How a gravitational field accelerates particles and atoms

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Abstract

Starting with the Einstein–Duffield definition of a gravitational field, we bring the description of a gravitational field to such a level that enables the creation of an artificial gravitational field. Through this process, we derive answers to unanswered physics questions: From what was the universe created? Why are elementary particles so small? Dark energy/matter is shown to be a simple special case of the extended concept of gravity. In addition, the paradox of the wave–particle duality, containing two conflicting models, is explained.

Content

1. Introduction

In response to the question “what is gravity?”, the authors of the StarChild site stated, “if we are to be honest, we do not know what gravity "is" in any fundamental way - we only know how it behaves” [1].

However, in the little-known works of Einstein, John Duffield [2] found a direct indication that the gravitational field is an inhomogeneity of “the energy-density of space.”
There is a connection with Nikola Tesla's statement that when this primary substance (energy-density) is set in motion, it becomes gross matter [3].

Thus, a new concept of vacuum is revealed; herein, a vacuum contains invisible energy or the primary substance, which becomes a gravitational field when inhomogeneous. Moreover, according to Tesla [3], subatomic particles are vortices of the primary substance.

We must explain how stable energy vortices can exist without the participation of forces. Indeed, if forces were possible in the primary substance, they would slow down the movement of the planets, which would consequently fall into the sun. Forces are possible only when ordinary masses interact with each other [4].

If there are no forces, then there is no pressure, and it is impossible to create a centripetal force such that the energy-density wave can swirl.

If the primary substance cannot produce a force, then a gravitational force cannot exist either. (Einstein also believed that the force of gravity is fictitious).
Then how does a gravitational field accelerate vortex-particles?

Herein, we provide answers to these questions. Additionally, we aim to bring the description of a gravitational field to such a level of detail that such fields can be reproduced (and not imitated by rotation).

2. Terminology

The “energy-density of space" and “primary substance” are two terms for the same entity. Both terms are correct, although they point to different properties of this entity.

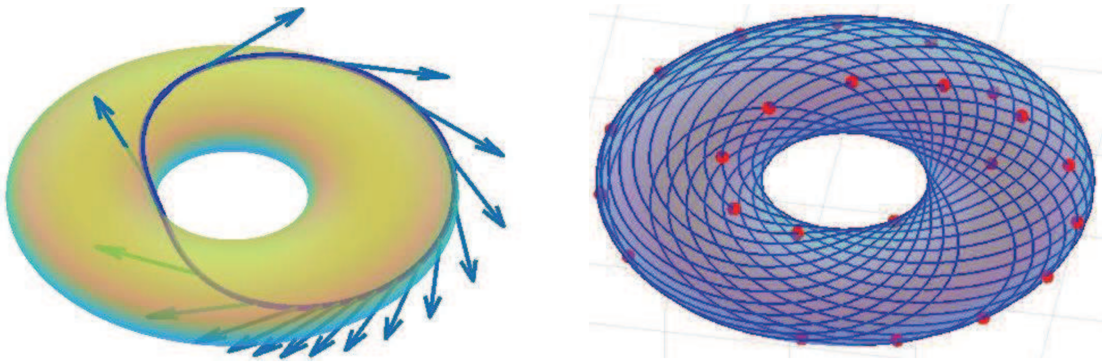
For our research, we will use a new name that emphasizes the similarity to and difference from ordinary mass and the possibility of their interconversion.
Because energy and mass are interchangeable terms, we will call this entity "unorganized mass," with the same meaning.

Unorganized mass is similar to ordinary mass in that they are of the same nature. Moreover, unorganized mass is the basis of our world. The Big Bang was a process of transformation from unorganized mass into

ordinary mass: into particles and then into atoms.
We will consider the reverse transformation as well.

3. Why subatomic particles are so small

Many physicists believe that the electron is a stable vortex with a toroidal shape. To this description, we add that the vortex represents a density wave of unorganized mass, which transforms into ordinary mass within the vortex (Fig. 1).



a) b)

Fig. 1. (a) The closed line presents the instantaneous position of a wave front circulating in a particle. For a few points on the wave front, the velocity vectors are shown by arrows. (b) The blue lines show several positions of the wave front at equally spaced time points. The red dots mark the trajectory of one selected point on the wave front corresponding to the same time points depicted by the blue lines.

Many can draw beautiful pictures, but the behavior of unorganized mass must match its properties.

What can cause a vortex wave to move along a curve with a small radius of curvature without the participation of centripetal force?

