World Journal of Advanced Research and Reviews
eISSN: 2581-9615 CODEN (USA): WJARAI
Cross Ref DOI: 10.30574/wjarr
Journal homepage: https://wjarr.com/

(Research Article)

Check for updates

A study discovered the coherent wave function of electrons and the stability when observed

Abdelrazak Mansour Ali [1,*], Radwa Abdelrazak Ali [2] and Ahmed Abdelrazak Ali [3]

[1] *Al-Azhar University affiliated, Faculty of science, Molecular science Department, Cairo, Egypt.*
[2] *National Institute of Health affiliated. Research Department. USA.*
[3] *Virginia Commonwealth University affiliated, Information system Department. USA.*

World Journal of Advanced Research and Reviews, 2023, 17(03), 876–882

Publication history: Received on 14 February 2023; revised on 23 March 2023; accepted on 26 March 2023

Article DOI: https://doi.org/10.30574/wjarr.2023.17.3.0485

Abstract

The wave phase is the origin of creation and precedes the particulate (molecular) phase. The wave and particle are not two figures of the same thing, rather they are heterogeneous and different from each other due to the different sources of each of them. The particulate phase is just generated by impinging of the wave on its target of spatial forces (Higgs field), and the wave phase is considered the extra dimensions or the extended fuzzy end of the particle. Because electrons are forced to move in synchrony, they can produce heat and light. The light would be reflected from the electron forming many synchronized shadows for the same electron at different places that could be misinterpreted by both the instrumental detectors and the person analyzing the results of observations. Therefore, the electron cannot exist in different places, rather the shadows of the same electron give false observational results that produced the false analytic conclusion of "probability and randomness" and thus the term "superposition" is not scientifically consistent or coherent– The energy and momentum of electrons influence their motion through a material, which, in turn, determines its electrical and optical properties. – Using laser pulses, physicists have been able to generate hot electrons that travel faster than the speed of light. Regarding the electrons in the famous double-slit experiment, they are considered accelerated electrons, so their speed is faster than the speed of light. Because the light emitted from electrons and the light of the electron detector (ICCD camera) are electromagnetic waves, the speed of light emitted from electrons is faster than that of the detector. Consequently, the electron detector (ICCD camera) could detect the particle phase of electrons but couldn't detect or capture the wave phase of electrons, because electromagnetic waves are harder to get a handle on. The result is the failure of observing and detecting the wave phase of electrons. Therefore, the wave function does not collapse.

Keywords: Electrons; Observer effect; Superposition; Quantum entanglement; Wave phase; Elementary particles

1. Introduction

1.1. Quantum mechanics

Is a fundamental theory in physics that provides a description of the physical properties of nature at the scale of atoms and subatomic particles (1). -In modern versions of this two-slit interference experiment, the photographic plate is replaced with a detector that can record the arrival of individual photons. The magnitude of the classical interference pattern at any one point is therefore a measure of the probability of any one photon's arriving at that point. The interpretation of this seemingly paradoxical behavior (shared by light and matter), which is in fact predicted by the laws of quantum mechanics, has been debated by the scientific community since its discovery more than 100 years ago. When one slit is open the electron behaves like a particle. When the second slit is open, the electron produces a diffraction

* Corresponding author: Abdelrazak Mansour Ali

pattern resembling a wave pattern. If a measuring device is placed on the second slit to determine if the electron passes through the slit, it reverts to the same result as if one slit was open – no diffraction pattern is found. When a measurement is made to detect a particle, it always appears point-like, and its position is immediately after the measurement is well defined. But before a measurement is made, the particle's position is not well defined; instead, the state of the particle is specified by its evolving wave function. The double slit experiment discovered that electrons, and all quantum particles, both exist as particles and probability waves, which means that we don't know certainly where these particles are, we can only know the probability of where they will be. These particles are said to be in superposition. This means that they are in all possible states at once. Once we try to observe the state of this particle, the wave function collapses into a single state [2].

1.2. Quantum entanglement

Is seen when things get small and two or more particles are connected in a certain way, that their states remain linked and united no matter how far apart they are in space or inside the quantum realm. That means they share a common, unified quantum state. So, observations of one of the particles can automatically provide information about the other entangled particles, regardless of the distance between them. And any transaction to one of these particles will invariably impact the others in the entangled system. (3). In our study, we try to remove the mystery of the probability waves of particles and to know certainly where these particles are.

