

# Validity of Universe Structure Conception as Nested Vortexes

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**Abstract**—This paper introduces the Nested Vortexes conception of the universe structure and interprets all the physical phenomena according to this conception. The paper first reviews recent physics theories, either in microscopic scale or macroscopic scale, to collect evidence that the space is not empty. But, these theories describe the property of the space medium without determining its structure. Determining the structure of space medium is essential to understand the mechanism that leads to its properties. Without determining the space medium structure, many phenomena; such as electric and magnetic fields, gravity, or wave-particle duality remain uninterpreted. Thus, this paper introduces a conception about the structure of the universe. It assumes that the universe is a medium of ultra-tiny homogeneous particles which are still undiscovered. Like any medium with certain movements, possibly because of a great asymmetric explosion, vortexes have occurred. A vortex condenses the ultra-tiny particles in its center forming a bigger particle, the bigger particles, in turn, could be trapped in a bigger vortex and condense in its center forming a much bigger particle and so on. This conception describes galaxies, stars, protons as particles at different levels. Existing of the particle's vortexes make the consistency of the speed of light postulate is not true. This conception shows that the vortex motion dynamic agrees with the motion of all the universe particles at any level. An experiment has been carried out to detect the orbiting effect of aggregated vortexes of aligned atoms of a permanent magnet. Based on the described particle's structure, the gravity force of a particle and attraction between particles as well as charge, electric and magnetic fields and quantum mechanics characteristics are interpreted. All augmented physics phenomena are solved.

**Keywords**—Astrophysics, cosmology, particles' structure model, particles' forces, vortex dynamics.

## I. INTRODUCTION

THE region of the observable universe is increasing since Gallio. Within the physical limit created by the speed of light, the universe is at least 100 times more than we can observe. The observable universe is dependable on the improvement of the instruments and the progress off research. The size ratio between the expected particle consists of galaxies to a single galaxy according to the theory in this paper could be the same as the ratio between a galaxy diameter to a star diameter, or the ratio of a star diameter to a proton diameter.

In the observable universe, there are clear nested (hierarchical) structures, a galaxy consists of stars and a star consists of protons (helium atoms). Proton is not the fundamental particle; it was discovered that it consists from smaller particles which are not precisely determined. In the

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other side, our galaxy is not the whole universe as billions of galaxies exist and should construct certain formation.

Recent theories imply a sort of filling in the universe space. The filling in each theory has nature and properties essential for the operation of that theory. The Field theory states that the space is filled with fields and the Pilot Wave theory states that the space is filled with waves in addition to Superfluid theory. The space filling is analogy to the Ether medium in Ether theories. But these theories did not describe the structure of their stated space medium and how that structure support its mechanism in the theory, and subsequently, method of transmission of gravity, electric and magnetic forces remain unknown, in addition to the contemporary ambiguous phenomena as wave-particle duality without interpretation.

Physics theories at different universe scales were established individually to state mathematical model representing its behavior. These theories do not provide a common structural model to all the universe particles at different scales that explain their behaviors. Many such theories have found contradicted. In result of that, a different conception "The Nested Vortexes" [32] has been introduced by us in TAUP2017 conference. This conception has admitted that the universe space is full of matter, from which all the universe structures (particles) are constructed from and maintained as medium to them. This theory puts a unified structural model to all the universe particles that explains their behavior. This model depends on vortexes as a mechanism to construct the universe particles. Although this theory was established as an outcome of monitoring the shapes and movements of the universe particles at all size scales and notices great similarity between them, the vortex surprisingly matches the earliest, first impression theories in both the macroscopic scale universe by "René Descartes" (1596-1650) [3] and the microscopic scale universe by Kelvin (1867) [15]. Tewari (2008) [31] followed this trend before the theory in this paper while there are many differences between them.

## II. LITERATURE REVIEW

Physics science is separated between the macroscopic scale and microscopic scale.

In the macroscopic scale universe, pioneer physicists studied the observable universe and they suggested the existence of a medium in space to interpret some phenomena in the universe. That medium was called "Ether," which is an old Greek word. Theories about the observable universe are summarized in [1], [2]. "René Descartes" (1596-1650) [3] saw that the planets are carried around the sun by an Ether vortex and the entire vacuum space filled with interlocked Ether

vortices. Christian Huygens (1629-1695) [4] proceeded to explain the earth gravity as the result of Ether that pushes objects toward its center due to its circulation around the earth. Unfortunately, Ether vortex idea did not continue since that time. Isaac Newton (1642-1727) [5] proposed that the earth gravity is caused by the pressure of the higher density stationary ether particles surrounding the earth. Although he put laws to describe the planets' rotation around the sun, giving up of the ether vortex leaves the rotation of planets around the sun unexplained.

Ether hypotheses have been confirmed by experiments. Michelson–Morley's experiment (1887) [6] used an optical interferometer to measure the earth speed relative to the proposed surrounded stationary Ether, but the measured speed was thought to be less than expected. Maurice Allais (1911)[7] used free pivot pendulum at which its swing plane rotates with earth rotation, noted a significant periodic change in the plane swing confirming the direction of Ether flow. The Sagnac experiment (1913) [8] using revolving platform with two light beams rotating in opposite directions showed that the speed of light is not invariant with the light source rotation speed. However, Albert Einstein's general theory of relativity (1916) [9] denied the existence of the Ether medium. He stated that space is curved around the earth to interpret its gravity, and the speed of light is constant. Einstein's theory generated a new question about how the earth mass curves the surround space and kept the transmission of light, heat, and magnetism unexplained again.

