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Review Article

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A New Basis for Field Theory

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Abstract

The review provides a brief chronological overview of Bernoulli's law, the Phenomenological approach such as the philosophical basis, the Hamiltonian operator, the Maxwell equations, the Schrödinger equation, the Heisenberg uncertainty principle and completes with a broad conclusion.

The aim is to show that an inaccuracyin the Bernoulli equation and arestriction of the Classicaxiom in the Maxwell equations are significantly reflected in further theories, results and conclusions.

This is the reason the proposals are made for a new interpretation of the theory based on a correction in the Bernoulli equation and extension of the Classicaxiom for Maxwell's equations.

Bernoulli equation (1738)

Daniel Bernoulli is a Swiss mathematician and physicist published the" Principle of Non-Viscous Fluid "in his book "Hydrodynamica".

Theory

Bernoulli theory for Ideal Fluid

The Bernoulli principle is derived from the Energy Conservation Bernoulli's principle: At horizontal laminar fluid flow, the higher velocity points have a lower pressure than the lower velocity pointsthat have a higherpressure.

The Bernoulli Law states that at every point in a current line of laminar flow the full mechanical energy is a constant. Hence, an increase in kinetic energy, leads to a decrease in pressure or potential energy. A potential flow in fluid mechanics is called a vortex-free flow ($\nabla x\ v=0$, or rot v=0) of an ideal (non viscous) barotropic fluid. For the steady flow of the ideal barotropic fluid Bernoulli Law claims that:

$\varphi F + v^2/2 + \int dp/\varrho = C$, (1).

where ϱ is density of the ideal fluid depends only of p ie. (ϱ (p): p isthe pressure in the fluid; φF is a potential of the field; C is a constant for all points belonging to one current line; v is the velocity of the liquid.

-If the pipe is not horizontal (h1> h2):

$\varrho.v^2/2 + p + \varrho g(h1 - h2) = const$, (2).

where ($\varrho.v^2/2$) is dynamic pressure of fluid , which plays the role of kinetic energy ; v is the velocity vector of the fluid; ϱ is the fluid density; p is the fluid pressure.

-Or, if the pipe is horizontal (h1 = h2):

$\varrho .v^2/2 + p = Eo = const$, (3).

The Bernoulli equation for energy:

$Ek(v)+Ep(p)=Eo=const$, (4).

where Ek(v) is kinetic energy that depends on velocity (v) along one line of fluid (velocity is constant), Ep(p) is potential energy that depends on the pressure (p) perpendicular to the boundary of fluid, Eo is total energy.

For Real Fluid who moves in dynamic mode in nature

The new attention is that in real laminar fluid the friction at the periphery line along the boundary causes a resistance. This resistance bends the pressure vector (p) in the opposite direction to the movement and turns it into avector-vortex (p_w).

Analyzes

For Ideal laminar fluid

The Fluid Mechanics describes Ideal laminar fluid [1].

- According to the Fluid Mechanics the priorities in variables velocity (v) and pressure (p) are the following: the velocity (v) is the reason and pressure (p) is the result. That is way the kinetic energy (Ek) that depends on velocity (v) is the reason and the potential energy (Ep) that depends on pressure (p) is the result.
- *According to the Fluid Mechanics the* cause and result appears simultaneously not sequentially.
- In mathematics the signplus (+) means the logic "or- or". This means that in summation of two variables the result is when acts"or" the first "or" the second variables sequentially, or if they act both of them sequentially.

- So, in the case of the equation for total energy (4), shows that the total energy (Eo) is equal to:
- " or"of the kinetic energy (Ek(v) depending on the flow rate (v) along one force line,
- " or"of the potential energy (Ep (p) depending on the amplitude (p) of the pressure, or depends on both of them in sequential - but not from both energies simultaneously.
- *Therefore for Ideal laminar fluid the Bernoulli equation (4) (Ek(v)+Ep(p)=Eo =const) is not precise, because of not precise " or-or" logic.*

For Real laminar fluid

For Real laminar fluid the pressure (p) is not a pure vector butis looks to the vortex(w). Thisvector- vortex (p_w˜) has the appearance of an amplitude of pressure, but the vector -velocity (ṽ) is her first derivative: "ṽ= d(p_w)/dt".