2. Material and methods

This analytic study would analyze both the stages of particle creation and the behavior of particulate electrons in the famous double-slit experiment to understand and explore the confusion of the superposition assumption to reach the objective interpretation: Consequently, and via the thought experiment, we could detect the scientific basis to correct the following conceptions: 1- Matter is found in two forms: the waveform and the particle form (molecule), 2- the particle can exist in different places at the same time. 3- Misconception rooted in a poor understanding of the quantum wave function and the quantum measurement as the wave couldn't be instrumentally detected, and 4- The collapse of the quantum mechanical wave function when observed.

3. Results

1-Electrons and atoms act like waves and particles whether observed or not. 2- The electron cannot exist in different places, rather the shadows of the same electron give false observational results that produced the false analytic conclusion of "probability and randomness, and thus the term "superposition" is no longer scientifically valid or effective. 3- The wave phase is the origin of creation, and is the stable, consistent phase that precedes the particulate (molecular) phase. 4- The particulate phase is just generated by impinging the wave on its target of spatial forces (Higgs field), and the wave phase is considered the extra dimensions or the extended fuzzy end of the particle. 5- The general change of the wave function immediately throughout the space upon the impingement of its spatial force target, would generate a quantity particulate of physical existence that is imposed described by the wave function. Thus, confirming the role of the wave phase in quantum informational entanglement. Therefore, it would counteract the collapse of the quantum mechanical wave function even as the wave function is the organized phase.

4. Discussion

Considering the facts related to the phases of creation, the stage of non-existence (nothing) that will start over the process of creation through the suggested theory "the speed drive"; The stage of speed (unseen existent) thing that should be shaped to wave thing to be fit loaded with memory, then becomes the smart thing, which is the abstract meaning thing or energy - The wave phase is thus the origin of creation and precedes the particulate (molecular) phase as interpreted from the origin of particulate phase which is generated at the moment of interacting the wave phase with its target of the Higgs field and exciting it. The field quickly, in just fractions of a second, finds a stable configuration, this gives rise to the Higgs mechanism which grants mass to the Higgs bosons. As the field is accompanied by a fundamental particle known as the Higgs boson, which is used by the field to continuously interact with other particles, such as the electron and photon. Particles that interact with the field are "given" mass. The result of a particle "gaining" mass from the field is the prevention of its ability to travel at the speed of light. These particles only existed in the high-energy conditions of the early universe. The Higgs boson decays too rapidly to be spotted and was a particle with no spin. During the excitation of the Higgs field by the wave phase, both the Higgs bosons and the "mass given" particles would acquire the information loaded in this smart wave phase. Then, coupling or mating of both the wave phase and the particulate phase gives rise to the material. It is noteworthy to remember that the wave phase of matter is analogous to the soul in living organisms including Human beings.

Thus, the wave and particle are not two figures of the same thing, but rather they are heterogeneous and different from each other due to the different sources of each of them. The wave function is an abstract meaning, not a particulate physical object like, for example, an electron or atom, which has an observable mass, charge, and spin, as well as internal degrees of freedom. Instead, the wave is an abstract mathematical function that contains all the memory of the statistical information that an observer can obtain from measurements of a given system. Mathematically the number of dimensions is just the number of coordinates you need to specify a point. We're familiar with specifying points in four-dimensional spacetime, but can you imagine a space where you need five bits of information? Or six? Or seven…? Mathematicians regularly work in higher dimensional spaces.

- It is supposed that the time paused at the time of impinging of spatial Higgs field by the wave phase, as evidenced by Hubert et al experiment. In their work, they showed numerically and experimentally that the accumulation of information in the wavefield induces the loss of time correlations, where the dynamics can then be described by a memory-less process. Thus, rationalize the resulting statistical behavior by defining an effective temperature for the particle dynamics where the wavefield acts as a thermostat of large dimensions, and by evidencing a minimization principle of the generated wavefield [4].