Although Einstein's theories became the fundamentals of modern physics, experiments supporting Ether continued. Miller & Wilson (1926-1933) [10] improved the optical interferometer experiment by which he confirmed the Ether relative speed of 10 km/s. Miller noted a periodic change in the Ether relative speed during each 24 hours that indicates the approximate Ether direction. Roland DeWitte experiment (1991) [11] using radio signal confirmed the results of the optical interferometer experiments and confirmed Miller Ether direction. The DeWitte experiment represented the first detection of "Ether gravity waves". Reginald T. Cahill (2002) [12] supported and calibrated the Ether velocity of Michelson–Morley experiment. Other significant experiment performed by Yuri M. Galaev (2002) [13] indicated that the velocity of optical wave propagation depends on the radiation direction which is practical disprove of the Einstein hypothesis that stated the speed of light is constant. "Ether gravity waves" was redetected by R.T. Cahill & F. Stokes (2008) [14] using Optical-fiber interferometer.

In the microscopic scale universe, Kelvin (1867) thought that the atom is fundamental particle, he proposed the "Atomic vortex theory" [15] which describes atoms as small knotted tubular vortices within an ideal, frictionless fluid, which was often identified as the Ether. Every element is represented by a particular configuration of vortex rings. He tried to explain everything just with some equations of vortex fluid dynamics derived by Helmholtz [16]. Then, he tried to modify his theory to interpret light propagation and gravity before his theory was abandoned around 1890 when his proposed atom model had

disproved. Thomson (1897) [17] and Rutherford (1911) [18] discovered the basic structure of the atom as a nucleus surrounded by orbiting electrons. Max Planck (1900) [19] and Bohr (1913) [20] originated Quantum theory, which states that the energy, momentum, angular momentum and other quantities of the atomic system are restricted to discrete values (quantization). Einstein (1921) [21] discovered the duality nature of light as a particle and wave at the same time. De Broglie (1929) [22] demonstrated that electrons also have wave-like properties. Schrodinger (1933) [23] derived a wave function to describe the motion of the electrons in their orbits around the atom nucleus. Paul Dirac (1933) [24] modified Schrodinger's equation by using the general relativity theory and the particle spin to derive the Dirac's equation which is capable of describing all sub-particles in many states. Dirac wave function was interpreted next by Max Born (1954) [25] as the probability distribution of finding the electron at a given position. Paul Dirac developed the Quantum Field Theory (1940-1950) [26] which states that fields are always there, the light is waves of electromagnetic fields which always exist in space. There is a field for each particle that contains energy and momentum as particles can have, but the particle does not exist in a position until the field is excited in that position. The fields are interacting as one could produce particle in the others. Quantum mechanics equations were interpreted with concepts that require harder interpretations as wave–particle duality, observation defines reality, the multi-alternative universe, and superposition. De Broglie – Bohm Pilot Wave theory (1952) [27] interpreted Schrodinger's equation by proposing that any particle has an associated matter wave that accompanies it and guide its motion, in addition to empty waves not associated with particles. This theory provided deterministic and reasonable interpretation to quantum mechanics equations. In 1990, Jerome Friedman, Henry Kendall, and Richard Taylor in Stanford Linear Accelerator Center discovered that protons and neutrons consist of quarks sub-particles which joined together by gluon subatomic particles.

Superfluid theorem [28] emphasizes that the vacuum space medium has properties as fluid. Analogy between Electromagnetism laws and fluid dynamics laws is shown in [29], [30].

Paramahansa Tewari (2008) proposed "the Space Vortex Theory" [31] in which he stated that the electrons and positrons are the universe fundamental particles and consist of vortices, which circulate at speed of light with a vacuum (void) in their centers. He considered protons and neutrons consist of units of electrons and positrons. He also considered the solar system and galaxies are large vacuum space vortices. He interpreted the electron charge, gravity, mass, and magnetic field using the space circulation of the electron vortex which he defined as "velocity field" and provided mathematical formulas to calculate them. He considered that gravity is actually electrostatic forces. However, some interpretations were not convinced as magnetic fields, or supposing the universe matter of electrons, positrons and hydrogen are created at the galaxy center, and the planets

formation material from the solar matter without explanation of how they were created.

### III. THE NESTED VORTEXES CONCEPTION

The following are descriptions of the universe space and particles according to this conception, then explanations of the forces and fields within and between particles, then interpretations of the contemporary ambiguous physics phenomena. Some expectations due to this conception have been stated.

#### A. The Universe Structure

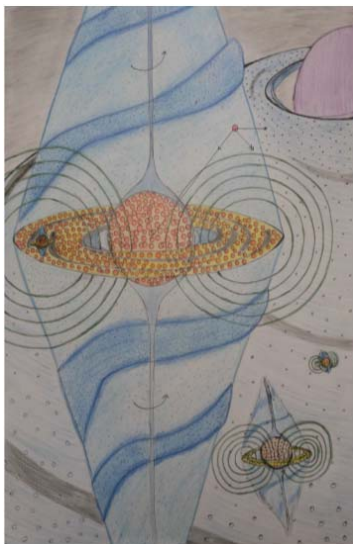


Fig. 1 The Nested Vortexes [32]

There is unified structural model in the successive levels of the observed universe. The discovered universe follows a nested (hierarchical) structure. The particles hierarchical levels in the observed universe are Proton - Star - Galaxy. Particles in the levels lower than protons are still very small to detect or measure. Therefore, there is no reason to believe that the space around us is empty, it is full of undetected particles from the lower levels, and thus the universe space is full of matter. The unified structural model of the observed universe is expected to continue in the unobserved universe. At any level of the hierarchical structure, there is a particle consisting of smaller particles of the next lower level and, at the same time, is part of a bigger particle at the next higher level. Aggregating particles at a certain level is forming a particle of the next level. Particles may also remain individuals. For a particle at a certain level, the lower levels particles are considered as a medium for that particle. Lets call it "Level Medium" in this paper.

