Demise of Gravity mystery

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The most incomprehensible thing about the world is that it is comprehensible.
Albert Einstein

Abstract
Gravity is everywhere in our life but still the oldest unsolved phenomena scientists faced so far. This article gives an extremely simple explanation about it with an example from our daily life. The solution also defines what the tiniest element of entity in the universe should be. The work investigates, if this tiniest element contributes to the solutions of many of the other mysteries in Nature both in micro and macrocosms or creates additional new problems. The article almost uses no mathematics and the mathematics of the theory and many of the fundamental applications are subjects of other articles.

1. Introduction

Do you like coffee?
By the observation of the surface of a cup of coffee, it is extremely easy to understand why an apple on a tree falls down to the ground.

Newton explained that an apple falls down due to the gravitational attraction that Earth exerts on the apple, which is the same natural phenomenon with "why the moon hangs in the sky" and “why earth wanders around the sun". It was not easy to comprehend with our mental perception that the *falling down of an apple* and the *Moon moving in the sky* are the same natural event. Newton elucidated that "the Moon-Earth and Earth-the Sun attracts each other; as the Moon is much smaller than Earth and Earth is far smaller than the Sun, they revolve around the elders. This rotation motion creates a centrifugal force. The gravitation attraction and centrifugal forces balance each other, and the revolving motion continues forever".

In fact, Newton could not eliminate the curiosity of mankind; conversely, he triggered it for more advanced questions. Actually, Newton, with his genius, for the first time taught that a **falling down action** of an object is a “**problem”** behind which a reason should have. Whereas, before him, the people assumed that it is an impulsively accepted ordinary and natural action. Probably those observed facts were the *immutable rules of Divine power*. After Newton, the curious people started asking new questions: What is then the gravitational attraction and why and how it exists, how the Sun attracts Earth from 150 million kilometers of distance, etc. If the *falling down action* has a *reason*, these questions are also significant. When looking for answers to these questions, mankind developed science and technology and started increasingly dominating the nature. But, despite tremendous developments in science the first question is still unanswered. **What is gravity?** The answer of this question is becoming increasingly vital, because, despite the gravitational attraction, it is noticed that the universe expands with an increased accelerated rate.
Obviously, we are missing something.

Let us turn to the beginning. Do you like coffee?

I have a cup of coffee with cream twice a day. I add coffee and cream to the cup then fill it with hot water afterwards. I stir it with a spoon to get a homogeneous mix.

Now, after mixing the coffee, if you look at the surface of the blend, you will notice an important detail. A small amount of foam accumulates in the middle of the coffee surface. Before mixing, the dissolved part of the cream was randomly dispersed on the surface but the stirring action caused this to change (**Fig**. 1). Why?

Fig. 1 The coffee surface before and after stirring action.

With stirring action, we transferred some energy to the coffee and the mixture earned kinetic energy and started rotating inside the cup. Normally, we should expect the foam to collect at the edges due to the centrifugal force but not at the center. It can be said that, "the foam is lighter than the mixture and there is an adhesion force between the mixture and the foam, the centrifugal force could not overcome this adhesion force". The explanation seems to be reasonable. But the similar conditions are valid while the foam accumulates in the middle. Therefore, there must be a stronger force which is more effective than even the sum of the centrifugal and adhesive forces. The kinetic energy in the mixture is proportional to the squared velocity of the liquid. Therefore we have to look at the velocity distribution in the mixture. It is not hard to estimate that the velocity in the middle of the coffee is greater than the velocity at edges. Right after the stirring, if we look at the mixture surface carefully, we will easily notice it. The foam on the surface normally rotates with the coffee mix. The while, the mixture particles towards the middle under the foam have faster velocities. Obviously faster velocity particles on the surface cause the foam to be dragged towards the middle or in other words the more energetic particles in the mix attract the foam. Why?

In fluid dynamics this feature is very well known. The engineers use it very often in their application which is called as **Bernoulli principle** [1]. This principle simply says that "*the pressure distribution inside the incompressible fluid is inversely proportional to the velocity distribution*". High speed causes unit area of coffee surface has fewer coffee fragments, which make the coffee surface looser consequently lower pressurized. For this reason, it is usual to expect coffee cream to be dragged from high surface pressure points to low pressure central area.