The Standard Model of Particle Physics, which is the definitive starting point for all things subatomic, tells us that every particle known to exist is an extended particle except for three: quarks, bosons, and leptons. One exception is the electron. Extended particles don't have a well-defined surface, instead, they are more like the atmosphere of the Earth, which is the thickest near the surface of the Earth and it gets thinner with altitude. Extended particles have a size, but the boundary or exactly where an extended particle end is fuzzy [5]. The extra dimensions are inherent in the mathematical notion of 'manifold'. Take, for example, a relatively large sphere, and place an ant over it. The surface of the sphere will look flat to the ant. So, we have a 'local' shape (flat surface) and a 'global' shape (the sphere) here. The sphere, in this case, is an example of a 2-dimensional manifold. It is the same with our world. We live in a 3-dimensional manifold. Even if we do not consider the postulates of "String Theory", general relativity suggests a fourth dimension, gravity, and the universal phenomenon is described with the help of curvature of this additional dimension [6]. Thus, we can easily conclude that a manifold may have curvature and other non-trivial properties, such as the wave phase being considered the extra dimensions or the extended fuzzy end of the particle.

Experimental results seem to confirm that indeed gravity does not induce spontaneous wave function collapse or decoherence by curvature superposition. The entanglement of massive virtual particles leads to massive gravity contributions at very small scales. All these recover general relativity at large scales and semi-classical models remain valid till smaller scales than usually expected. Gravity can therefore be added to the Standard Model [7]. It is noted that the waveform phase would accommodate and store the informational memory of things due to its geometric shape and the sinuses it includes. The general change of the wave function immediately throughout space upon the impingement on its target (spatial Higgs field) would generate quantity particulate of the existent that is described by the wave function and would confirm the role of the wave phase in quantum informational entanglement. Therefore, it would counteract the collapse of the quantum mechanical wave function. Besides, the wave function is the basis for probabilistic predictions concerning the physical existence described by the wave function.

It is likely that Einstein, Podolska, and Rosen's theoretical result that mutually exclusive wave functions can simultaneously apply to the same concrete physical circumstances can be implemented on an empirical level [8]. The concept of wave-particle duality in quantum theory is difficult to grasp because it attributes particle-like properties to classical waves and wave-like properties to classical particles. There seems to be an inconsistency involved with the notion that particle-like or wave-like attributes depend on how you look at an entity [9].

The intrinsic properties of quantum gravity and matter alone can't explain the tremendous effectiveness of the emergence of time and the lack of quantum entanglement in our ordinary, everyday world [10]. Instead, it's necessary to include the properties of the observer, and in particular, the way we process and remember information.

As electrons are forced to move in synchrony, they can produce heat and light [11]. The light would be reflected from the rotating electron forming many synchronized shadows for the same electron at different places that could be misinterpreted by both the instrumental detectors and the person analyzing the results of observations. Therefore, the electron cannot exist in different places, rather the shadows of the same electron give false observational results that produced the false analytic conclusion of "probability and randomness".

The energy and momentum of electrons influence their motion through a material, which, in turn, determines its electrical and optical properties [12,13]. - Using laser pulses, physicists have been able to generate hot electrons that travel faster than the speed of light [14,15]. Regarding the electrons in the famous double-slit experiment, they are considered accelerated electrons [16]. so their speed is faster than the speed of light. Because the light emitted from electrons and the light of the electron detector (ICCD camera) are electromagnetic waves. The speed of light emitted from electrons is faster than that of the detector. It never will be possible to see atoms, molecules, or electrons using visible light, even with the most powerful microscopes. To see an object, its size must be at least half the wavelength of the light being used to see it, but the wavelength of visible light, is much bigger than an atom, making it invisible. X-rays, however, have a wavelength short enough that they can be used to "see" atoms. Consequently, the electron detector (ICCD camera) could detect the particle phase of electrons but couldn't detect or capture the wave phase of electrons, because electromagnetic waves are harder to get a handle on, for several reasons. First, the things that are oscillating are electric and magnetic fields, which are much harder to see. Second, the fields can have components in various directions, and there can be relative phases between these components. And third, unlike all the other waves we've dealt with electromagnetic waves don't need a medium to propagate in. [17]. The most neglected fact is that the memory program contains a wave phase that could not be sensed, detected, or photographed (which is an ironic statement, considering that we can get the electron memory photographed). The result is the failure of observing and detecting the wave phase of electrons. In other words, the wave function is the stable organized phase, and it is the memory informational store of both electrons and entanglement. Therefore, it couldn't be directly measured or physically detected because of the following considerations.

