

Deterministic interpretation of quantum mechanics

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Abstract: Schrodinger's wave functions for matter and energy particles are interpreted as deterministic electromagnetic wave functions. The stable orbital motion of electrons in an atom and the planetary systems are explained by the deterministic interpretation of matter waves. Pauli's exclusion principle is explained using classical physics and extended to the planetary systems. Then the wave particle dual nature of matter and energy is explained using classical electromagnetism. Finally, validity of Kepler's laws of planetary systems to the atomic systems is proved. .

Key Words: Wave function, wave particle duality, Continuum physics.

1. INTRODUCTION:

Deterministic interpretation of quantum mechanics was made in the previous articles published [1] [2] [3] [4] [5] [6] [7] [8] [9] [10]. In this article, Schrodinger's matter wave equation [11] [12] [13] [14] is derived using classical electromagnetic wave equation, after establishing a relationship between mass and charge by comparing Newton and Coulomb laws [15] [16] [17]. Then, the stable orbital motion of the electrons in an atom is explained [11] [12] [13] [14]. The mass and charge relationship allows the application of Schrodinger's wave equation to the planetary system and the stable orbital motion of planetary system is explained. Then the Pauli's exclusion principle is explained and extended to the planetary systems [15] [16] [17]. The wave particle dual nature of matter and the energy are explained by applying the classical electromagnetic theory [11] [12] [13] [14]. The deterministic interpretation of matter waves allows the application Kepler's laws [14] [15] to atomic systems and so, the validity of Kepler's laws of planetary motion to the atomic system is proved using Newton's laws of gravitation.

2. MASS AND THE CHARGE EQUIVALENCE [15 16]:

Mass and Charges are proved to be equivalent sources of fields, if we compare the Newton's Law of gravitation [15] with the Coulomb's law of electricity [16]. Electric Charge is equal to $\sqrt{G4\pi\epsilon} \times \text{Mass}$. This relationship establishes the link between fundamental units of electric and gravitational fields.

3. DETERMINISTIC MATTER WAVE: [11] [12] [13] [14]:

Any accelerated charged particle will radiate electromagnetic waves as per the classical physics. So, an electron revolving around a nucleus like in the hydrogen atom radiates electromagnetic waves. The radiated wave travels between the boundaries electron and the nucleus. In other words, the electromagnetic wave travels in a one dimensional waveguide. So, the radiated and the reflected waves produce normal mode waves. In other words, this waveguide system produces discrete orbits or energy states to the electron to revolve around the nucleus. The energy radiated by the electron is reflected by the nucleus and comes back to the electron. So, the electron does not fall back into nucleus and revolves around the nucleus stably. The process of radiation and recovery of waves makes the electron to oscillate to produce wavy orbital path. Enough reflected energy has to come back to the electron to bring back to the original orbital level. Otherwise, if the energy returned is not sufficient enough to bring back to the original level, the electron will fall down from the original orbit. So, the electrons will be moving stably only in the discrete orbits in which radiated energy comes back to the electrons and enough energy is supplied to keep the electron in the same orbit.

When the electrons orbit the nucleus in the fixed orbits, the force exerted by the photons radiated by the electrons on the electrons is equal or almost equal to the force of attraction between the electron and the nucleus. But at all the other orbital paths (other than the quantum orbits), the photons radiated exerts force less than the force of attraction between the electron and the nucleus. So, the electronic orbital paths can't be stable.

4. STABLE ORBITAL MOTION OF ELECTRONS AND PLANETARY SYSTEMS [11] [12] [13] [14] [15] [16] [17]: The gravitational force is always attractive and so, one of the two interacting bodies should be assumed to be positive charge and the other as negative charge as per the mass-charge equivalence principle. The matter particle

is a charge less particle. So, a matter particle must be made up of electric dipoles. The dipoles of the matter particles are aligned to attract each other particle. That is why always the gravitational force is attractive.

The De Broglie's matter wave equation $E = \text{Energy of the matter particle} = mC^2 = h.f$, where m is the mass of the particle, C is the speed of the light in the free space, h is Planck's constant and f is the frequency of the matter wave, implies that a matter particle is a photon. So, as per the De Broglie's equation, a matter particle could be defined as a photon with a finite mass. So, the photon of an electromagnetic energy has the mass of $h.f/C^2$, as per the De Broglie's matter wave equation. As per the Planck's law, a photon is defined as electromagnetic wave energy stored in the f cycles of field waves, where f is the frequency of the electromagnetic wave. So, the photon of the electromagnetic energy is not an isolated particle, but it is a travelling impulse energy train of f cycles [11-15]. But the matter particle is an isolated impulse energy train of f cycles.

