

APPENDIX B

Entanglement and Quantum Mechanics

I – REVIEW OF RESULTS FROM THE EARLIER SECTIONS 11 - 19

Particles

1. All four fundamental particles [protons, electrons, anti-protons, and anti-electrons also called positrons] are centers-of-oscillation, oscillating spherically in a pure, simple, single frequency of $[1 - \text{Cosine}]$ form.

- They propagate a corresponding, wave field radially outward in the form of a spherical oscillation, at the speed of light, c , at the frequency of their center-of-oscillation's frequency.
- A particles' motion changes its oscillation's purely spherically symmetrical form so as to somewhat "point" in the direction of motion, but the shift is relative to the particle's "home", "at rest" fundamental frequency and to its purely spherically symmetrical form.
- That fundamental frequency is the same for all protons and anti-protons and is the same, at a different value, for all electrons and anti-electrons.

The only difference between particles and their anti-particles is that their oscillations are the negative of each other. That is, the oscillation of the proton and the electron are of $+ [1 - \text{Cosine}]$ form and that of their anti-particles are of $- [1 - \text{Cosine}]$ form resulting in the two forms being 180° out of phase with each other.

The other particles are of several types:

- Composite particles = the neutron and anti-neutron and the various atomic nuclei and their anti-particles.
 - These are all various combinations of the above fundamental particles in complex, composite centers-of-oscillation, spherically oscillating in a complex composite waveform; and propagating a complex, composite wave field.
- Non-rest mass [pure propagating wave] particles = photons and neutrinos.
 - These all result from energy changes in fundamental particles, usually the electrons and anti-electrons.
 - These are not centers-of-oscillation; rather each is a piece of the wave field propagated by its fundamental particle source.
- Fragment particles = the product of smashing apart the fundamental or composite particles.

- These are all unstable with very short lives.
- They are not normal centers-of-oscillation; rather each is a fragment of the center-of-oscillation of the fundamental or composite smashed particle source and / or of the wave field that was propagated by the fundamental or composite smashed particle source.

The Common Origin of Particles

2. At the origin of the universe the “home”, “at rest” fundamental frequency of the four fundamental particles was established, creating the same “home”, “at rest” frequency of all protons and anti-protons and the same but different value “home”, “at rest” frequency of all electrons and anti-electrons.

- That resulted in all composite particles each having for its type [e.g. neutron, oxygen atom, etc.] the same composite, complex, “home”, “at rest” spherical oscillation and propagated waveform.
- Therefore all of today’s particles, throughout the universe, fundamental and composite, oscillate and propagate relative to the same, identical “home”, “at rest” composite waveforms for the particular particle’s type.
- They all share and are relative to the same original birth no matter where they have traveled and no matter what speeds, directions, and interactions they have experienced since that original birth.

Motion and Particles

3. All motion is absolute, that is it is relative to the one single universal frame of reference which is the frame in which the “Big Bang” took place. Being “at rest” is being without motion relative to the absolute frame. Being in motion is having motion relative to that frame.

4. The effect of motion on the oscillation of a center-of-oscillation and the effect on its propagated wave field are as follows.

- The action is on the single frequency of a fundamental particle and on the single frequency of the composing fundamental particles of a composite particle.

- The frequency of the oscillation decreases by the factor:

$$[1 - v^2/c^2]^{1/2}$$

- In the direction of the motion of the center-of-oscillation [0°] the wave field wavelength decreases by the factor:

$$[[(c - v) / (c + v)]]^{1/2}$$

- In the opposite direction [180°] the wave field wavelength increases by the factor:

$$\left[\frac{(c + v)}{(c - v)} \right]^{\frac{1}{2}}$$

- In the directions directly to the side [90°] the wave field wavelength is unchanged.
- In all of the directions in between the above the wave field wavelength is the vector resultant of the nearest pair of the above [0° and 90°] or [180° and 90°] .

4. In consequence of the above particle motion behavior, motion of matter at or in excess of the speed of light, c , is impossible.

5. In consequence of the above particle oscillation propagation wave field at speed c , communication at other than the speed of light, c , is impossible.

II – Quantum Mechanics and Entanglement

Quantum Mechanics

6. Quantum mechanics postulates that the *state* of every elementary particle can be described by a *wavefunction*, a mathematical representation used to calculate the probability that the particle is found to be in a location or a state of motion; and that the act of *measurement / observation* of the particle causes the calculated set of probabilities to *collapse* to the value defined by the measurement.

The condition that, until *measurement / observation*, the specific *state* of the particle is deemed unknown, consisting of various probabilities of various states according to the *wavefunction*, is also described as that the particle is in a *superposition* of all of its possible states.