For Real laminar fluid, equation for total energy has a little modification - instead vector (p) it use vector-vortex "(pw)". After this the equation for energies claims:
Ek(v)+Ep(p_w)=Eo =const., (5).

where kinetic Energy Ek(v) depends on vector velocity (ṽ) , but potential Energy Ep(p_w) depends on amplitude of vector-vortex of pressure(p_w˜).

In mathematics the signplus (+) means the logic "or- or" .So in the case of the equation for total energy (5), shows that the total energy (Eo) is equal to:
" or" of the kinetic energy (Ek(v) depending on the flow velocity (v) along one force line,
" or" of the potential energy "Ep(pw)" depending on the amplitude (pw) of vector-vortex of pressure, or depends on both of them in sequential - but not from both energies simultaneously.

Therefore the equation for total energy in Real laminar fluid (5) is not precise as well because of not precise"or- or" logic.

Conclusions

The total energy equation for Ideal laminar fluid (Ek(v) + Ep(p)= Eo)(4) is not precise because of logic" or-or".
The total energy equation for Real laminar fluid (Ek(v) + Ep(pw)= Eo)(5) is not precise as well, because of logic" or-or".

Proposals

The total energy (Eo) for Real laminar fluid should be equal to the product of the kinetic energy Ek (v) that depends on velocity (v) and potential energy Ep(p) that depends on pressure of vector-vortex (pw):

"Ek(v) . Ep(p_w)= Eo," (6).
where pressure of vortex (p_w) is an amplitude but velocity (v) is her first derivative(v = d(p_w)/dt. Therefore the total energy (Eo) is not a vector (4) but it is an area of space.

Phenomenology as a philosophical basis

Theory

The name comes from a phenomenon (from Greek singular-phenomenon, φαινόμενον, plural-phenomena.φαινόμενα).The name means any phenomenon that is observable.

The term means the knowledge that links empirical observations top articular phenomena.The term in science is used to describe a body of knowledge that connects empirical observations of certain phenomena to each other in a way that is compatible, but not directly derived from, fundamental theory.

The essence is a description of the observed phenomenon according to external signs and properties - for example: length, weight, height, what color, what temperature, etc. instead of describing internal causal relationships

Phenomenological theory is a theory that expresses mathematically the results of observed phenomena without paying detailed attention to their fundamental significance (According to the Short Dictionary of Physics) [2].

The author Husserl wrote that phenomenology approach is descriptive and studies methods of description [3].

Edmund Gustav Albrecht Husserl (1859–1938) was a German philosopher considered the founder of phenomenology. Husserl was born in Moravia, part of Germany.

Phenomenology in the physical sciences: In physics there are cases when the observed results cannot be explained only on the basis of already known basic principles, such as *Newton's laws of motion, or Maxwell's equations of* electro magnetism. There may be several reasons for this: the theory in question may not yet be discovered or the mathematics that describe the observations may be too complex. In these cases, assumptions are sometimes made about what will happen in future observations or experiments based on a simpler algebraic model. If the assumptions turn out to be accurate enough, they are often accepted by the scientific community, despite the fact that algebraic expressions themselves are not supported by a fundamental theory in this field of knowledge.

The boundaries between theory and phenomenology and between phenomenology and experiment are quite blurred. Some philosophers of science, and Nancy Cartwright in particular, have argued that any fundamental law of nature is simply a phenomenological generalization [4].

Examples in physics

The phenomenology model corresponds to relevant level of knowledge. The description use analogies on base the knowledge accumulated so far.

- *Second law of thermodynamics:* Before the development of statistical mechanics by Ludwig Boltzman (1896), this law is phenomenological.
- *Rutherford Model (Planetary Model) (1911).* The model resembles a planetary system. It describes position of electrons to circular orbits based on experimental results.
- *Bohr's (1913) model.* This modeluses some result of quantum mechanical to localize the position of electrons to elliptical orbits.

