Resolving Duality Conundrum, Convergence of Classical & Quantum Mechanics and Its Mind-Boggling Extrapolation to Cyclic Time

Main Author: Dr. Ankur Chaturvedi (Ph.d), *Doctorate in Anatomy of Thoughts & Masters in Memory Science, Yoga-Samskrutham University; Florida, USA, Fl 34236. Masters in Memory Science & Business Administration. Speaker for Tedx & ASQ, Author.*

***Common sense is not so common yet its extrapolation is perplexing ***

Science is an approach to find the ultimate truth, with time, human mankind do stride gradually to achieve this goal. As we are constantly in state of quasi truth, we continue to challenge old theories & philosophies and enhance our understanding to answer erstwhile paradoxes. Below presented is one of interpretation of quantum mechanics towards wave-particle duality and its extrapolation.

It's a century old debate, when Quantum theory ignited a clash between Albert Einstein and Niels Bohr & Heisenberg. On one hand, Einstein holding a strong views of determinism whereas Bohr & Heisenberg were talking about probabilities (redefining what is real).

According to Heisenberg's book[1], *Wilson Photographs* says when α-rays and rays passed through supersaturated water vapor; straight lines (particle behavior) were produced for α- rays, but irregular curve (Wave nature) for rays. Yet In another experiment, when rays passed through a thin foil (composed of minute crystals at random) of matter, it produced blackening rings (wave nature).

Again for X-rays[1], when it made to travel through crystalline mass, it produced rings (wave nature). Whereas in Compton-Simon experiment, travelling through supersaturated water vapor, it exhibited particle nature.

Adding to it, double slit experiment[1], when we observe the movement of an electron, it destroys the interference (particle nature). On the other hand, when we don't observe, it behaves like a wave, producing interference. Heisenberg explains the interaction between observer and object causes uncontrollable and large changes at subatomic level.

Basis the above few experiments, duality principle formed. How can a quantum entity behave as particle as well as wave at **same time**? Hence, the probabilistic nature of subatomic particles comes into picture. This is the birth of Quantum mechanics. With that comes quantum superposition, i.e. a quantum system can take multiple quantum states at given point of time, simultaneously.

Million dollar observation is, in all the above mentioned experiments, light or subatomic particles **never exhibited wave and particle behavior at same time**. There was always an added Intervention or non-equivalent conditions, e.g. X-rays for Crystalline mass and water, observer in double slit experiment.

Let's understand with an analogy, State A: a bird is grazing on a grass. It will continue to do. State B: the moment I observe it (as an observer), it flew away. Comparing the given experiment with quantum deductions,

1. Bird don't existed in both the states (i.e. A and B) rather it switched from state A to state B. Before my observation, it existed in state A, mere observation did not manifested it rather impacted the state. Similarly, it is difficult to comprehend, how Schrodinger's Cat thought experiment was translated into quantum paradox, cat was simultaneously alive and dead until it is seen.
2. Uncertainty principle: In order to predict the movement of bird, one needs to know all the variables related to bird, observer and environment. Rather than theorizing a principle of uncertainty (that it is impossible), we should look to explore hidden variables into the quantum system, e.g. consciousness. same is been postulated by Heisenberg in his book, "*the interaction between observer and object; in classical physical theories it has always been assumed either that this interaction is negligibly small or else that its effect can be eliminated from the result of calculations based on control experiments. This assumption is not permissible in atomic physics; the interaction causes uncontrollable and large changes in the system being observe*[1]".

   Additionally, Heisenberg states that uncertainty principle is chiefly derived on account of insufficient language capability and present knowledge's horizon[1].

$$\Delta x \Delta p_x \geq h \,. \qquad (1)$$

This uncertainty relation specifies the limits within which the particle picture can be applied. Any use of the words "position" and "velocity" with an accuracy exceeding that given by equation (1) is just as meaningless as the use of words whose sense is not defined.[1]

The uncertainty principle refers to the degree of indeterminateness in the possible present knowledge of the simultaneous values of various quantities with which the

   Hence uncertainty principle is a temporary state & incapability of knowledge in understanding the concepts.