Astronomers should expect that some of what appear as a distant bright galaxy (quasar) could be a next level particle, which consists of galaxies and is neighbor to our galaxy next level particle. It is exactly as when the astronomers thought neighbor galaxies are stars.

Like any medium, vortexes could be formed like a vortex in

the air or water. Quantum vortices known as "Abrikosov vortex" are observed experimentally in type-II superconductors liquid helium, and also could be created within atomic gases in Bose-Einstein Condensate state. Vortex occurs due to relative motion between two streams in the medium. At a certain level in the universe's hierarchical structure, the Level Medium could form a vortex. The Level Medium relative motion could be due to an asymmetric great explosion at the beginning of the universe looks like a Super Nova explosion. The clearest Supernova to the earth SN1987A shows a ring vortex. This explosion accompanied by anisotropic temperature distribution and consequently density differences that help forming vortexes. In March 2013, the Planck satellite produced a 50-megapixel image of the oldest light in the universe, called the cosmic microwave background, showing temperature fluctuations after elimination of solar and galaxy Doppler effect.

A Level Medium vortex at any level in the universe's hierarchical structure follows the vortex dynamics. The vortex eye known as "Black Hole" has low pressure. Some of the vortex lower levels are aggregated in its center assembling a new particle at the next higher level of the universe hierarchical structure. Thus, a Proton is constructed due to aggregating of lower level particles by a vortex at its center, electrons are the same. A star is constructed due to aggregation of Protons (hydrogen atoms) by a star vortex. A galaxy is constructed due to aggregation of stars by a galaxy vortex. Free particles could remain free and does not include in a next level vortex, as intergalactic stars exist between galaxies vortexes. In short, a particle at a certain level is the nucleus of a vortex within the Level Medium.

A particle at a certain level in the universe hierarchical structure, which is nucleus of a vortex of the Level Medium at this level, could be trapped in a bigger vortex in the next level to form the next higher level particle and so on. The dimension (size) of a vortex determines the particles levels which could be trapped inside it. The vortex of Protons forms a star in its center as a higher-level particle. Much bigger vortex (galaxy) of stars and lower particles aggregates the stars in its center and forms the higher-level particle. It is predicted that the galaxies could be trapped in a much bigger vortex. Thus, the universe is a hierarchy of vortexes or Nested Vortexes. The highest level (root) of the hierarchy structure is a single giant vortex including the entire universe.

As a vortex on a certain level gathers the lower level particles (vortexes) in its center, the aggregated vortexes at the center are pressurized and could be merged. The merged vortexes combine their nucleuses and share their surrounding rotating lower particles, such as, a star combines two protons of two hydrogen atoms to form a single helium atom. Continuing such combinations produces next atoms in the periodic table converting a star to a planet. This conception considers a planet as an old cold star where hydrogen atoms had merged to produce advanced atoms in the periodic table. Planets and stars in our galaxy were from two different galaxies collided together in the past. Galaxies of planets, and individual planets in our galaxy could exist.

The rotation speed of the vortex nucleus is almost the same rotation speed as the adjacent surrounding medium of the vortex. That is applicable to the earth vortex confirming the result of the Michelson–Morley’s experiment which indicated that the relative speed between earth and the supposed “Ether” is very less than expected. The light speed in the experiment tool did not change because the “Ether” medium has almost the same speed with the light source on the earth surface. Consistency of light speed is not true, and relative speed between a propagating light wave and a moving observer generally is not fixed. The speed of light propagates with constant speed with respect to the carrying medium similar to sound wave in the air. If the light source is moving, wherever the light source disturbs the surrounding medium, it produces light waves which propagate within the medium with fixed speed irrespective to the source speed. In this case the foundation and results of the special and general relativity were wrong.

The Earth is trapped within the Sun vortex and has almost same rotation speed around the Sun with the rotating “Ether” of the Sun vortex. The light of a fixed light source on Earth surface parallel to the rotation direction of the earth still faces slight speed change due to relative Earth rotation to the “Ether” which rotates within the sun vortex. This causes the light of the light source faces slight speed change has maximum and minimum values each 12 hours apart that interprets the slight periodic displacements in the Michelson-Morley interference experiment. Due to the inertia of the Earth, There is some speed lag between the Earth rotation and the rotating Ether of the Earth vortex and also some speed lag between the rotation of the Earth around the Sun and the rotating Ether of the Sun vortex.

### *B. Forces within a Particle*

#### 1) Spinning

As a result of the rotation of the vortex in a certain direction, the vortex particle which aggregated and condensed at its center forming a higher-level particle acquires the same movement of rotation with the same direction. This causes the particles’ spin. Due to the inertia of the vortex particle, there may be small speed lag between the vortex particle rotation and the rotation of the surrounding vortex medium.

#### 2) Orbiting

A vortex at a certain level could trap other vortexes (particles) which have convenient comparable sizes, making them rotate around in an orbit in the same direction of the vortex rotation. That is the case for an electron orbiting a proton vortex forming hydrogen atom, or planets orbiting a star forming solar system. The rotation produces a centrifugal force while the trapped particle is being exposed to the vortex Pressure Gradient Force. Orbiting is not due to attraction or gravity forces between the trapping and the trapped particles. The orbited object just sails within the rotated medium around the vortex axis. There is no need for an incomprehensible assumption that the space is buckled around the planets and stars to explain orbiting as given by Albert Einstein's general

theory of relativity.

The orbit around the vortex center is not necessarily perfect circle and it depends on the momentum and incident angle of the incoming trapped particle.