Centers-of-Oscillation and Quantum Mechanics

8. Because centers-of-oscillation oscillate over a cyclic range of instantaneous values per the particular waveform of each case, the Quantum Mechanics “*state*” of the particle continuously varies.

The Quantum Mechanics “*state*” of the particle is the particular instantaneous position in the waveform that its center-of-oscillation is at a particular moment.

- The waveform of the center-of-oscillation is the “*wavefunction*” of Quantum Mechanics.
- The center-of-oscillation’s oscillation over a range of instantaneous values is the Quantum Mechanics described behavior that particles are in a *superposition of all possible states* until a *measurement / observation* causes the *superposition* to *collapse* to the state *measured / observed*.
- The *collapse* is the selection of that particular instantaneous position of the waveform of the center-of-oscillation that it happens to occupy at the instant of the *measurement / observation*.

Quantum Mechanics is defective in that it neither has, nor offers, any causality, any mechanism for its contentions. Thus it lacks one of the fundamental requisites for truth.

“Entanglement”

9. If two or more identical fundamental particles or composite particles of the same type are located near each other and are caused to be traveling in the same direction at the same speed, then they have identical oscillations in their centers-of-oscillation and identical wavefields propagated outward.

- In Quantum Mechanics they are said to be *entangled*.

If two or more photons and / or neutrinos are generated by identical energy changes in a corresponding two and / or more *entangled* particles,

- Then in Quantum Mechanics the two or more photons and / or neutrinos are said to be *entangled*.

The Effect of Entanglement

10. If a pair of *entangled* particles are *measured / observed* at the same instant of time, regardless of their location and distance of separation, the *measured / observed state* of each of the particles will be the same because of the synchronization effect of the requisite condition for their *entanglement*.

- However, the above is theoretical and the practical fact is that the particles need to initially be near enough to each other to establish their traveling in the same direction at the same speed, and any subsequent motion of either particle not matched by corresponding motion of the other(s) destroys the entanglement because not matching motion results in their oscillation and propagated wave forms becoming different.

11. If a pair of entangled photons or neutrinos are *measured / observed* at the same instant of time, regardless of their location and distance of separation, the *measured / observed state* of each of the photons or neutrinos will be the same because of the synchronization effect of the requisite condition for their *entanglement*.

- This is practical because the location and motion of photons can change without changing their “state”, without causing their “untangling” because change of each photon cannot affect its originating particle. The two are immediately and permanently independent once the photon is emitted.

Centers-of-Oscillation and Quantum Mechanics’ “Uncertainty”

12. In view of the overall above presented nature of particles and their centers-of-oscillation the *state* of a particle is always definite and determined. The particle is where it is and it is going where and how it is going, both so long as it is independent of any interfering, disturbing action by an observer.

There is no actual *uncertainty* about the *state* of the particle; its *state* is certain and definite

However, it is impossible to observe the location or motion of a particle without disturbing it. The act of observation changes the particle's location and / or motion so that while data can be obtained indicating what the location and / or motion of the particle was immediately prior to the observation, those data will no longer be currently valid because the disturbing effect of the observation has resulted in the particle having a new, different location and / or motion.

Therefore, observer knowledge of the *state* of a particle is always *uncertain*.

The reason for this is that for data about the particle to be obtained information must travel from the particle to the observer and that transmission / communication results in its source, the particle, undergoing change.

III – Cause, Mechanism, and Quantum Entanglement Effects

The Over-riding Fundamental Principle Governing all of Physics

13. Every action, every effect, and every event must have a cause and a mechanism by which it takes place.

Failure to identify or perceive the cause or mechanism does not necessarily invalidate the contended action, effect or event; however, it must be possible for the requisite cause and mechanism to exist and, therefore, be subject to discovery.

If a cause or mechanism for a contended action, effect or event is absolutely, irrevocably impossible then the contention is not valid.

The Fundamental Principle Applied to Quantum Entanglement

14. Both communication and change of location instantly or at a speed greater than the speed of light are impossible. They are impossible by virtue of the nature of matter and light and because violating that principle requires an actual infinity, which is impossible.

Therefore the contended instantaneous communication between separated photons as in the Bell's Inequality experiments and opposed in the Einstein, Podolsky and Rosen *Gedanken* [thought] Experiment is an invalid contention.

Also therefore, the contention that a particle has no specific location until specifically observed / measured, that the particle only exists in a superposition of all possible locations for it, is not valid because it requires that the act of observation / measurement cause the particle to instantaneously change its location from the contended various locations in the superposition to the single specific location observed / measured.