2. Thought Experiment

One can see no relation of this observation with the gravitational attraction. To understand the relation, we need a *thought experiment* which is as simple as the coffee observation. It will not be enforcing the logic such as Schrodinger's cat. We will also not kill a cute cat or any other creature.

Let us have a circular and sufficiently large pool. We will be the observer at the side. Let a robotic propeller be at the center of the pool buried in water just below the surface. Its rotation axis is in vertical position. The propeller will be our spoon to stir the water. Let it start rotating. The water between its wings also rotates. This movement in the water pervades towards the edges. The water velocity amongst the propeller wings is equivalent to propeller velocity but gets slower at far distances. We can recognize the propeller's rotation by the movement of the water at edges after a while, because the movement of the water will arrive to the edges after *a certain time of period.* This time duration will depend on the radius of the pool and the power of the propeller (the starting speed of water amongst the wings). If the power of the propeller is small, then we will recognize the existence of the propeller later. If the power is very weak, we may not notice it because the movement of the water at edges may be lower than our detection threshold.

Let us have a higher density liquid pool, then the same propeller will rotate slower, and we will notice the propeller existence even later. Perhaps the velocity field will be terminated before arriving at the edges. If the pool is a lighter density fluid pool than water, then the velocity field will arrive at the edge much sooner.

The propeller pumps energy to the water. While the energy pervades in the water some of the energy gets lost due to the friction. If no friction is present and the size of the pool is infinite, we expect the energy to be pervaded infinitely. If the propeller power is constant i.e., if the **energy transfer** to pool water is *constant* and *continuous*, then every outer water ring around the propeller carries equivalent energy from the propeller to infinity. Since *every outer ring in the pool contains more water*, the velocity of every outer ring has to gradually *decrease even it is frictionless*. For higher density liquids the velocity decreases sharper. Due to friction, the velocity decrease will be even much sharper.

In the pool, if the propeller works continuously with a fixed power at a fixed position, we will observe the *same event in the same point continuously*. The motion of all water in the pool *has been formed* by the propeller and this *formation will survive unless the propeller stops*. If it stops, the whole water will go to its previous calm state starting from propeller vicinities. This phase will also take time like the forming process before. This shows that for a *formed motion of the water to survive*, a *continuous energy pervading process is a must* which means that **the energy flow**, from the propeller to the edges, **is a continuous process**.

If there are *floating objects* such as *pieces of woods* on the pool surface formed by a propeller, they will be influenced by water movement. On one end, they will revolve with the water around the propeller and on the other; they will be dragged towards the propeller just like the cream on the coffee surface. Although there are certain distances between the *objects* and the *energy source*

(propeller), the **varying velocity field** *formed by the propeller* creates a force to move the objects (remote effect). The movement speed of the objects depends on:

- The distant to the propeller,
- The power of the propeller,
- The characteristics of the fluid in the pool.

The last item above is important because, the liquid determines the pervading velocity of the energy to distant. The density of the liquid is decisive both the in *circular motion* and *energy diffusion velocity*. The lighter liquid rotates faster and diffuses the energy faster. If the pool is not so big, a bigger portion of the energy will be lost at the edges due to the friction. If the liquid is heavier, even the starting speed is the same as in light liquid; the energy may not even reach to the edges, because the mass difference and the resulting velocity difference between the adjacent liquid rings around the propellers will be great. Remember that the radial force applied to the object to drag it towards the propeller is not the function of the liquid's rotation velocity but its variation in radial direction. This variation in velocity is lower for lighter liquids than heavier ones. Therefore, if the propeller speed is the same, the floating objects drift faster in heavier liquid to the propeller than the lighter liquid.