#### 3) Gravity Force

The aggregated particles at the nucleus of a vortex have mutual attraction (explained later) that keeps them adjacent. The aggregated particles take a spherical shape; it is similar to the spherical shape of amount of water in space or air bubble in water. The air bubble surrounded by water has equal pressure in all directions of its sphere surface, neglecting the surface tension; the pressure inside the air bubble is equal to the pressure of the surrounding water. The particles inside the bubble resist the outside medium force and are arranged to exert lowest force against the outside water medium force symmetrically in all directions. Spherical shape has the lowest surface for a certain volume. The air bubble spherical surface makes the total force acting upon its surface due to the water medium pressure is minimum. The spherical shape of amount of “loosely coupled” particles is an additional evidence of existence of a medium surrounding it. Thus, the spherical shape of the earth and the sun is an additional evidence that they are in a medium.

Following the Archimedes principle which could be stated as “The more displacement of the water by the bubble volume, the more force by the water upon the air bubble,” the force from water upon the air bubble spherical surface is proportional to the volume of the bubble, it is symmetric around the bubble surface and perpendicular to it. Thus, the spherical nucleus of a vortex is exposed to surrounding medium force perpendicular to its surface giving the effect of “Gravity”. For the earth where its oceans, atmosphere or anything belongs to the earth should adhere to its spherical shape, if anything try to go out the sphere shape, the surrounding medium pressure push it back provides “Gravity” effect. The effect of the surrounding medium pressure extends several hundred kilometers above the earth surface and is reduced gradually. The universe lowest level particles medium should be limited within a certain volume so that it could have pressure.

The other force that gives the Gravity effect is the vortex “Pressure Gradient Force”. In vortex dynamics [7], there are two types of vortices, free (irrotational) vortex where there is no force act on the fluid to create the vortex, and the other type is forced (rotational) vortex where external force creates the vortex. The distribution of the velocity within the free vortex is inversely proportional to the distance from the vortex axes as in Fig. 2 (a). The velocity distribution within the forced vortex is proportional to distance from the vortex axes as in Fig. 2 (b). The nucleus of a vortex is rigid and follows the “forced vortex” velocity distribution.

Individual vortex at a certain level in the universe hierarchy follows a “free vortex” dynamics. The vortex could be considered as concentric cylinders where each cylinder rotation velocity increases towards the vortex axes center. Force produced from higher pressure to lower pressure

towards the vortex center is called “Pressure Gradient Force”. The rotation of the vortex produces centrifugal force perpendicular to the vortex axes. The Pressure Gradient force drives the lower level particles of the vortex to accumulate and condense towards the vortex rotation axis which takes a spherical shape because of the pressure of the surrounding medium. The spherical shape of the vortex nucleus makes the vortex inner concentric cylinders bend with the nucleus spherical surface, making the pressure gradient force almost perpendicular to the spherical surface of the nucleus and towards its center, as in Fig. 1, causing the additional gravity effect within the vortex.

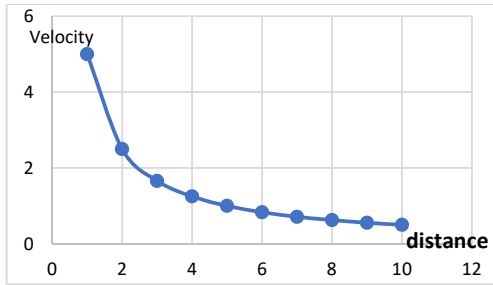


Fig. 2 (a) Free vortex

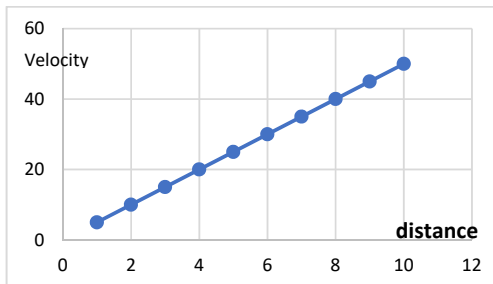


Fig. 2 (b) Forced vortex

When a particle is trapped within another vortex, as electrons rotate around the nucleus of an atom or planets around a star, this particle rotates in orbit around the vortex axis. The orbiting particle is exposed to a centrifugal force at the direction vertical to the rotation axis of the vortex and also exposed to the Pressure Gradient Force at the direction towards the center of the vortex nucleus. The resultant direction of the two forces will be towards a plane vertical to the vortex rotation axis and passing through the center of the vortex nucleus, as in Fig. 1. For simplicity, this plane will be called "The Orbits Disk". This explains why the orbits of the planets around a star or orbits of stars around a galaxy center are finally settled in the Orbit Disk. This is applicable to Saturn rings. According to this theory, the vortex model is the same in all levels, the vortex in the level higher than the galaxies vortices should have Orbit Disk where these galaxies exist. Experimental data from various independent sources, for example, WMAP, BOOMERanG, and Planck, confirm that the “observable universe” is flat with only a 0.4% margin of error. Plank space telescope detects cosmic microwave

Background Radiation afterglow of the big bang and the radiation lines were received parallel without any distortion indicating that the “universe” is flat.

#### 4. Attraction and Repulsion Forces

Two adjacent vortices at the same level and rotate at opposite directions can be joined together such as two adjacent whirlpools in a lake. The adjacent particles of the two vortices push each other in same direction causing the particles to move faster and produce low pressure in the middle which forces the two vortices to move towards it and keeps the two vortices joined (attracted). This explains the interconnections between atoms, stars and galaxies together. On the other hand, if two adjacent vortices are rotating in the same direction, the adjacent particles of the two vortices collide and push back each other according to Newton's third law, or in other expression, the particles condensate and produce high pressure in the middle which pushes the two vortices away from each other (repelled). Thus, the electric charge type of a particle is only an expression about its vortex rotation direction (spin).