Similar to the speed of sound in gas, the higher the density of the medium, the slower the wave running in the medium. In our consideration, the medium is unorganized mass, which is present everywhere.

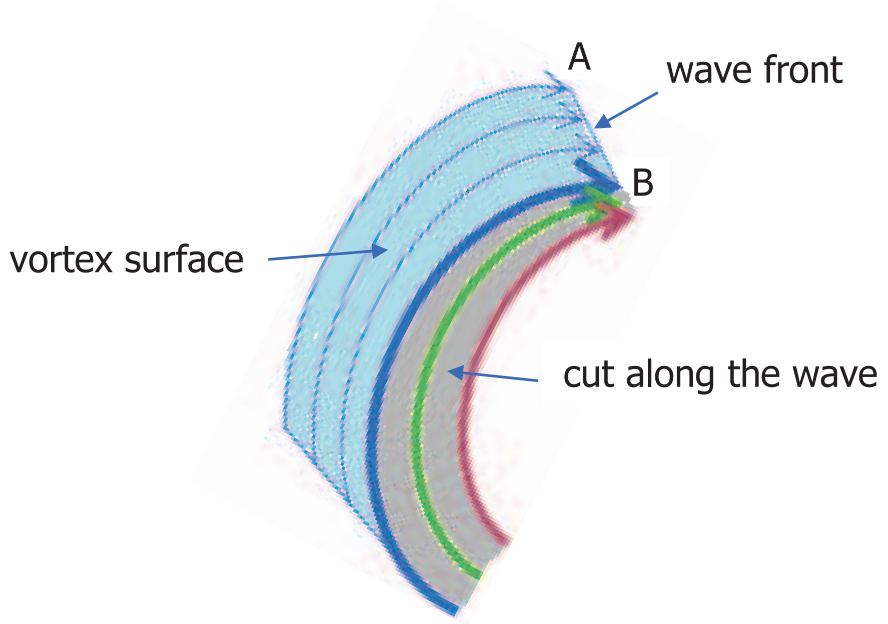


Fig. 2. Portion of a particle-vortex.

In Fig. 2, the surface portion of the wave (in blue) moves between the low-density vacuum and the extremely dense interior of the toroid (gray). The difference in velocity on the different sides of the blue wave is enormous, leading to a small radius of wave rotation, which determines the particle size.

This phenomenon results in an extremely hard particle surface that is collision-resistant.

This knowledge will be useful in Section 5 when we choose a method for creating an artificial gravitational field.

4. How a gravitational field accelerates particles and atoms

Thus far, we have established that a gravitational field consists of inhomogeneous unorganized mass with a spatially varying density. On the other hand, particles are vortices of circulating organized mass. However, we have not provided an explanation for the mechanism by which this inhomogeneity accelerates particles and atoms toward a higher density of unorganized mass.

What happens when the front of the circulating wave moves in a gravitational field? Figure 3 provides an illustrative explanation.

Although unorganized mass is invisible, for clarity, it is depicted in Fig. 3 by shades of gray - the higher the density of the unorganized mass, the darker the shade of gray and the slower the wave circulating in the vortex.

In Fig.3a, AB denotes a segment of the front of a circulating vortex wave at time point t. In contrast to Fig. 2, in this consideration, the upper point A of the wave front is located in a rarefied zone, while the lower point B is located in a denser zone.

As a result, a lateral deviation of the wave due to the difference in medium density in the gravitational field is added to the effect of the wave turning with a small radius of curvature (see Section 3).