- The observer effect is the disturbance of an observed system by the act of observation. [18,19]. This is often the result of instruments that, by necessity, alter the state of what they measure in some manner. This concept confirms the notion of "unreliability of the results."
- Physicists have found that observation of quantum phenomena can change the measured results of this experiment. Despite the "observer effect" in the double-slit experiment being caused by the presence of an electronic detector, the experiment's results have been misinterpreted by some to suggest that a conscious mind can directly affect reality [20]. The need for the "observer" to be conscious is not supported by scientific research and has been pointed out as a misconception rooted in a poor understanding of the quantum wave function and measurement. Once one has measured the system, one knows its current state, it has apparently decohered from them without prospects of future strong quantum interference [21,22,23]. This means that the type of measurement once performed on the system would affect the end state of the system.
- This unpredictability of quantum systems does not imply chaos, however. Quantum mechanics still enables the relative probabilities of the alternatives to be specified precisely. Thus, quantum mechanics is a statistical theory. It can make definite predictions about ensembles of identical systems, but it can generally tell us nothing definite about an individual system [24].

4.1. Superposition

The only way we can explain this pattern is that each particle is a sum – a superposition – of two paths, one going through the left slit and one through the right. So why not just say that the particle goes both ways? There are two reasons to disagree with this phrase. One experimental thought experiment is that a superposition of two paths is not something in space. It belongs to an abstract mathematical structure called a Hilbert space. It just has no analog in physical space. This is why we can't find good words to describe it. It doesn't belong in the world we know; it's something else entirely. The other problem with these superpositions is that while they exist in mathematics, we don't observe them. The synchronized shadows (at different places) of the same electron in its particulate phase may be observed by the detector and perceived as if the electron was in a superposition state. Therefore, electrons and atoms appear to act like waves when you're not watching them, but as particles when you are observing. We should be cautious of a common misconception assuming that the wave function amounts to the same thing as the physical object it describes. This flawed concept must then require the existence of an external mechanism, such as a measuring instrument, that lies outside the principles governing the time evolution of the wave function to account for the "collapse of the wave function" after a measurement has been performed. There are two thought experiments that can destroy nearby quantum spatial superposition.

- if a massive body is put in a quantum superposition of spatially separated states, the mere presence of a black hole in the vicinity of the body will eventually destroy the coherence of the superposition. This occurs because, in effect, the gravitational field of the body radiates soft gravitons into the black hole, allowing the black hole to acquire "which path" information about the superposition. A similar effect occurs for quantum superpositions of electrically charged bodies [25].
- The gravity hypothesis posits that, when a particle is in superposition, its gravitational field undergoes significant stress, as the field also must be in two places at once. Unable to withstand this physical state, the gravitational field collapses, eliminating the second particle state.

Unfortunately, the technological ability to detect and confirm this gravitational collapse remained nonexistent until recently [26].

4.2. Randomness

A-Single-electron effects provide a means to control precisely small amounts of charge down to a single electron, raising the possibility of single- or few-electron memory circuits with a high potential for scaling. [27]. This memory should exclude the concept of randomness.

- Elementary particles are conceived as point objects which have no axis to "spin" around. Therefore, there is no explaining how spin arises at the fundamental level, and why particles have the values they do. However, spin is like a vector quantity; it has a definite magnitude, and it has a "direction", to spin [28].
- As suggested by quantum physics, the randomness exhibited by subatomic particles does not allow outcomes to be predicted, which should then make quantum mechanics an invalid attempt to justify indeterminism. The measurement problem that comes with standard collapse theories, such as the Copenhagen interpretation**, would also be naturally eliminated instead of having to seek an explanation via the concept of consciousness. The theory regarding consciousness, however, effectively demonstrates how the fields of philosophy and physics are intertwined and dependent on one another. Through philosophy, humans can find possible solutions to physical problems (consciousness solution to measurement problem); through physics, we are able to discover new insights into the universe, reality, and existence (consciousness theory allows mind-body dualism).
- Quantum mechanics is a sophisticated physics theory with elaborate mathematics, but its full implications can only be known once the philosophical questions are answered. [29]. From the summation of A & B & C, we can reject the theory of "Randomness" that stated the universe is indeterminate, thus undermining the cornerstone of quantum physics. - The idea known as "super determinism", is that what we ultimately see on measuring a quantum object is somehow predetermined by factors we can't observe. The idea seems to undermine the notion of a scientific experiment: if undetectable initial conditions somehow predetermine outcomes, experimenters cannot use their free will. so, how can we trust science? [30]. It is noteworthy to mention the words of Nobel prize winner in physics (1946) Professor Bridgman" No sharp line can be drawn in physics between the purely instrumental and the purely mental" [31].
- ** The Copenhagen interpretation explains that a quantum particle does not exist in one state or another, but in all its possible states at the same time. Observation is needed to collapse the wave function and see the reality of the state. In other words, everything in the universe has a particle form and waveform, but these properties are mutually exclusive from each other when measured [32].