The particle charge q is proportion to the vortex circulation strength  $\Gamma$  around the vortex nucleus.

$$\Gamma = C_1 q$$

$\Gamma$  is equal to the integration of the medium velocity  $V$  along a closed path around the vortex nucleus center  $\Gamma = \oint_c V \cdot dl$ . That means that the particle charge depends on its spin velocity and its circumference (size).

Using Biot-Savart's law in vortex dynamics, the velocity  $V$  at a point has distant  $r$  from a vortex filament is  $V = \frac{\Gamma}{2\pi r}$ .

The attraction – repulsion force between two individual particles' vortices as electrons, protons, planets, or stars is actually an "electrostatic force". If two individual particles have  $r$  distance apart, the attraction or repulsion force  $F$  of each one upon the other is proportional to the velocity of each vortex at the center of the other vortex and acting along the line intersecting the two vortices centers. Thus, the force  $F$  is proportional to the product of the two velocities,

$$F = C_2 V_1 V_2 = C_2 * \frac{\Gamma_1}{2\pi r} * \frac{\Gamma_2}{2\pi r} = \frac{c_2}{4\pi^2} * \frac{\Gamma_1 \Gamma_2}{r^2} = \frac{c_2 c_1^2 q_1 q_2}{4\pi^2 r^2}$$

which is similar to Coulomb's law for electrostatic force between two points' charges  $F = \frac{1}{4\pi\epsilon_0} \frac{q_1 q_2}{r^2}$

$$c_2 c_1^2 = \frac{\pi}{\epsilon_0}$$

The Newton's gravitation law to get gravity force between two objects having amount of mass (Table I C) is a sort of coulomb's law (Table I B), where the mass amounts contain complete atoms and not a single particle. In this theory an atom is a merge of several proton vortices with their centers are almost concentric. The orbited electrons which are vortices themselves have opposite spin directions and are not concentric. The atom has weak resultant (net) vortex strength

which causes its weak gravity. From coulomb's law point of view, the summation of the directional fields' strengths at point P, along the direction from the atom center to the point P, of all the protons and electrons charges in an atom, as in Fig. 3 (a), is positive. As proton has positive charge and electron has negative charge, the summation of the electrons fields' strengths components along the direction from the atom center to the point P is less than the summation of the fields' strengths of the protons at the atom center. Thus, the atom has a weak positive charge. This interprets the Newton's "gravity" force of a mass of atoms which is actually attraction force of atoms.

To calculate the attraction (Newton's gravity) force of atoms, it is easier to calculate the attraction (Newton's gravity) force for a proton-electron pair within an atom. The proton-electron pair has average separating distance  $1 \times 10^{-10}$  meter, each has charge of  $1.602 \times 10^{-19}$  Coulomb, and their charge signs are opposite. The resultant fields' strengths, at a point P at distance 1 meter from an atom center, as in Fig. 3 (b), by substitution in Coulomb's law, the net field strength at the direction from the atom center to the point P is a weak positive charge of  $14.418 \times 10^{-30}$  Newton/ Coulomb. This is applicable for most electron positions around the atom nucleus. The atoms which have several proton-electron pairs always represent positive charge with some fluctuations due to orbiting of the electrons.

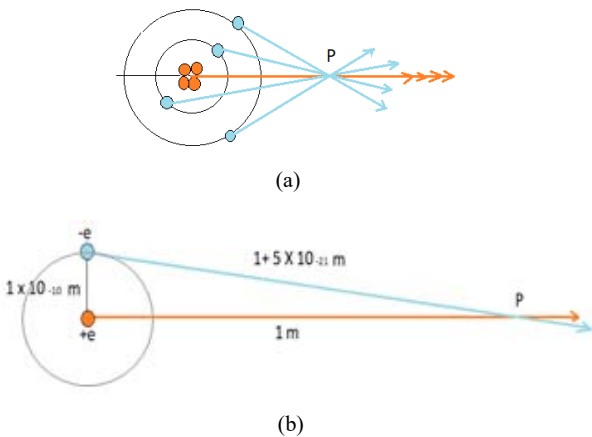


Fig. 3 Atom net field strength at Point P as per Coulomb's law

If some electrons are removed from an atom forming positive ion, the resultant (net) vortex strength of the atom increases and produces "electrostatic field" which could be measured by Coulomb's law.

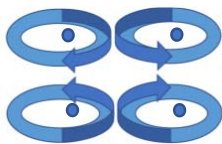


Fig. 4 Atoms array – ionic bound

As the Newton's gravity force is calculated by Newton laws

(Table I C), the mass  $m_1$  and  $m_2$  are related to the net vortex strength or the weak positive charge of the atom. Thus, the attraction or repulsion force F could be represented using three laws as in Table I.

TABLE I  
SIMILAR LAWS FOR SAME FORCE

A Using Vortex strength law (for particles- ions)	B Using Electro static law (for particles - ions)	C Using Gravity law (for atoms)
$F = \frac{C_2}{4\pi^2} \frac{\Gamma_1 \Gamma_2}{r^2}$	$F = k_e \frac{q_1 q_2}{r^2}$	$F = G \frac{m_1 m_2}{r^2}$
$F = \frac{c_2 c_1^2}{4\pi^2} \frac{q_1 q_2}{r^2}$	$k_e \approx 9 \times 10^9$ $N \cdot m^2 \cdot C^{-2}$	$G = 6.674 \times 10^{-11}$ $N \cdot (m/kg)^2$

The attraction (Newton's gravity) force F between two atoms could be represented by the laws in Table I-A or C. We assume two identical atoms have mass  $m_1 = m_2 = m_{atom}$  and atomic net vortex strength  $\Gamma_1 = \Gamma_2 = \Gamma_{atom}$ .

$$m_{atom} = \frac{1}{2\pi} \sqrt{\frac{C_2}{G}} \Gamma_{atom}$$

Thus, the mass of an atom is proportional to its net vortex strength. This relation is of course applicable to individual particles.