Analysis

Phenomenology is the application of a descriptive approach to natural phenomena. For example it describes: length, width, height, color, frequency spectrum, temperature, etc.

It conducts statistics in observation, accumulates information about the external behavior of the phenomenon, about the form of its manifestation, but not about its content.

Based on exiting ones so far Knowledge, the phenomenology makes simple analogies that can expand them with known so far postulates.

Conclusion

The phenomenology does not affect the causes of the studied phenomenon or causal relationships and this affects the quality of scientific conclusions.
Scientific conclusions are superficial and do not reach the essence of the phenomenon.

Proposal

It is need to modern and to update the current scientific philosophy because it shows over time its scientific un productiveness. *It is necessary to use and apply a New Causal philosophy that does not describe the studied phenomenon from the outside only, but seeks to explore and discover the internal connections that create this phenomenon*.

William Rowan Hamilton (1833)

Theory

The Hamiltonian operator is Legendre's transformation from the Lagrange operator [6]. If we transform the equations by defining a coordinate system independent of time t, it can be shown that H is equal to the total energy:

$$H = T + V, \qquad (7).$$

where T - kinetic energy, V - potential energy.

The Hamiltonian equation is a first-order differential equation and this facilitates its solution.The Lagrange equation is of the second order. If we transform Lagrange equations by defining a coordinate system independent of time (t), it can be receive Hamilton operator H.

Analysis

The total energy H is a sum of kinetic Energy (T) and potential energy (V) (5). In mathematics the plus sign (+) means logic "or- or".

In the case of the equation for total energy, the logic "or- or" shows that the total energy (H) is equal to:" or" of the kinetic energy (T)," or" of the potential energy (V), but not from both energies simultaneously, at the same time.

Conclusion

-The Hamiltonian operator (H) is not precise (7). The reason is that according to the paragraph (I) the total energy (H) as a sum (the logic "or- or") of kinetic Energy (T) and potential energy(V) (5)is not precise.

Maxuell's equations(1864)

Theory

It is well-known the four Maxwell's equations in differential and integral form (Figure 1). They describe primarily Electromagnetic processes [5]:

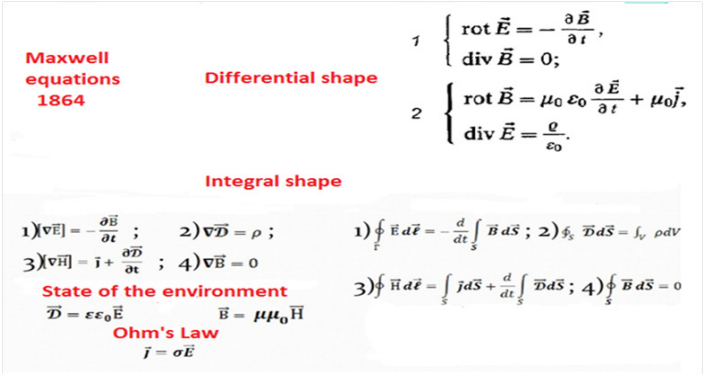


Figure 1

The Classic Axiom

The Classic Axiomclaims:

$\nabla x(\nabla xE)=0$ or div (rotE)=0, (8).

The Maxwell's equations of are correct in fulfilling the only Classic Axiom(8).

The essence of Classic Axiom

The axiom means that when a vector E moves in a closedloop ((∇ xE) or (rot E)), the variations of the vector E ($\nabla x(\nabla xE)$ or div (rot E)) are zero (8). Therefore velocity of vector E is constant and the motion along close loop is evenly.

Analysis

This ClassicAxiom (8) shows that all Maxwell's equations *are true only for uniform motions with constant velocity or Maxwell's equations describe only evenly processes.*

Since all Maxwell's equations describe primarily Electromagnetic Field, *then that described Maxwell's Electromagnetic Field is only evenly(v= const)* .