In the classical physics a matter particle or a charge is assumed to be a sphere of zero radius or a point. But in the quantum physics, energy particle is assumed to be made up of waves, as per the Planck's law. The length of the energy particles varies with the wavelength of the particle. Quantum laws were developed for the sub atomic particles and the electromagnetic energy particles. But while applying to the large scale masses like planets, stars, etc. the quantum laws can't be directly applied because of the large volume of the masses. Even the point of assumption of a large scale masses as assumed in the classical physics is invalid because the large scale mass is made up of many sub atomic or elementary particles. Such problems demand the modification of the De Broglie's matter wave equation. Since the present form of De Broglie's equation is valid only for the particles of sub atomic scale, it is only a special case of general matter wave equation which is yet to be found. For the large scale masses, only the Newton and mass-charge equivalence principles are valid. Large scale masses are made up of so many atoms and atoms are made up of so many sub atomic particles. All these particles of a planet can radiate matter waves as per the Schrodinger's wave equation towards the Sun. Since the masses of the particles are different, planets radiates electromagnetic waves over a wide range of frequencies.. In general the universe is expanding and all the large scale masses are accelerated due to the variation of forces of attraction acting from the other masses. Since, all masses radiates over wide range of electromagnetic spectrum, a large amount of force is exerted on the planet by the photons. This force is balanced out by the gravitational forces of attraction if the planet is orbiting in a stable orbit. So, the stable orbital motions of the planetary systems could be explained like the stable orbital motions of the electrons in an atom were explained. Like for the atoms, the energy theory also could be used to explain the stable orbital motion of the planetary system. The electromagnetic energy radiated by the planet towards the Sun has to be reflected back and come back to the planet and supply enough energy to keep moving in the same orbit before it start falling towards the Sun. So, only at fixed orbits this condition could be satisfied. So, planets could orbit stably only at fixed orbits or discrete orbits.

As per the Pauli's exclusion principle, no two electrons of an atom can have the same set of quantum numbers or states. This principle could be explained by the radiation of the orbiting electrons. As explained in the previous paragraph, orbiting electrons radiates, radiated energy is reflected by the nucleus back to the electrons so that electrons stay in the same fixed orbits. Suppose, if there are two electrons in the same orbit, the repulsive force between the electrons will force the reflected radiations from the nucleus back to both the electrons. So, one of the two electrons will get more energy than it has radiated. The other one will get lesser energy back than it has radiated. So, one of the electrons will jump to the higher orbit and the other will remain in the same orbit. So, no two electrons can stay in the same orbit. Thus the Pauli's exclusion principle is proved. The charge-mass equivalence principle and the matter waves radiated allow the extension of Pauli's exclusion principle to the planetary system. So, the Pauli's exclusion principle to the planetary systems is that no two planets can stay in the same orbit. Here, the explanation for the exclusion principle is different because the gravitational forces are always attractive. So, suppose if two planets are in the same orbit, the force between them is attractive and so, they will eventually merge to become one planet.

5. WAVE –PARTICLE DUAL NATURE OF MATTER [11] [12] [13] [14] [15] [16] [17]:

As per $E = mC^2$ and mass and charge equivalence, charge $Q = \sqrt{G4\pi\epsilon} X m$, $E = mC^2 = Q/(\sqrt{G4\pi\epsilon}).C^2$. So, both the charge and mass have energy. Both mass and energy could be defined as highly concentrated fields as per Newton and Coulomb laws of forces. Field has potential energy. So, both the charge and mass have energy. The charge and mass are always seen together. As per the mass and charge equivalence principle, mass of a charged particle includes both the masses of the charge and the matter. So, the electromagnetic wave and energy radiated by the accelerated electron is due to both the matter and the charge. A photon is made up of impulse train of electromagnetic fields. So, as per the De Broglie's matter wave equation $E = mC^2 = h.f$, the matter particle is also made up of electromagnetic waves with the frequency f . So, as per De Broglie's matter wave equation there is no difference between energy particle and matter particle. So, matter particle's fields behave as waves like the photons. As per De Broglie's matter wave equation, photon must have a mass like the matter particle and is $h.f/C^2$.

6. KEPLER'S LAWS FOR ATOMIC SYSTEMS[14] [15] [16] [17]:

Mass and Charge equivalence principle and the deterministic interpretation of quantum mechanics allow one to apply Kepler's laws of planetary systems to the atomic system.

7. CONCLUSION:

Wave function of the Schrodinger equation is proved to be electromagnetic waves. The stable orbital motion of the electrons in an atom and the stable orbital motions in the planetary systems are explained using deterministic theories. Pauli's exclusion principle was explained and extended to the planetary systems. Wave –particle dual nature of energy and matter are explained using deterministic electromagnetic theories. Finally, Kepler's laws of planetary systems are proved to be valid for atomic system using deterministic theory.

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