has been performed on the other, and with what outcome, even though there is no known means for such information to be communicated between the particles, which at the time of measurement may be separated by arbitrarily large distances." [1]

This manuscript attempts to explain this entanglement, and the collapse of the wave-function, based on the previous works [2] and [3].

Detailed Description:

In a paper titled: "Some conjectures on the nature of energy and matter"[2] and its latest version " On the emergence of physical world from the ultimate reality" [3] it was proposed that 'space' or 'vacuum' can be viewed as a 'super flexible continuum (SFC), and 'particles' of 'matter' as 'spherical standing wave patterns' of fluctuations generated in SFC. 'Space' is not a void extension of nothingness; rather, there exists a highly subtle super flexible continuum (SFC) which is present everywhere in the space, for all the time. This SFC, because of its mass-less-ness, is free to remain steady or fluctuate or vibrate; so there are 'fluctuations' or 'perturbations' spontaneously sprung in it.

Since, in a continuum, when a labeled dot moves from point A to A' the point B behind it has to move from B to B'; and this chain of displacements has to complete a closed circular path, as shown in the fig.1 below:

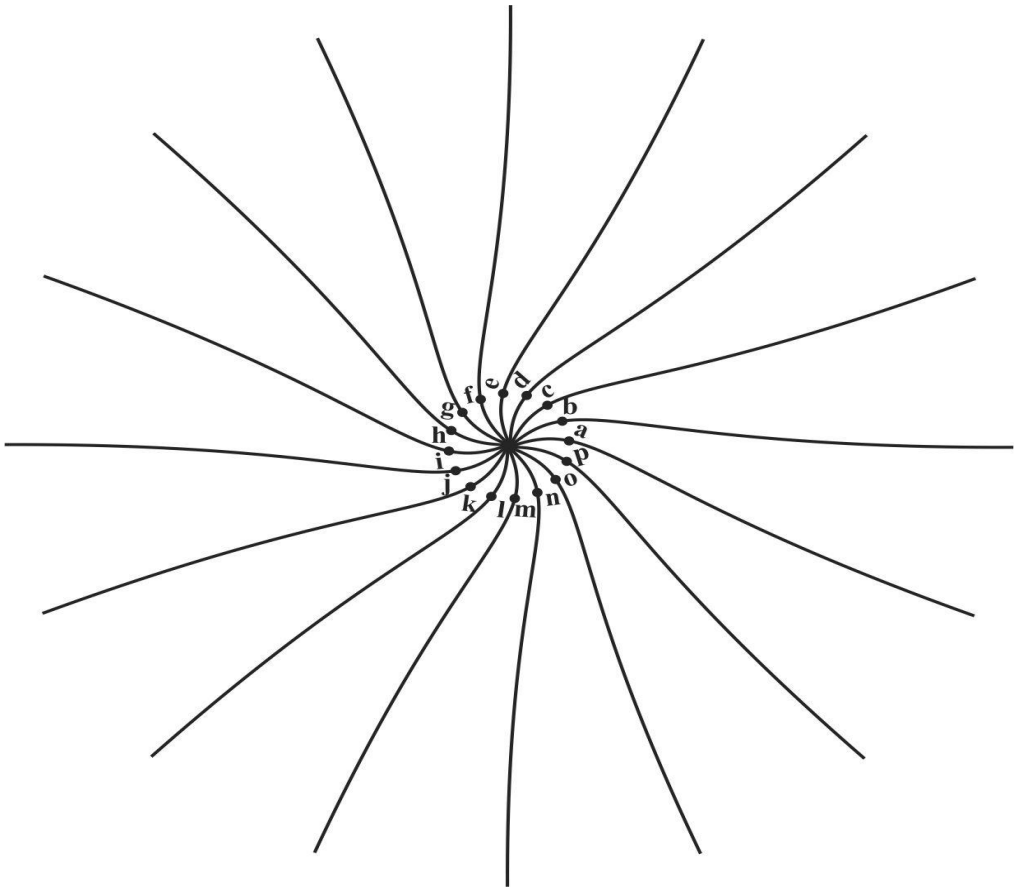

Fig.1

Radius of this displacement-circle can be as small as a few nano-meters or as large as a few thousand kilometers. Since there is no preferred axes about which the point A should rotate, it rotates partly about x-axis, partly about y-axis and partly about z-axis; completing a circular path on the surface of the spherical shell. When this motion of point A completes a small circle on the surface of a spherical shell in a time *t*, it gives rise to a spherical wave, as shown in fig.2 below:

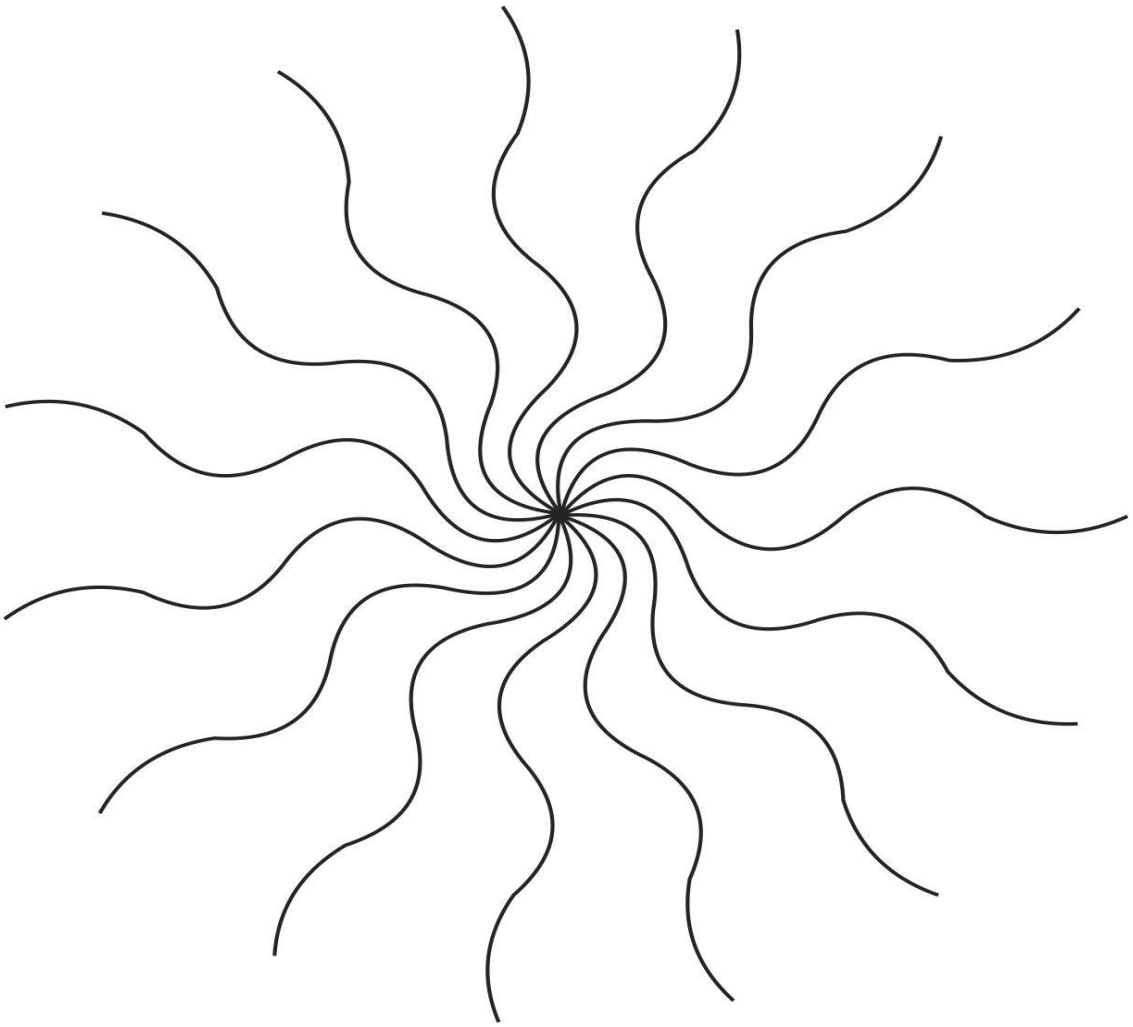

Fig.2: When the labeled dot A moves in a small circle on the surface of the spherical shell, it gives rise to a spherical wave as shown here.

If the radius of the spherical shell is very large, compared to the small circular path traversed by point-A, then amplitude of the radial wave can decrease even in radially-inward direction; giving rise to a wave traveling in radially outward directions, as shown in fig.3 below:

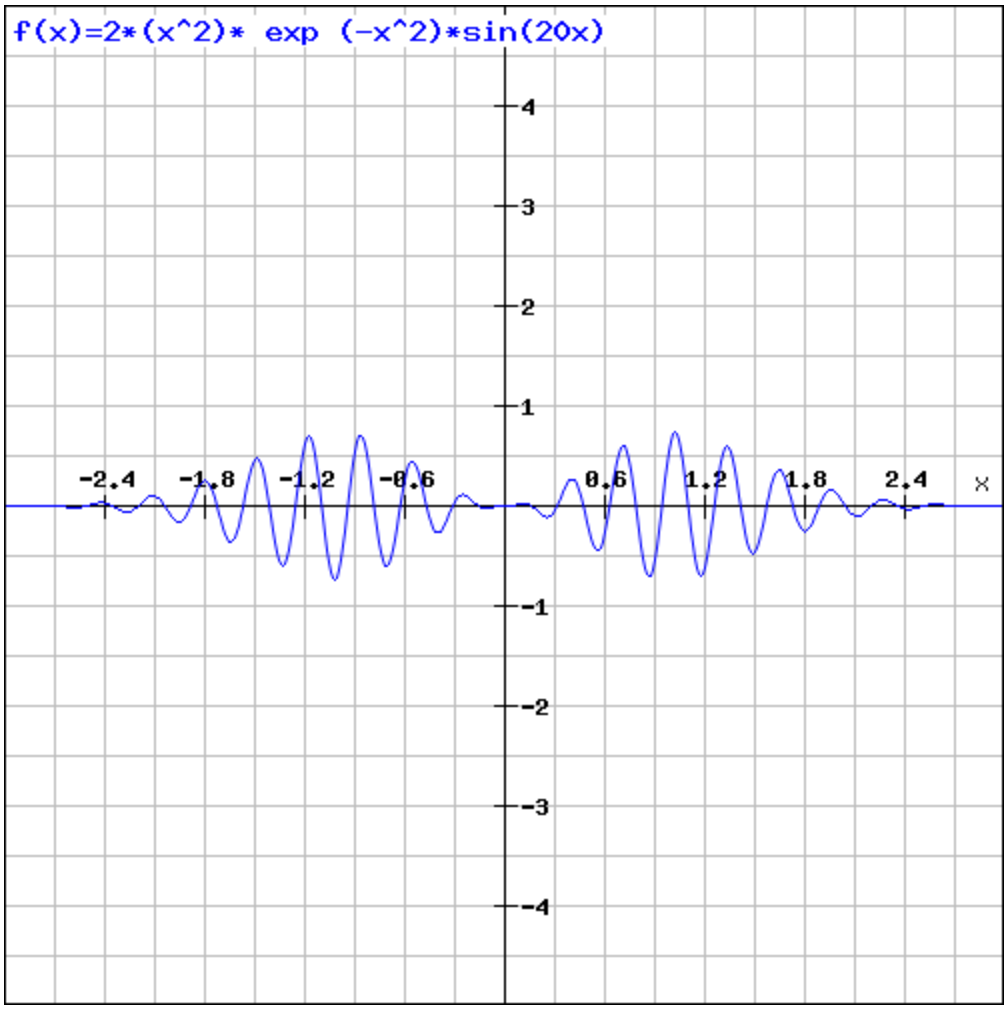

Fig.3: When a labeled point vibrates in a circular path on the spherical shell of large radius, pairs of waves get generated in the radial directions. In this figure, one such pair of waves, generated along x-axis, is shown.

When such a wave of fluctuations moves in radial direction its mirror-wave, of the same frequency and amplitude, has to move in radially opposite direction, giving rise to a pair of pulses moving apart in radial directions. The propagation of this pair of waves in the radial directions is at the speed of light; whereas the displacements of points on the surface of spherical shells are instantaneous and simultaneous; because of the continuum nature of 'space'. Since, the spin and polarization of 'photons' are perpendicular to the direction of propagation of photon, they are in the tangential-direction of the spherical shell, on which displacements of points take place instantaneously and simultaneously. Therefore, when spin (or polarization) of one photon

is measured the spin and polarization of the mirror-particle gets instantaneously affected, because of the simultaneous displacements of points on the surface of the spherical shell. There was a possibility of detection of photon by any atom lying on the surface of spherical shells, but as soon as the photon is detected by any one atom, the wave gets collapsed. Of course, there may be much more to it than it is discussed here.

Conclusion:

The observed entanglement of photons, and other particles, seem to imply the presence of an underlying 'super flexible continuum' (SFC), instead of empty space, as was conjectured in [2] in the year 1988.

References:

[1] http://en.wikipedia.org/wiki/Quantum_entanglement

[2] Tank, H.K. "Some conjectures on the nature of "energy" and "matter" , *Science and Culture* (Published by Indian Science News Association, Kolkata) Vol.**54**,(1988); p.106-113.

[3] Tank, H. K. "On the emergence of physical world from the ultimate reality" http://vixra.org/pdf/1312.0084v1.pdf