Conclusions

Maxwell's equations are true only for the part of the Electromagnetic Field that moves evenly.
Maxwell's equations are not true for fields that move unevenly, with variable speed(v const).
Maxwell's equations are not true especially for fields that have an acceleration(dv/dt):dv/dt>0–accelerating field or dv/dt<0 decelerating field.

Proposal

If we want to describe unevenly motions in a field other than the Electromagnetic one, we must this description place it on a new foundation. Or if we want to describe different, more expanded field which includes new unknown fields, we must write New Axioms.

We must write New Axioms for movement with acceleration. They will ensure the truth for the New Laws for unevenly and un uniform movement with variable speed *:($v \neq const; dv/dt>0; dv/dt<0$).*Then we could describe a broader class of phenomena - for example: the Gravitational Field, Super conductivity, the presence of Free Energy, etc.

Unlike the Classical axiom which allows only even motions(8), an extended axiom should provide uneven motions(9). This means

that it must allow accelerating motions - with positive and negative acceleration: *(v≠const;dv/dt>0;dv/dt<0).*
∇x(∇xE) ≠0 or div(rotE)≠0, (9).

Erwin Schrodinger (1925)
Theory
The Schrödinger equation (1926).

Erwin Rudolf Josef Alexander Schrödingeris Austrian physicist.

-The equation is not derived, but is postulated by an analogy with classical optics.

-It is a description and postulation of an unknown phenomenon similar to an already well-known phenomenon before[6]. This is an inherent feature of the Phenomenological approach described earlier.

$$\frac{d^2\Psi}{dx^2}+\frac{8\pi^2 m}{h^2}(E-U)\Psi=0$$

$$\frac{\partial^2\psi}{\partial x^2}+\frac{\partial^2\psi}{\partial y^2}+\frac{\partial^2\psi}{\partial z^2}(E-U)\psi=0 \qquad (10).$$

where E istotal energy, U is potential energyof the particle, Planck constant h, mass m, Ψ is wave function.

-The Schrödinger equation (10) is a differential equation in partial derivatives. It describes the behavior of the de Broglie waves-3D waves on the surface of water [6].

The Total energy of a particle is expressed by the Hamilton operator (7) (H=E=T+U). The Total Energy equals: "or "of T- Kinetic energy dependent on the velocity along the orbit,"or "of U- Potential energy dependent on the frequency of Ψ that forms standing wave.

Wave function (Ψ) describing the state of the particle as standing wave.

The roots of Wave function (Ψ) are periodic:in (+) direction) is falling wave, in (–) direction) is reflective wave:
Ψ(x, y, z, t)= b.sin[a.V(x, y, z ,t)+ δ], (11).
where a=2π/h; δ is phase constant. V is amplitude of phase: V(x,y,z,t) = E.t - S(x,y,z);E=dV/dt
-The number and the shape of phases of the (ψ) which appears as anwave function (11) are shown in Figure2 .

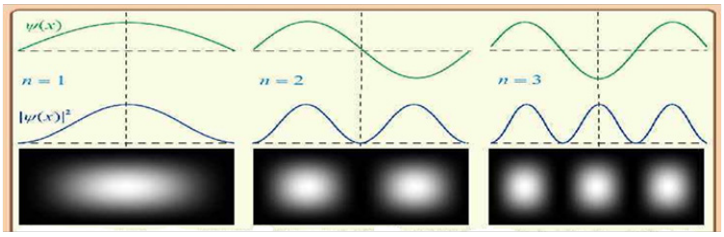
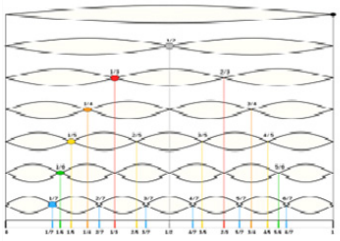


Figure 2.