Let us, now, take the experiment one step ahead. We can imagine an infinitely large and deep pool. Let the propeller be at the middle of the water. We need now, to consider the water movement in three axes. It is easy. We will see no motion along the rotation axis, because *on this axis line* the water amongst the wings will move on a circle having zero radiuses. But, on the plane which is perpendicular to the rotation axis and crosses the wings at the middle (equator), the water velocity will be the maximum. This means that the velocity distribution on a *spherical surface* with a fixed radius from the propeller in the water is a **horn-torus** type [2]. **Fig**. 2 depicts this velocity distribution. Here the *water velocity on a point* A on the *rotation axis* of which the distance from the propeller is d, is zero, while on B, C and D are proportional with $O\acute{B}$ and $O\acute{C}$ and OD respectively. If there are *objects* in the pool having *equal density* with the water inside the pool, they will be influenced only with this *velocity field*. The ones on the rotation axis remain stationary but the others will both rotate with the water around the rotation axis and be dragged towards both *the propeller* and *the equator plane* to faster velocity points.

Let us go even further. Now, we have *two equivalent propellers* each has *half the power* of the first. Let them stand close each other. If we observe them from a distance which is much longer than the distance between the two propellers, we perceive them as if they are in the same point. Let us assume that, for the time being, they have no interaction between them and keep their positions fixed. If their axes are *in parallel*, the *total velocity field* in the water will exactly be the *same as the first big propeller's field*. If the axes are *perpendicular* to each other, then the total velocity in each point will be the *sum of two equivalent perpendicular velocities*. In any case, the resultant velocities will decrease as the distance from the propellers increases. The rotation axis of the resultant velocity field will be the bisector of the two axes.

Now, let us have many equivalent smaller propellers such as the total power of them equal to the first one. If all the *axes are in parallel, then we will still have a single and same size horn-torus type velocity field.* But if the axes are scattered randomly, the resultant velocity at each point will

be the sum of many small velocity vectors. Obviously, this resultant velocity at each point will decreases as the distance to the group of propellers increases. Now, we can consider infinite number of infinitely small propellers with homogeneously scattered axes. Still we are assuming that they do not influence each other, and our observation point is sufficiently far away.