For an object contains millions of atoms, the aggregated net vortexes of the atoms have net vortexes strength.

In Cavendish experiment, the big and small mass ball have aggregated atomic net vortexes strengths which cause attraction force between them. In addition to that, the big ball has stronger net vortex than the small ball, the small ball exposes to the pressure gradient force of the big ball net vortex and also tends to orbit around the big ball, but because the small ball are tided, it just moves towards the big ball.

For permanent magnet bars, an iron bar becomes a permanent magnet bar when the iron atoms' spin axes are aligned in the same direction. The aligned atoms of permanent magnet bar have strong aggregated (net) vortexes. Thus, permanent magnet bars have strong attraction and repulsion properties. A permanent magnet bar has similar attraction and repulsion behavior like a single vortex, as explained previously. When two permanent magnet bars which have same direction are adjacent, their aggregated net vortex has same rotation direction and they repel. If one of them is flipped 180 degrees, their aggregated net vortex will have opposite rotation direction and they will attract.

When two permanent magnet bars that have same direction are joined along their axis, their aggregated net vortexes have same rotation direction and will be linked together (as explained in the attraction force) and cause the bars to attract. If the two permanent magnet bars that have opposite direction are joined along the same axis, their aggregated net vortexes have opposite rotation direction and will push the two vortexes away from each other (as explained in the repulsion force) and cause the bars to repel. Putting the permanent magnet bars in same axis produces stronger attraction or repulsion than the adjacent ones because the strength of rotation of the vortexes is stronger at the vortexes' axes.



Simple experiment has been made to prove the existence of the net vortex of a magnet and whether it can orbit objects around its rotation axis, as mentioned previously. As shown in Fig. 5, using two iron sheets tighten at the ends using thin wooden stick which is hanged from its middle to the room ceiling, using thin thread, few centimeters away from the ground. The wooden stick can rotate due to a very small force. After leaving the iron sheets hanging several hours until they settle down without any movement, plastic cylinder containing 12 home magnetic disks were put between the two iron sheets (The magnets force should not be strong enough to attract the iron sheets towards it). The wooden stick started to rotate slowly for at least half circle before the twist of the thread resist the rotation. After removing the magnetic disks and leaving the iron sheets hanging for several hours until settle down again, the magnetic desks were put upside down, the wooden stick started to rotate slowly to the other direction. This experiment has been repeated with marble stone cuboids instead of the iron sheets using stronger magnet, the same results were obtained.

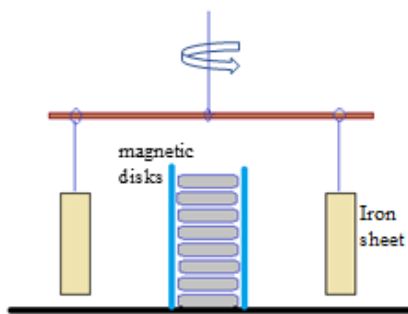


Fig. 5 Vortex orbiting experiment

A powder from the marble has been checked using a magnet, it did not attract to the magnet indicating that it did not contain iron metal. Cavendish experiment has been made using two sets of magnetic desks instead of the two big iron balls and two marble stone cuboids instead of the small balls. The wooden stick clearly rotated until the two marble stone cuboids contacted with the magnetic desks. When another marble type was used, it tended to repel to the magnetic desks. Thus, Cavendish experiment measured the attraction force between objects contain atoms not a gravity force.

### C. The Particle Fields

#### 1. The Electric Field

The effect domain of attraction or repulsion of a particle is called "Electric Field." The field around a particle is the influence of its vortex motion which extends along its diameter wide. The field is proportion to the inverse of distance square from the vortex center. When another particle passes through the vortex domain, there will be a change in the direction of its movement, like changing the direction of a boat passing near a whirlpool in a lake. This explains the direction change of light particles (photons) as they pass near a star particle.

#### 2. The Magnetic Flux Lines

As previously mentioned, The Orbits Disk is vertical to the rotation axis of a particle vortex. The same or lower level particles rotating within a particle vortex tend to settle and orbit within the Orbits Disk. The Orbits Disk looks like a crowded multi lanes highway. The movement of the particles orbits in the Orbits Disk cause circular standing waves in the surrounding medium around their rotation orbits, as in Fig. 1. The  $\lambda/2$  point of a standing wave cycle is called a node. While the  $\lambda/4$  and  $3\lambda/4$  points alternate from peaks to bottoms, the node point stays stationary. All the node points' positions in the space medium perform lines called "node locus". The node locus of these standing waves is the closed magnetic flux lines. It is similar to the magnetic flux lines circling around a ring wire carries electrons.

Standing wave node locus lines in a medium at any level can levitate objects as in "Acoustic Levitation". This interprets arranging the iron powder in lines within a magnetic field. This is applicable for planets or stars. The standing waves node locus lines are circling around the orbits of the next lower particles in a planet's or star's Orbits Disk. The waves node locus lines from all directions of the Orbits Disk are concentrated at the planet or star rotation axis outgoing from the North pole, revolving and ingoing to the South pole.

#### 3. Quantum Orbits

The nucleus of a vortex wobbles and produces standing waves in the surrounding medium. This standing wave has node locus rings  $\lambda/2$  apart in the Orbits Disk where the lower level particles are concentrated in. This is the same as objects levitating in the nodes of a sound standing wave. Thus, the orbits in the Orbits Disk are quantized as known in quantum physics.

The "irrotational" type vortex surrounding medium has rotation speed inversely proportional to the distance to the vortex axes that cause discrete decreasing speed of objects rotating in the standing waves nodes' rings of the Orbits Disk and this creates the spiral arms shape of the galaxies.