5. Conclusion

The speed drive theory described the stages of creation, which are: speed point was formulated to wave to be qualified to fit memory program. Then the wave impinged and interacted with the Higgs field spatial forces to generate particles, which mate with a wave to form the fundamental basic units of all creatures. Electrons and atoms appear to act like waves when you're not watching them, and as particles when you are observing because the wave function is an abstract meaning, not a particulate physical object like, for example, an electron, photon, or atom, has an observable mass, charge, and spin, as well as internal degrees of freedom. Instead, the wave function is an abstract mathematical expression and is not physical. So, we cannot measure the wave function directly. It carries crucial information about the electron it is associated with. The wavefunction is the organized stable phase of the electron that contains all the statistical information that an observer can obtain from measurements of a given system, it is the memory store for both electron and entanglement.

Compliance with ethical standards

Acknowledgments

We thank Shehab Ali, the expert in computer science for the discussions and help to this study.

Disclosure of conflict of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper. The authors declare no conflict of interest.

Author's contributions

R-A and A-A have drafted the work and substantially revised it.

References

[1] Feynman, Richard; Leighton, Robert; Sands, Matthew (1964). The Feynman Lectures on Physics. Vol. 3. California Institute of Technology. ISBN 978-0201500646. Retrieved 19 December 2020.

[2] Jethro Andal. futurism (2014). https://futurism.com/double-slit-experiment-crazyquantumshenanigans

[3] Paul Sutter What is quantum entanglement? May 26, 2021. https://www.livescience.com/what-is-quantum-entanglement.html

[4] Hubert, M. Prehard, S., Vandavall, N. et al. Overload wave memory induces amnesia of a self-propelled particle. Nat Commune. 13, 4357 (2022). https://doi.org/10.1038/s41467-022-31736-z.

[5] Jaime Trosper. String Theory Explained: A Brief Overview Everyone Can Understand. In science, Jan 12, (2022). https://interestingengineering.com/science/string-theory-explained-a-brief-overview-for-starters.

[6] Elodie Resseguie, US Department of Energy's Lawrence Berkeley National Laboratory. String Theory Explained: A Brief Overview for Starters. In Interesting Engineering. (2022). https://headtopics.com/us/string-theory-explained-a-brief-overview-for-starters-23395416.

[7] Mae's, Stephane. No Gravity Superposition Induced Wave Function Collapse in a Multi-fold Universe. OSF Preprints, 30 July (2022).

[8] Reid, M. D.; Drummond, P. D.; Bowen, W. P et al. Colloquium: The Einstein-Podolska-Rosen paradox: From concepts to applications NASA Astrophysics Data System (ADS). (2009)-10-01. https://www.science.gov/topicpages/e/einstein-podolsky-rosen+epr+paradox.

[9] Brom, Joseph M. Quantum Interference: How to Measure the Wavelength of a Particle. (2017)-01-01. ERIC Educational Resources Information Center.

[10] Robert Lanza. The Arrow of Time? It's All in Our Heads. The fundamental laws of physics don't care about our notions of 'time passing.' Sep 26, (2016). The Crux, Wake Forest University.

[11] Dube, Y., Sivan, Y. Hot electrons in metallic nanostructures—non-thermal carriers or heating? Light Sci Appl 8, 89 (2019). https://doi.org/10.1038/s41377-019-0199-x.

[12] J. Jang, H.M. Yoo, L.N. Pfeiffer, K.W. West, K.W. Baldwin, and R.C. Ashore, Full momentum- and energy-resolved spectral function of a 2D electronic system. Science 358, 901. (2017). [DOI: 10.1126/science. aam7073].