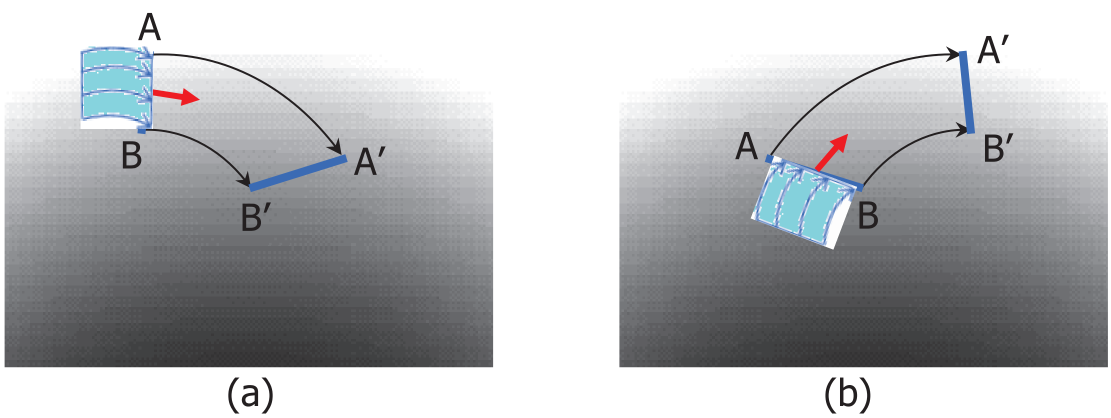


Fig. 3. AB denotes a segment of the wave front in a vortex-particle. If the segment moves down, it is turned by the gravitational field such that the vertical component of the AB velocity increases (a). If the segment moves upward, then the vertical velocity component decreases (b). In both cases, the acceleration of the wave front segment is directed downward.

A rigorous mathematical derivation of this gravitational acceleration is given in Section 11 of Ref. [4]. Here, we obtain this acceleration by simple reasoning so as not to get lost in the math.

As noted above, the denser the medium, the speed of the wave circulating in the vortex is lower. Therefore, by the next time point (t'), point A will have covered the path AA', which is longer than BB' due to the difference in speed.

Consequently, the wave front segment will rotate such that the velocity vector (which is almost horizontal at time point t) deviates towards the vertical axis. In other words, the downward vertical velocity of the wave increases.

The situation in Fig. 3b shows the segment AB moving upward in the gravitational field, i.e., toward a more rarefied zone. Its initial speed has a large positive vertical component; in contrast, at the final position A'B', this component is almost zero. Thus, the vertical velocity component of the wave front segment has decreased, indicating a deceleration in the rise of the vortex.

Hence, we find that in a gravitational field, a particle-vortex is accelerated towards the higher density of virtual mass. This phenomenon occurs without the participation of any force, simply because the side of the wave located in the denser medium moves more slowly.

This behavior is the same as that of the wave, which rolls up into a small hard particle, as described in Section 3; however, in this case, an additional wave rotation occurs in the lateral direction.

5. Methods for creating a gravitational field. The experiment of Hau et al.

Because unorganized and ordinary masses are of the same nature, they can transform into one another. Atoms of massive bodies lose part of their mass, which transforms into unorganized mass.

This mass increases the vacuum density around massive bodies; meanwhile, far from these bodies, the vacuum density remains lower. Vacuum inhomogeneity is an indicator of a gravitational field and explains how a gravitational field is created around a massive body.

Because no other mechanism for creating a gravitational field has been observed, it has been falsely assumed that only massive bodies can produce a gravitational field.

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Knowing what a gravitational field is, one can generate artificial gravity. To create artificial gravity, it is necessary to produce a locally increased density of unorganized mass.

If this increased density is generated above an object, the effect may be called antigravity.

The decay of atoms of any substance into unorganized mass is an effective method of extraction; however, the method of mechanically destroying atoms is unsuitable due to the high stability of subatomic particles.

In Ref. [4], a more practical method for destroying the atoms of a substance is suggested, namely, by bringing them below the lower limit of their stability.

We believe that such an approach has already been implemented in the experiment by Hau et al. [5]. In this experiment, a cloud of sodium atoms was cooled to almost absolute zero.

The researchers recorded a decreased speed of light at 17 m/s within such a cloud, which indicates a 20-million-fold increase in the medium density. This finding indirectly confirms the presence of a gravitational field.

We explain this large jump in medium density by the decay of sodium atoms to unorganized mass: the atoms begin to lose more mass than they receive from the medium, and some of these atoms decay.

We hope that the authors of this experiment [5] will confirm our conclusion by direct measurement, for example, by the deflection of a laser beam passing near the cloud.

<u>Remark</u>: To measure the speed of light, the cloud of sodium atoms was required to be transparent in [5], which complicated the experiment. No transparency is required to verify gravity. Moreover, for the decay process, one can choose a more technologically suitable replacement for sodium atoms.

6. Explanation of the dark energy/matter phenomenon

The essence of the dark matter/energy phenomenon is based on gravity without the presence of massive bodies [6].
In the previous section, we showed that a gravitational field is possible without the presence of large massive bodies. Thus, in our approach, the problem of dark energy/matter is eliminated.

For illustration, the phenomenon typically attributed to dark energy is shown in Fig. 4.