Because the electrons are vortexes themselves, the electron vortex radius is larger than its nucleus radius; this keeps a minimum distance apart between two adjacent electron nucleuses along an atom orbit circumference. Thus, the number of electrons which could exist in an orbit is proportional to the orbit circumference.

## IV. SOLVING AMBIGUOUS PHENOMENA

### A. Duality of Particles

If the universe is not empty as assumed in this theory, a moving particle at a certain level will cause waves in the medium consisted of lower levels particles (level medium), such as a boat moving in a lake causing waves in the water.

The rotation of the vortex is not steady, even though if the vortex does not move, it could have fluctuations exactly as a water whirlpool. This makes the particle at the vortex center wobbling and producing waves in the surrounding medium. The earth is wobbling around its axis. Thus, it is possible to

say that there is an effect of the particle itself, as well as the effect of the waves it produces in the surrounding medium which consists of lower levels particles. This explains the appearance properties of the particle as a wave such as photons of light. When the properties of light are tested, the effect of the photon as a particle is detected in addition to the effect of the wave which is generated by its motion and wobbling.

In double slit experiment, a particle generated waves passed through both slits and at the same time the particle passes through one slit. The particle faces its wave interference and follows the wave constructive path, because the constructive wave path is synchronized with its currently generated waves and the destructive wave path will resist the particle advance. The observation of the photons at the slits must be a destructive test which destroys the particle accompany waves or distort its interference.

In the photoelectric effect [21], colliding of a photon particle in a light with an electron within an atom results in pushing the electron away from the atom vortex, forming the electron emission.

#### B. Cosmic Speed Limit

When a particle speed increases to reach the space medium wave propagation speed (speed of light), high pressure barrier starts to form. The barrier resists the particle advance. This makes the particles appear to have speed limit to the light speed. But there is no prevention for a particle to exceed the wave propagation speed of the medium if the particle has enough power. Breaking the space medium wave barrier is like a supersonic plane breaks the sound barrier when exceeds the sound speed. Scientists who use particles accelerator should be aware about the consequences if a particle breaks the space medium barrier (speed of light).

#### C. Gravitational Waves

The vortex's nucleus at its center is wobbling and vibrating and produces longitudinal and traverse waves in the surrounding medium. In the galaxy vortex level of the universe hierarchically structure, the galaxy nucleus or "black hole" at the galaxy vortex center is wobbling. If two vortices collide together, the wobbling of their nuclei or "black holes" will be increased and generate stronger longitudinal and traverse waves which could be detected on earth as "gravitational waves."

#### D. Galaxies Movement

At the level of galaxies in the universe hierarchical structure, the galaxies rotate in an Orbit Disk of the higher-level vortex. The galaxies rotate at different distances from the higher level vortex center in the same direction. As a concentric track, assuming free vortex dynamics, the galaxies near the center of the vortex are faster than the farther. Therefore, for galaxies closer to the vortex center than our galaxy, if a galaxy is behind us, we observe that this galaxy moves closer to our galaxy and if a galaxy is in front of us we observe that this galaxy moves away from us whereas, for the galaxies further from the vortex center than us, we observe

that we move closer to a galaxy in front of us and move away from a galaxy behind us. Understanding movements of the galaxies around us by this way could lead to determine the center of the Orbit Disk of the galaxies higher-level vortex.

#### E. The Dark Matter

Dark matter was proposed to interpret the difference between the detected and predicted velocities of stars of some galaxies as shown in Fig. 6 and keep the stars holding and orbiting around the galaxy. This theory does not deny dark matter as the rotating lower level particles in a galaxy vortex is of course a matter. But, holding of stars orbiting around the galaxy vortex axis does not require a certain amount of masses, as they all are sailing within the rotating medium of the galaxy vortex. This theory interprets the difference between the detected and predicted velocities of galaxy stars as follows: In the vortex dynamics, there are two types of vortices; free (irrotational) vortex where there is no force acting on the fluid to create the vortex, and the other type is forced (rotational) vortex where external force creates the vortex. The distribution of the velocity within the free vortex is inversely proportional to the distance from the vortex axis as in Fig. 2 (a). The velocity distribution of the planets around our sun, Fig. 6 (a), confirms the free vortex velocity distribution significantly, taking into consideration that there are, may be, relative velocity between planets and the rotating medium of the sun vortex. This supports the correctness of this theory. The velocity distribution within the forced vortex is proportional to distance from the vortex axis, Fig. 2 (b). The detected velocity distribution in spiral galaxy in Fig. 6 (b) could be interpreted as the galaxy exposed to external attraction force from a neighbor galaxy, where the neighbor galaxy vortex rotates in opposite direction, which adds additional velocity to the stars according to the forced (rotational) vortex dynamics. The nucleus of a vortex is coherent and follows the forced vortex velocity distribution. This appears in the left side of the velocity distribution curve of a galaxy stars in Fig. 6 (b).

The stars' velocities around the galaxy nucleus do not follow Kepler law. Kepler law proposes that the planets' orbits around the sun are eclipses, which is not common in the vortex dynamics.