Standing wave:w1, w2, w3...-Quantum events is like an excited ocean



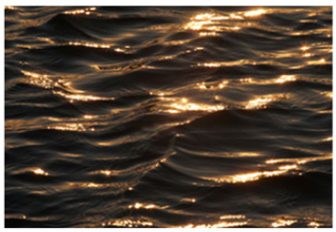


Figure 3.

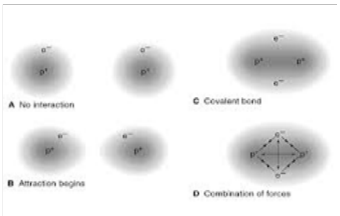
The probability (ψ²)of finding that wave at a pointin the space in 3D coordinates .

It turns out that the square (ψ²) of function(ψ) no longer describes the motion of the wave, but *it shows the probability* of finding that wave at a point in the space in 3D coordinates ..

The sum of the probabilities that the system is in all possible states should be equal to 1, therefore the modulus of the wave function should also be equal to 1. With this interpretation, the wave function represents the amplitude of the probability of finding a particle. The modulus of a square represents the probability of the particle occupying a possible region of the configuration space. For example:I ψ(r,t) I²..d³ r is the probability that the wave function is in volume : d r = dx.dy.dz

The sum of the probabilities is:
∫ I ψ(r,t) I²..d³ r= 1 (12).
The tops of this wave equals the probability of particle to be in this place (Figure 3). It is a principle of statistical determinism in quantum mechanics .The wave functions derived from the Schrödinger equation for a particular atom are called *Atomic Orbitals(Figure 4).*

Atomic Orbitals are as the region of the atom in which the electronis likely to be 90% of the time.



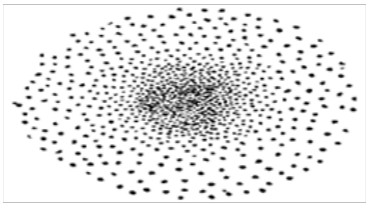


Figure 4.

Analyzes

The Total energy of a particle is expressed by the Hamilton operator(7), that has" or-or "logic .The Total Energyequals "or " to Kinetic energy (T) dependent on the velocity along the orbit,"or to Potential energy (U) dependent on the frequency of (Ψ) sequentially but not simultaneously.

It turns out that electron"or "moves in an orbital (V(x, y, z,t)),"or" pulsates through the wave function (Ψ(x, y, z, t), *but it is impossible to move and pulsate at the same time- simultaneously.*

The blurring of the orbits occurs to the fact that the *vacuum is full of matter.* The exact analogy is when we observe the stars through the thick and dense layer of the planet's atmosphere, such vibrating,

it moves the position of the observed star.

The reason is that so called empty space is *inhomogeneous* and electron is looking for the way with minimum resistance

Conclusions

The Schrödinger equation is not precise as well (10). The reason is that Hamilton operator for Total Energy has been not precise (7) because of "or-or" logic.

Therefore it is not true that the electron either moves in an orbital (V) or pulsates through the wave function (Ψ). It is not true that for one electron is impossible to move and pulsate at the same time, simultaneously.

The fact of blurring of the orbits proves that vacuum is full of matter - perhaps it is a model of so called "dark matter"(Figure3, Figure 4)

The fact that Atomic Orbital sare as the region of the atom in which the electronis likely to be 90% of the time proves that there is atleast a mode of pulsating in which an electron is most *visible* and it look likes to particle more than in the second mode of pulsating (Figure 4).

In summary it should exists two phases of electron pulsation:In one phase electron is more visible because it looks more like a particle(in lower orbital velocity). In the other phase the electron is more invisible because it looks more like a wave(in higher orbital speed).

Heisenberg (1925)

In 1925, the German physicist Werner Karl Heisenberg presented a scheme in which *instead of coordinates and velocities of the particle wereused abstract quantities - matrices.* Soon after, Schrodinger proved the equivalence of the two theories that the wave equation follows the matrix and vice versa, and that the results are identical.