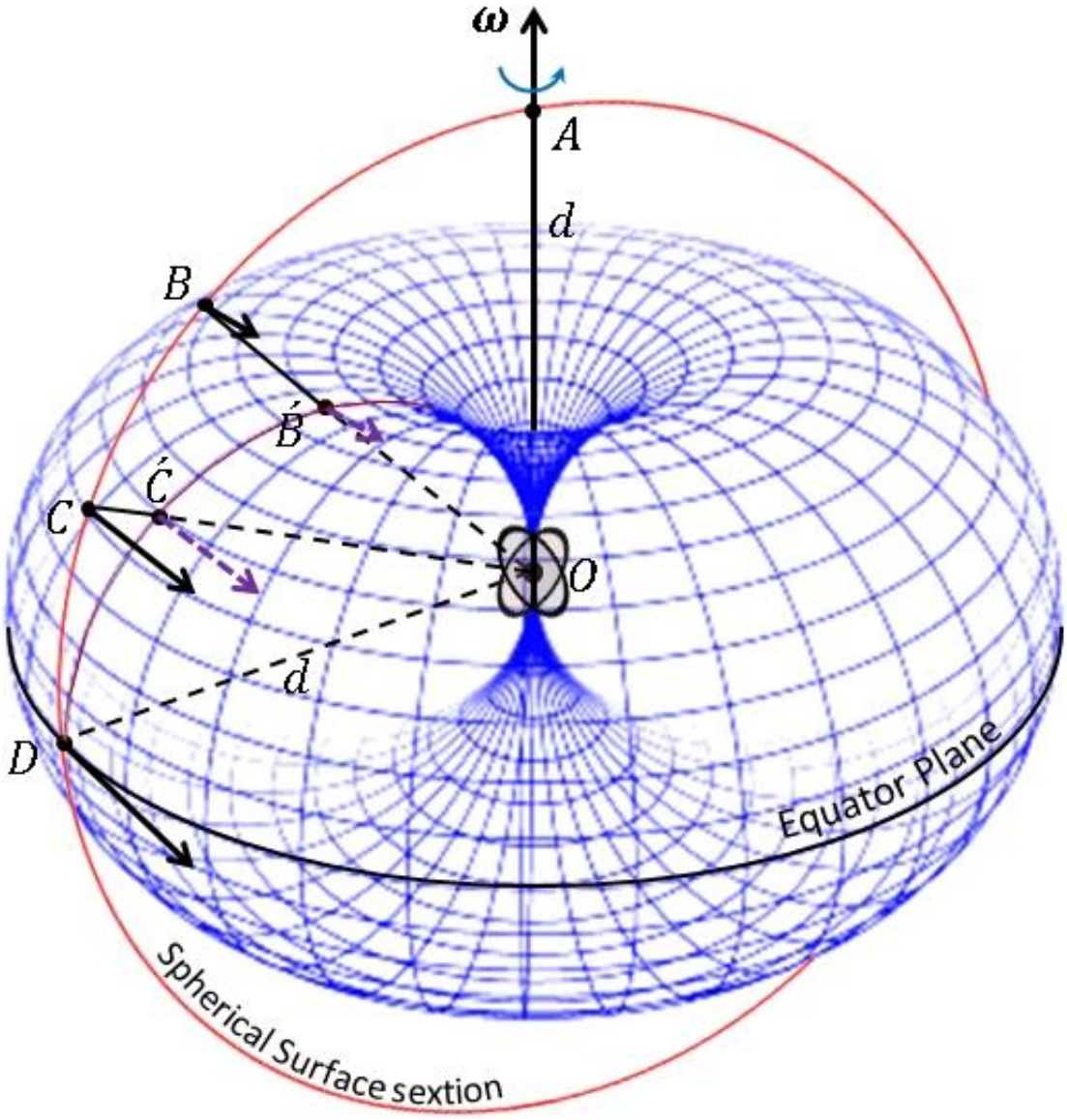

Fig. 2 Velocity field of a robot propeller over a spherical plane with radius d. The horn-torus graphic was used with Mr. Wolfgang Daeumler's permission (www.horntorus.com).

The following observations are obvious:

(1) Homogeneously scattered axes impose not axial but spherically symmetric field structures, no a resultant rotation axis is present,
(2) The diffusion velocity of the total energy in the field will be the sum of each tiny propeller's spread out velocity,

(3) In every point in the effective field the total axially rotating velocity $\boldsymbol{v_T} = \sum \boldsymbol{v_i} = 0$, where $\boldsymbol{v_i}$ is rotating field velocity of i^{th} propeller in the specified point.
(4) **The pressure intensity caused by resultant water velocity field in close distances is lower than the pressure intensity in longer distances**.

The last item above seems to be **intuitive**, but it is **concrete**.
Let us assume *two different points* in the effective field, one is *close to the propellers stack* and the other is *farther*. The resultant rotating field velocity in each point:

$$\boldsymbol{v_T} = \sum \boldsymbol{v_{ci}} = \sum \boldsymbol{v_{di}} = 0$$

Here $\boldsymbol{v_{ci}}$ and $\boldsymbol{v_{fi}}$ field velocities of i^{th} propeller in the near and far points respectively. We know that $\boldsymbol{v_{ci}} > \boldsymbol{v_{di}}$. On the other hand, we also know that every velocity corresponds to a scalar pressure value. If respective pressures are p_{ci} and p_{di}, according to Bernoulli principle $p_{ci} < p_{di}$. Since all corresponding pressure values are positive scalar quantities, we conclude that:

$$\sum p_{ci} < \sum p_{di} \neq 0$$

This is due to the **vector** and **scalar** nature of the **velocity** and **pressure** quantities respectively [3]. **The sum of two equivalents opposite vectors is zero but the sum of their pressure equivalent is twice the pressure of one.** Therefore, we will have lower pressurized medium at closer distances and the pressure will increase as we go away from the propellers stack. Apparently, *the object* in this field will have *no revolving motion around the propeller* stack but only *radial drift towards the propellers* due to the decreasing pressure radially.

This thought experiment shows what is happening on Earth. We can assume that; *the space behaves as an incompressible liquid medium with very low density* and *Earth consist of infinite number of infinitely small propellers*. But this is not compatible with the atomic structure model that we know. Remember, in our experiment, we assumed that the tiniest propellers do not influence each other. But in real situation each tiniest propeller has its own velocity field and consequently force field. Thus, they interact with each other to create basic particles such as electrons, protons, neutrons etc. With this assumption; the source of the gravitation attraction can easily be explainable. Here, while we were dealing with the interaction in macro-cosmic scale, *we had to define what the tiniest elements of the entity should be*: **infinitely small propellers (energy point particles)**. Now, *we have to take a close look at this model, if it solves many of our current problems or creates even more others?* But before going on further details of that issue **we must comprehend the meaning of** *the velocity field* **that we used so far from the point of** *traditional gravity theories*.