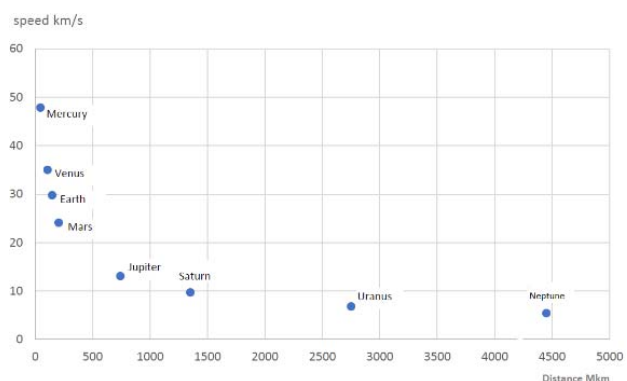


Fig. 6 (a) Speed end distances of planets



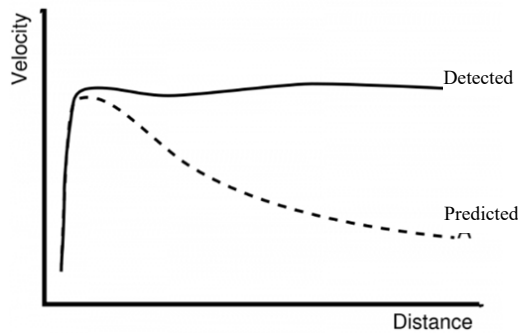


Fig. 6 (b) Detected and Predicted velocities of spiral galaxy stars

The vortex of a star particle can deflect photon particles passing through it. The vortex geometry can refract the photons' accompany waves and gives the effect of "gravitational lensing".

#### F. Entanglement

Entanglement is a remote junction between two particles. Vortexes of a twin particles could be attracted along their axes of rotation, as explained for the attraction between two permanent magnets joined along their net vortex axis. Whatever the length of the rotation axis, the twin vortexes are still linked, affecting each other, and looking entangled. If the linked axis is bent, the spin directions of the entangled particles are opposite. Twin whirlpools could be seen in a water pool.

#### G. Particle Decay

As the vortex could exist to construct a particle, it also could disappear. The surrounding rotated medium containing lower level particles and the possible orbiting objects dissipates. The vortex nucleus, as a star or a galaxy nucleus, starts to reduce its rotation due to the friction with the surrounding medium. The gravity effect of the vortex nucleus will be reduced as the vortex pressure gradient does not exist, and only the surrounding medium pressure keeps its spherical shape and the vortex nucleus could expand. This confirms the current belief that the elliptical galaxies are old galaxies, "at final stage before die".

### V. CONCLUSIONS

The different conception to the universe provided in this paper describes a hierarchical structure to the universe and a standard structure model to the particle in each level of that hierarchy. The particle in a level is constructed from aggregation of the lower-levels' particles by a vortex. Thus, the universe is nested vortexes. The vortex eye is a Black Hole. The nucleus of vortexes at a certain level could be merged as merging protons' vortexes in a star forming atoms. This conception confirms the Michelson-Morley experiment result without postulating consistency of the speed of light.

The forces within a particle vortex, as spinning and gravity forces in addition to the attraction or repulsion forces between two particles have been interpreted according to the vortex

fluid dynamics, as follows: The spinning of a particle is due to the rotation of its vortex. A particle orbits around another if it is trapped within the vortex of the other particle. The surrounding medium of a particle which consists of lower-level particles gives the spherical shape and the gravity effect to that particle. Additional gravity effect is produced from the particle vortex "Pressure Gradient Force." The resultant of gravity and centrifugal forces has a direction towards an "Orbit Disk" plane that is perpendicular to the vortex rotation axis, in which the orbiting particles are finally settled. The attraction or repulsion between adjacent particles is according to the direction of rotation of their vortexes where high pressure or low pressure region is formed in the medium between them. A particle's charge and mass are proportional to its vortex strength. Atoms have weak net vortex, due to aggregation of protons' and electrons' vortexes, and form a permanent magnet when they are aligned in one direction.

The electric and magnetic fields of a particle have been interpreted, as follows: The electric field of a particle is the domain of its vortex. The magnetic flux lines around a particle are nodes' locus of standing waves produced by the rotation motion of lower level particles in the Orbits' Disk of the particle vortex. Particle quantum orbits are the node locus of standing waves produced from the wobbling of particle nucleus which are  $\lambda/2$  apart. This conception showed the similarity between Newton's law of gravity and the Coulomb's law. Newton's law calculates the attraction force between two objects containing atoms, whereas the Coulomb's law calculates the attraction force between two objects containing ions or between two individual particles. A similar law has been derived which is function of the vortex strength of a particle or the net vortex of atom or ion. Relation between an atom mass and its net vortex strength has been derived. Experiment has been carried out to detect the orbiting effect of the net vortex of a permanent magnet. The experiment also shows that the Cavendish experiment measured the attraction force between objects containing atoms not a gravity force.

Many augmented phenomena have been interpreted as follows: Particle motion causes waves in the space medium that interprets the duality of particle. The particles' speed appears to have light speed limit because the space medium wave barrier resists the particle advance. Gravitational waves are produced due to vortex nucleus wobbling. The distance between the galaxies to its vortex center determines if they appear moving closer or moving away from our galaxy. The planets' speed in our solar system follows the free vortex dynamics. Dark matter is not necessary to interpret the "gravitational effects" in a galaxy; therefore, the variation of stars' speeds is because the galaxy vortex may be exposed to attraction force from other galaxy. Entanglement phenomenon could occur due to the conjunction of two vortexes axes. A particle is decayed if its vortex disappears. This conception leads to valued expectations as: The planets are old stars where advanced nuclear fusions have been carried out. Stars and planets in our galaxy came from different galaxies which were merged in the past. Planets could be existed individually

between stars in our galaxy. There is a thin Orbits Disk of protons around the sun and the planets. A quasar could be galaxies' next level particle, which is neighboring our galaxy's next level particle. The whole universe, which is at the top level of the universe structure hierarchy, is a single vortex which has a certain size whatever how big it is. The fixed size of the universe results in causing the space medium inside this size has pressure. A particle speed may break the medium wall consisting of the lower levels' particles in a particle accelerator.

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