Theory

The essence of Uncertainty principle

Heisenberg creates so called *uncertainty principle* in 1925. He argues that no physical system can be in a state where its coordinates and its impulse (speed, kinetic energy) simultaneously take on definite meanings.

According to uncertainty principle is impossible to observe and measure at the same time the impulse of particle(depends on velocity) and point in 3D volume(depends on wave function).

This is a true statement because measurement itself is made by sunlight, which, as a form of an electromagnetic wave, creates the electron. Therefore, when we measure, the state of the electron changes.

Analyzes

The first interpretation of the Uncertainty principle of observeand measure

First interpretationis quite precise. He is enbergargues that it cannot observes and measures the impulse p(v)
(that depends on velocity)and the spatial 3D coordinates of an electronat the same time (simultaneously):
"$\nabla x . \nabla p \geq h \nabla x$" 13.
This formula (11) *is the uncertainty measurement* of the spatial coordinates of the microparticles.

The measurement error when is known the spatial coordinates (Δx) is the uncertainty of the momentum

(∇p): $\nabla p = m.v$ 14.

where m is the mass of the electron, v is velocity, h is the Planck constant, $h=6,62.10^{-34}$Js.

This formula(14) *is the uncertainty of the momentum* of the particle. The mere fact of measuring the location (Δx.)of a particle changes its velocity(Δp) in an unpredictable way(13).

In fact, if we succeed with zero error (14), *to determine exactly one of the measured quantities, according to Heisenberg's formula(13), the uncertainty of the other quantity will be infinite, i.e. absolutely nothing will be known.*

In other words, if we could determine exactly the coordinates of a quantum particle ($\Delta x = 0$), then we would have no idea about its velocity ($\Delta p = \infty$) and viceversa (14).

The photon (measuring) and the electron (measured) after the collision are already one. This is reflected in the mathematical apparatus of quantum mechanics, where they are *described by a common wave function with indivisible variables- the photon wave function depends on the state of the electron, and vice versa.*When measuring, say, the momentum of an electron, *we influence the whole electron-photon system. And the whole system* leaps into a new state

This process is described as a *collapse* of the wave function. In this way,the electron acquiresan added impulse but the photon losses an impulse. Only then the electron and the photon become independent objects.

The second interpretation of the Uncertainty principle

This measurement uncertainty is not related to instrument imperfections, *but with the objective properties of quantum nature of the electronandin general on quantum world* .
Under the terms quantum structure and quantum behavior mean different things:

*On the one hand,*the quantum *structure of the particles* (for example of an electron) is indisputable. This is reflected in the internal structure of the electron which includes quanta of photons. But scientists do not yet know what the internal structure of the electron is.

On the other hand,for the quantum behavior of an electronis perceived the external impression of the electron's behavioras *if it appears in various random places in space.*

The Phenomenological approach as the philosophical foundation of science explain existing of this external impression (paragraph II).This external impression is a superficial perception for very complex processes.

The accidental appearance and disappearance of the electron can be explained by the fact that the electron becomes *visible at certain points in space (in top of wave, Figure 3), and invisible for certain sections* from distances (in empty space, Figure 4).

If we assume that the electron moves and pulsates simultaneously (6), it means that there is a phase in the pulsation in which the electron *is visible and there is another phase - in which the electron is invisible.*

If scientists use neutral rays for observation and measurement instead of light, they will be able to accurately measure the speed and frequency of the electron's pulsation.

The conclusion about quantum behavior ofan electron that *it accidental appearance and disappearanceis not entirely accurate.*

The reason is in the complex internal structure of the electron which is manifested externally in the visibility of the electron at certain points and invisibility - in certain sections of distance.

Conclusions

The first interpretation of the Uncertainty principle of Heisenberg for observe *and measure is quite precise(13).*The reason is thatan external observer can investigate and measure a quantum micro particle (for example an electron) only if used sunlight wave which however, interact with the electron itself. The sunlight wave adds extra external (energy) speed and momentum(Δp) and the electron takes off and changes its location in space (Δx)(13).