[13] Konstantin Y Bliokh et al 2017 New J. Phys. 19 123014DOI 10.1088/1367-2630/aa8913.

[14] Shaikh M, Lad AD, Brondello G, et al. Mapping the Damping Dynamics of Mega-Ampere Electron Pulses Inside a Solid. Phys Rev Lett. 2018 Feb 9;120(6):065001. Doi: 10.1103/PhysRevLett.120.065001. PMID: 29481271.

[15] Mike McRae, Physicists Broke the Speed of Light with Pulses Inside Hot Plasma. In PHYSICS. 02 September (2022).

[16] National Aeronautics and Space Administration, Science Mission Directorate. (2010). Anatomy of an Electromagnetic Wave. Retrieved [insert date - e.g., August 10, 2016], from NASA Science website: http://science.nasa.gov/ems/02_anatomy.

[17] David morin. Electromagnetic waves author physics. August 2022. https://scholar.harvard.edu/files/david-morin/files/waves_electromagnetic.pdf

[18] Dirac, P.A.M. (1967). The Principles of Quantum Mechanics 4th Edition. Oxford University Press. p. 3.

[19] Archived copy (PDF). Archived from the original (PDF) on 19 August 2019. Retrieved 23 April 2019

[20] Mahmoud E. Yousif. The Double Slit Experiment-Explained. January 2016. Journal of Physical Mathematics 7(2) DOI: 10.4172/2090-0902.1000179.

[21] Gregg Jaeger (2019) A Realist View of the Quantum World. Quantum Communication and Measurement Laboratory, Department of Electrical and Computer Engineering and Division of Natural Science and Mathematics, Boston University, Boston, MA.

[22] Graciosa, Francesco (2014). On unitary evolution and collapse in quantum mechanics. Quanta. 3 (1): 156–170. arXiv:1406.2344. doi:10.12743/quanta. v3i1.26. S2CID 55705326.

[23] Schloss Hauer, Maximilian (2005). Decoherence, the measurement problem, and interpretations of quantum mechanics. Rev. Mod. Phys. 76 (4): 1267–1305. AR Xiv: Quan tph/0312059. Bibcode:2004RvMP...76.1267S. doi:10.1103/RevModPhys.76.1267. S2CID 72956 19. Retrieved 28 February 2013.

[24] Drummond, Brian. Understanding quantum mechanics: a review and synthesis in precise language Open Physics, vol. 17, no. 1, 2019, pp. 390-437. https://doi.org/10.1515/phys-2019-0045.

[25] Danie L. Danielson, Gautam Satish Chandran, Robert M. Wald, Black Holes Decohere Quantum Superpositions. In Int. J. Mod. Phys. D 31 (2022) 14, 2241003. arXiv:2205.06279v2. High Energy Physics – Theory. Doi.org/10.48550/arXiv.2205.06279

[26] Annabelle Mathers. Envisioning Quantum Physics: The Curious Saga Between Gravity and Superposition Nature Physics (2020). DOI: 10.1038/s41567-020-1008-4).

[27] Z.A.K. Dorran, H. Ahmed, in Nano silicon, (2008). Nano silicon single-electron transistors and memory. In https://www.sciencedirect.com/topics/engineering/electron-effect.

[28] Nader Butto. Petah Tikvah, Israel. A New Theory for the Essence and Origin of Electron Spin. Journal of High Energy Physics, Gravitation, and Cosmology.Vol.7 No.4, October 2021.10.4236/jhepgc.2021.74088.

[29] Quantum Mechanics and Metaphysics. (2023) Young Scientists Journal.

[30] Miriam Frankel. PHYSICS. August (2021). https://www.newscientist.com/article/2288232is-quantum-theory-really-as-random-as-itseems/.

[31] Werner Heisenberg, Physics and Philosophy, Introduction copyright © Paul Davies, 1989. https://www.naturalthinker.net/trl/texts/Heisenberg,Werne.

[32] Dan C. Marinescu, Gabriela M. Marinescu, - Measurements and Quantum Information, Classical and Quantum Information, (2012), Pages 133-220, ISBN 9780123838742, https://Doi.org/10.1016/B978-0-12-383874-2.00002-3Don Lincoln 2020 Physics, Science.