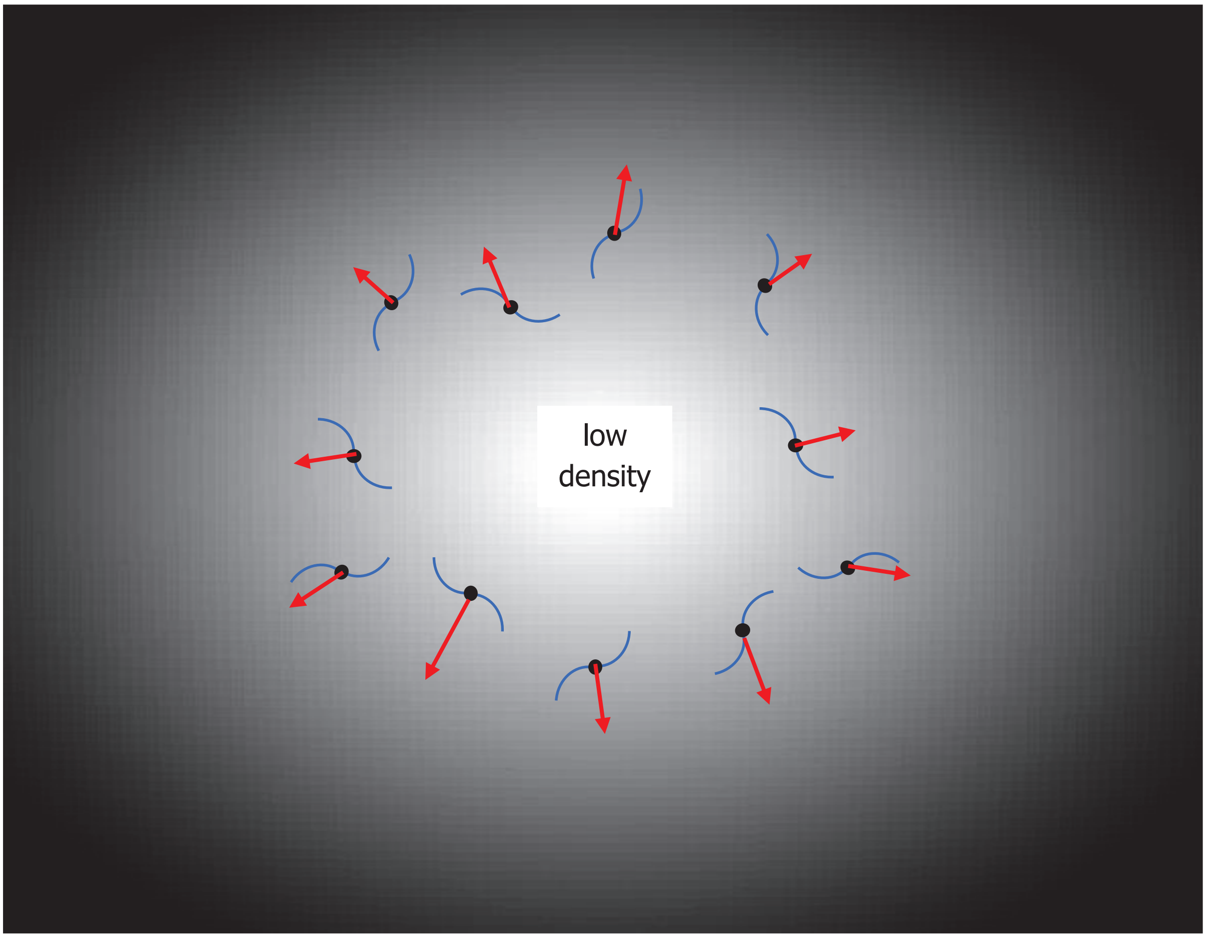

Fig. 4. The center corresponds to a zone with a low density of unorganized mass, while the density is high at the edges of the figure. There are eleven spiral galaxies in the intermediate zone. Because the density of unorganized mass is inhomogeneous in this zone, the galaxies move at an accelerated rate towards a higher density. Astrophysicists attribute this phenomenon to "dark energy."

It remains only to explain how a zone with a low vacuum density can form.

In the birth of the universe, unorganized mass transformed into particles, which reduced the vacuum density [7]. Enormous zones of reduced vacuum density led to the entity denoted by astrophysicists as "dark energy."

The difference between dark matter and dark energy lies only in the direction of gravitational acceleration. This direction is determined by the side with the higher vacuum density.

7. Conclusions

A gravitational field causes particle-vortices to accelerate towards a denser virtual mass. In general, such zones are located near massive bodies, but a gravitational field can exist without a massive body. The nature of a gravitational field is sufficiently clear to be artificially reproduced while displaying all technical perspectives.

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