The second interpretation of Uncertainty principle of propertiesof the quantum world is not quite precise.

There are a few reasons:
If we adopt the new interpretation (6) of total energy (Eo), then it becomes clear that, in contrary to Schrödinger equation (10),the electron moves at a velocity (v) along the ellipse of the orbital and at the same time (simultaneously) the electron pulsates with a wave function(ψ). An electron manifests externally. It shows its visibility at certain points of space and invisibility - in certain sections of distance along its elliptic orbit.

- If an external observer uses any other kind neutral wave or beam (not sunlight), the observer will be able to measure the parameters of motion and pulsation of the electron without disturbing its mode of existence. This means that an external observer can measure with other methods" and "velocity as impulse (Δp) "and "the location in space((Δx) as apulsation of wave function (ψ) (11).

Therefore if scientists use neutral rays for observation and measurement instead of light, they will be able to accurately measure the speed and frequency of the electron's pulsation.

General conclusions

Electron is moving and pulsating simultaneously

If we assume that the electron moves and pulsates simultaneously (6), it means that the electron through pulsating passes minimum two final phases.

There is a phase in which electron is visible and there is another phase - in which the electron is invisible. Along the pulsation an electron will moves in two phases and forman ellipse, not a circle.

Visible or invisible mode of electron

The property of an electron to appear randomly in different places is its *immanent property.* The random appearance of an electron is calculated with *the probability* (ψ^2), (12) that it will appear in a narrow region. It is about the same electron in the same orbit - the orbital.

The accidental appearance and disappearance of the electron can be explained by the fact that the electron *becomes visible* at certain points in space at top of wave function with maximum probability (ψ^2)(12)(Figure 3). After that electron *becomes invisible* for certain sections from distances corresponding to the empty areas in space (Figure 4).

Therefore the conclusion about quantum behavior ofan electron that it accidental appearance and disappearance is not entirely accurate. The reason is that the unknown and unexplored *internal structure of the electronis manifested externally* in the visibility of the electron at certain points and invisibility - in certain sections of distance (Figure3, Figure4) (12).

By this way an external observer *render an account the same electron in different places,* But in fact, this same electron *is seen at some points and not seen at other points* .

The reason is existing of acceleration

The new proposal for an extended axiom is for existing of acceleration (9). The acceleration is the reason the electron to become visible or invisible.

First phase of electron moving when acceleration is negative ($dv/dt < 0$) and velocity along the orbitis minimum, then electron is denser and more visible. Second phase- when acceleration is positive ($dv/dt > 0$) and velocity along the orbit is maximum, then electron becomes less dense and invisible .

These phases correspond to the two sections of the orbital ellipse - *straight section and curved section.* Therefore in curved section electron moves in negative acceleration and minimum velocity - *it is similar to a particle and becomes visible*. In straight section electron moves inpositive acceleration and maximum velocity -it look likes to *an wave and it is invisible.*

Atomic orbital is result of diffusion of the electron orbit.

The *Atomic Orbitals are the result of pulsation* of the entire ellipse. Each time each ellipse has a different path.

The reason is that the medium in which the electron moves is *not empty (vacuum) but even it is in homogeneous.* By analogy with the diffusing of light when an outside observer looks at a distant star through a thick stratospheric layer. The reason is that the stratospheric layer is in homogeneous and has different resistance in space and time. And besides the light searches for the path with minimum resistance so the path of light is scattered in 3D around 1 point-star.

- *Therefore vacuum is notonly empty but it has inhomogeneous structure with variable resistance* because the vacuum is in homogeneous, electron searches path in minimum resistance,the ellipse is scattered in 3D around 1 center.

Hypothesis

There is a possibility besides linear velocity and pulsation of the electron to *performand a third motion simultaneously* (6). For

example electron can wind inward (to become denser and visible) andit can wind outward (to become less dense and invisible) through open vortex (9). The winding in ward and unwinding out wward are carry out through assumption of the presence of acceleration (9).

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