3. Velocity field versus Gravitational potential

In conventional physics, for the interaction between the objects in macro scale, we use Newton's universal law of gravitation [4] and Einstein's general relativity field equations [5]. They are both based on the *intangible* scalar **gravitational potential field**. Newton's force field is the *gradient* (**first derivative**) of this potential field while Einstein uses its *Laplacian* (**second derivative**), because he needs *how the force changes in range* (**space curvature**) rather than force itself. On the other hand, the dimension of the *gravitational potential* is a **squared velocity**. The coffee experiment showed us that using base field as *velocity field* is very significant and explanatory. **It is obvious that, theoretically, there is no difference between using** *intangible gravitational*

potential **and its corresponding** tangible *square root* **(velocity field)**. Last of all, the first theory uses the "gravitational potential" in *gradient form* the second theory in *Laplacian form* and our coffee experiment uses it in *velocity form*. **In other words, in terms of force relations between masses, the velocity field is equally valid. In fact, it can be said that, masses form the velocity field and as a consequence the gravitational field emerges. Working with velocity fields has three distinct advantages** over the others, which are:

- *The velocity field is indispensable for a relativistic force relation* between the objects, because, there is no other way to sum the total field effects of various sources as well as the *perceived field effects* (**relativistic**) by the *moving object* in the effective field.
- If you deal with the **square of a velocity** rather than **velocity** itself, you *settle for*, in advance, **the loss of information**, because the squaring process ignores the signs of the quantities (uses **speed** instead of **velocity**). **In this case, you can never recognize the *repulsive* effect of the interaction**.
- The velocity field **proves** that the **space behaves** like a very low density incompressible **liquid medium** where the **Bernoulli principle** can be applied. This gives us new perfect calculation opportunities both **geometrically** and **mathematically**.

4. Point energy particles and building blocks

Now, we can go on to examine if this *tiniest energy particle* is a **rescuer** for ongoing problems in all scale in physics or an additional **troublemaker**.

The proposed infinitely tiny propellers are **point energy particles** and have no volumes. They just spin and rotate the space texture. By this way, they transfer their energy to the space. Because they are in a point structure, they expose their entity in the space only with the velocity field they create. This velocity field (energy) pervades in the effective region with the speed specified by the space fabric. The field velocity will decrease as the distance from the source increases. *The thought experiment shows that the model neatly solves the gravitation phenomena in macro scale*. Let us examine what does the model do in microcosms?

In the thought experiment, we ignored the interaction of the tiny propellers in stack with each other. Actually, the interaction between the point energy particles is obligatory, because every micro propeller has its own tiny velocity field causing a tiny force field.

Principally, the interaction between the energy particles does not change the property of the distant effective field, because it is the “space fabric” to carry the velocity field (energy) to far points. The energy particles just know to spin to form a velocity field around but nothing else. The interaction causes only a new resultant rotation axis of total velocity field of the participant point energy particles that is all.

The energy particles can grow up by getting together in two different ways:

(1) Growing up in a single horn-torus structures,
(2) Clustering in balanced manner in which each participant keeps its separate individual horn-torus structure and distinct location.

The first way expresses that the horn-torus structure can be in *any size*. **Here, the size does not have a volumetric meaning but energy amount.** The *bigger in size* means *larger velocity field*. Whatever the size is, it is still a point quantity. Double size or hundred times greater means, twice or hundred times strong field velocity in the same distance. *There is no upper limit in size*. The traditional *Planck constant* may be a measure to define the *tiniest one*. The photon or other energy particles which have no visible mass are samples in microcosms. But it is not all just that. A **black hole** is also an example for a huge horn-torus structure. In this context, *primordial* or *low-mass black holes* of Hawking are not meaningless [6].