While it is true quantum systems do exhibit particle-like and wave-like properties in different environments but not simultaneously. Hence, the position and momentum of quantum system can be calculated and we may need advanced mathematical calculator for the same. So in this way, classical mechanics and quantum operate under same principles. With this enhancement, the world of probabilities and manifestation of reality by observer loses its water. Now it is important to distinguish between wave-like and particle-like vector movement. According to Newton's Corpuscular theory of light, light behaves as particles, i.e. moving in straight lines. This is

the prime difference. Question is, can a quantum system in this gravity dominant universe, travel in straight line. When we know, earth is orbiting and rotating, Sun, black whole, all are rotating because gravity produces centripetal and centrifugal force. Can a quantum system (which is also under the influence of gravity) travel in straight line or particle movement is also part of another wave whose magnitude and wavelength is infinite or sufficiently large. In mathematics, a line is an arc of circle with infinitely large radius. What is the possibility, the straight bands of particle observed in double slit experiment, is an interference pattern of 2 waves, one of which has infinite wavelength, i.e. observer. Above presented view is just an extension of De Broglie matter waves[2].

Concluding with this common sense perspective, we can define the duality as, light exhibit only wave behavior wherein particle behavior is also considered as wave behavior. Particle and wave behaviors are subject to different quantum environments, e.g. Wilson and X-rays, quantum system interfered with supersaturated water. In order to mitigate the indetermination, we need to know the mathematical modeling of all the variables involved, e.g. observer and supersaturated water.

In the light of above arguments, it seems Einstein was right about his deterministic model, i.e. God don't play dice.

Extrapolation: The efficacy of a theory is its ability to answer some of the current unanswered questions within the current known boundaries of science, for example, any theory which says laws of physics are broken in one of its phenomenon, loses a certain degree of efficacy.

If the whole universe is one giant wave (group of particle matter waves and quantum waves), then we must be producing only periodic motion.

The only scenario wherein universe will not produce periodic motion, when any of the electronic or matter wave is non-periodic in nature. Using Newton's 3rd law, energy can neither be created nor destroyed. This would mean cumulative sum of energy, matter and force must be constant for the universe. If these are constant, this would make our universe as infinite potential well. Following the Schrodinger's wave equation[3],

$$\psi(x) = A_1 \cos Kx + A_2 \sin Kx$$

Notice the trigonometric functions used in the equation, we know in mathematics that sine and cosine functions are periodic in nature.

Additionally, we know that in an isolated system (i.e. no exchange of energy and mass), all the classical and quantum systems (e.g. angular momentum, energy etc.) are conserved. Hence with our current knowledge of classical and quantum mechanics, we can safely deduce that universe is a single giant wave and all the actions inside it is periodic in nature.

Subsequently, we need to define the periodicity of universe, after a time T, the configuration of energy and matter will be repeated in exactly same fashion. Then the mind-boggling fact is, even though you are reading this article for the 1st time, you have already read it in previous universal wave cycle.

Application: As we have observed the convergence of classical and quantum world and witnessed the universal wave which is immortal (energy can neither be created nor destroyed), continuous and has no end and no beginning (being periodic and closed bound wave). It raises some questions on our understanding of universe creation and evolution. When we found, universe is accelerating and created a funnel back in time to singularity. What is the possibility that we might have misunderstood the angular acceleration with linear acceleration? As mentioned above, in this world of gravity, it is very less probable that any entity in universe can have linear acceleration. If this true, then Big Bang theory, evolution from single cell and all its postulates are in big trouble.

This can also be corroborated with Milankovitch cycles[4], If obliquity (tilt of earth), axial precession and eccentricity needs to periodic then whole universe along with earth has to come in exactly in same configuration (due to exact gravity vector quanta) as it was in previous cycle. Hence, in order Milankovitch cycle to happen again, earth, sun and whole universe should come in same position. This can't happen if universe is linearly expanding and accelerating.

References

1. Heisenberg, Werner, The Physical principles of Quantum theory, Chicago, Dover Publications, INC., July 1930
2. Joseph S. Merola, *Scientific American Blog Network*

   https://www.scientificamerican.com/article/why-isnt-the-dual-wavepar/ (1998)

3. Neamen, Donald, Semiconductor Physics and Devices, 3rd edition, New Mexico, McGrawHill Higher Education, 1992
4. Campisano, C. J. (2012) Milankovitch Cycles, Paleoclimatic Change, and Hominin Evolution. Nature Education Knowledge 4(3):5 https://www.nature.com/scitable/knowledge/library/milankovitch-cycles-paleoclimatic-change-and-hominin-evolution-68244581/#TB_inline?height=300&width=400&inlineId=trOutLine