The velocity fields of the tiniest point energy particles are so small that they cannot interact with the others. They have to grow up a bit in horn-torus structure to interact in the second way. In this case, these energy particles keep both their individual identity and discrete locations. **By this way, they create their private region surrounded by a force field which is not a point nature anymore and the combined unit now, earns a volume**. With this way, they establish *the base particles of an atom* such as **neutron**, **proton**, **electron** etc.

This type of interaction is also possible in two different ways:

- The interaction takes place such that, the sum of *velocity fields of all energy particles in each point is zero*. In this case, *no net rotation velocity field is present* just as in our thought experiment. Therefore, those base particles are not willing for further interaction except gravitational attraction as described. **In other words, the energy particles consisting of the new** *genesis* **use their full energies** for their new **"entity form"**. The **neuron** is an example for those kinds of particles. For this reason, it is more accurate to say that the mass is a form of energy itself, rather than it has an energy equivalent.
- The interaction takes place such that, the velocity fields in each effective point of all energy particles consisting of the new genesis *do not fully compensate each other and there are still a net rotating velocity field*. Those formations have both **visible mass-volumes** and **electric charges** such as proton and electron. Due to *partially compensated rotating velocity fields* those particles are *very active for further interaction*. It is understood that **the electricity**, which keeps its secret so far and is accepted as an *unknown phenomenon with our mental perception*, is an **energy particles organization** of which *the velocity fields are not fully compensated*. In other words, **the electricity is rotating velocity field effect of firmly interacted energy particles.** The total energy of a charged particle is partially mass form and partially electricity.

It can be estimated that the building up process is very flexible such that, *infinite number of different sized formations* or *voluminous base particles are possible*. Moreover, *two particles* having great difference *in mass* size may have *equivalent charges such as proton and electron* or *three different sized horn-torus structures* (**quarks**) can create a *charged proton* or *uncharged neutron* depending on interaction combinations.

The model also imposes that, **the main and only source of the force in Nature is the "varying field velocity" in range**. This is valid for the gravitational attraction and electrical interactions as well as the nucleus forces in atoms. **No mediator particles such as gravitons, gluons etc. are necessary.** Those issues all are examined in detail, in a separate and exhaustive work entitled

"Fundamentals of the **field relative model of the universe** in microcosms" which will be ready soon.

5. Black Holes

As previously stated, point energy particles have velocity fields that weaken with distance. For this reason, they tend to come together. In this context, the largest formation in the Universe is black holes. Inside a **black hole**, in a *specified region*, the *velocity field is so violent that no other types of interactions are possible*. The *base particles* and *matter formations* are *only possible after the **distances** where the velocity field strength gets **sufficiently small***. **This distance is the event horizon**. This means that **a black hole is not a singularity region** where the *density of the mass (space curvature)* goes to infinity but a *violent velocity field* where the mass type of formation of the base particles is not possible. With the increasing mass in size, during the gravitational evaluation process, the mass density increases. This process also leads to an increase in the velocity field strength. After a *threshold field velocity*, the *matter form of energy particles are disrupted and untied, consequently transformed to primordial velocity field*. **This is also an information loss process** [7], i.e., irreversible deterioration of matter structure.

The horn-torus structured of black holes causes flat structured spiral galaxies due to their energy intensified equator planes. As they are axially symmetric, their masses will be perceived larger on the galaxy plane and will decrease as you move away from the plane. Therefore, the total mass (energy) in the universe might be less than what we estimate [8]. The recent observation made by Margot Brouwer and her colleagues in Leiden Observatory [9] clearly supports the non-spherical horn-torus nature of black holes.

As it can be seen, the new model of universe, have a great potential to solve lots of the mysterious phenomenon both in micro and macrocosms. In fact, every observation in nature is a sign that reveals a secret of nature, "provided that" we know how to look at it and keep our curiosity inherited from Newton alive.

The coffee observation shows that the operation in nature is not as complicated as we thought; conversely it is extremely ordinary and simple. Besides this **simplicity**, the nature comprises incredible **diversity** and **richness**. This contradiction is the magic of the universe. The elegance of the universe probably comes from this paradox. Extremely simple but extremely gorgeous.

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