Can special relativity, general relativity, and quantum physics unify into one theory?

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Abstract

Current physics has no answer as to how to unify special relativity, general relativity, and quantum physics into one theory. I claim that this unification is possible if the correct physical structure of the entire universe is considered. I describe in this paper the entire physical structure of the universe.

General

Special relativity, general relativity, and quantum physics are three of the most successful and well-tested theories in physics. Special relativity and general relativity have been experimentally verified to high precision and have revolutionized our understanding of space, time, and gravity. Quantum theory has been incredibly successful in predicting and explaining phenomena at the atomic and subatomic levels. Its principles are used in many fields of physics. However, there are some reasons to believe that these theories may not be complete. For example, there is no compatibility of quantum physics with general relativity.

In addition, some observations cannot be explained by either special relativity, general relativity, or quantum physics. For example, the existence of dark matter and dark energy, which according to current physics make up about 95% of the universe.

As a result of these limitations, physicists are continuing to search for a more complete theory. This theory is often called a "theory of everything" (TOE), and it would be able to unify special relativity, general relativity, and quantum mechanics. At present, physicists are exploring several approaches to achieve this unification, including String Theory, Loop Quantum Gravity, and Grand Unified Theories. However, a TOE remains elusive.

Description

I claim that the structure of the entire universe which is shown schematically in the following Fig. 1 and Fig. 2, unifies the three theories.

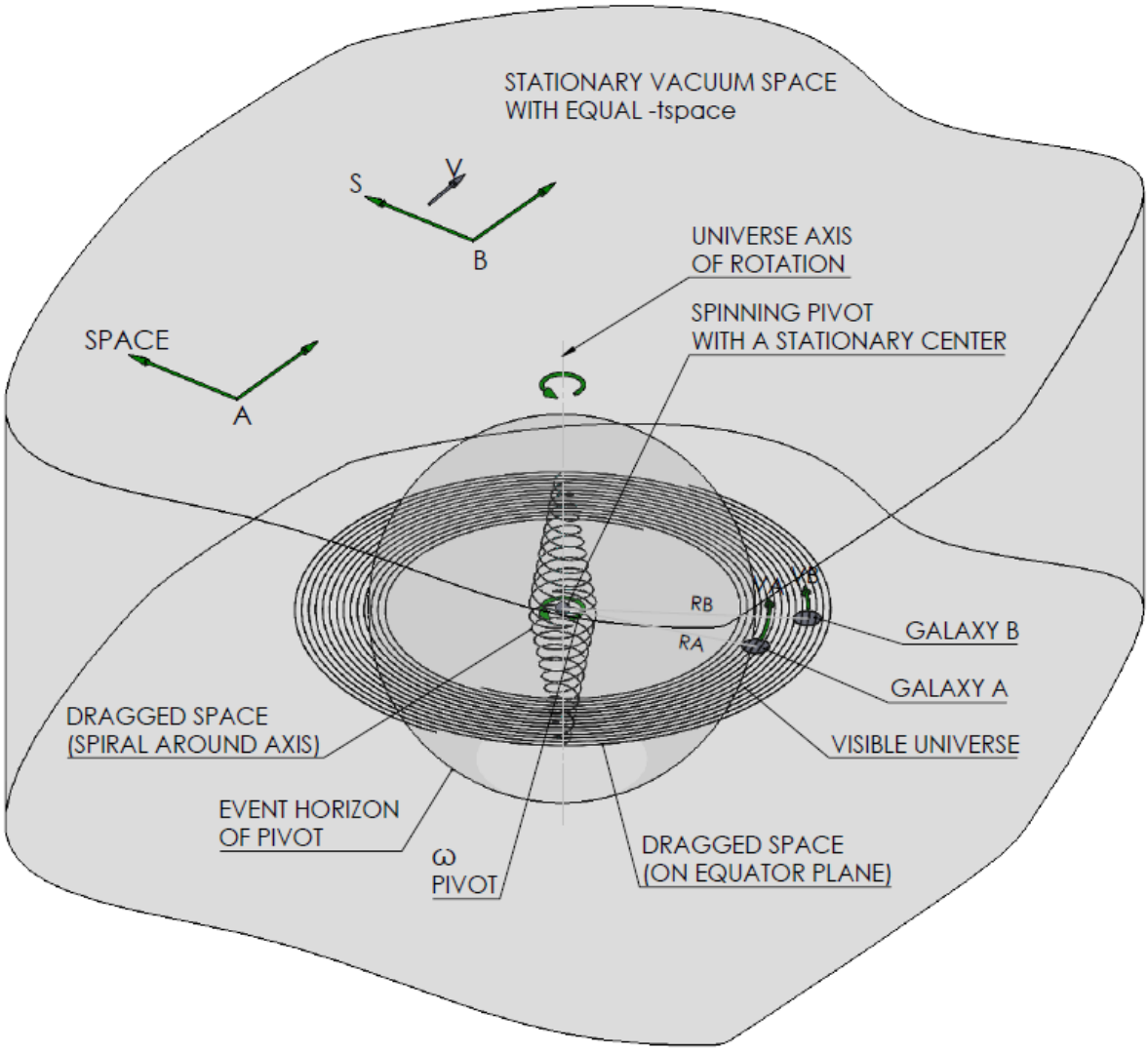

Fig. 1 - Entire structure of the universe

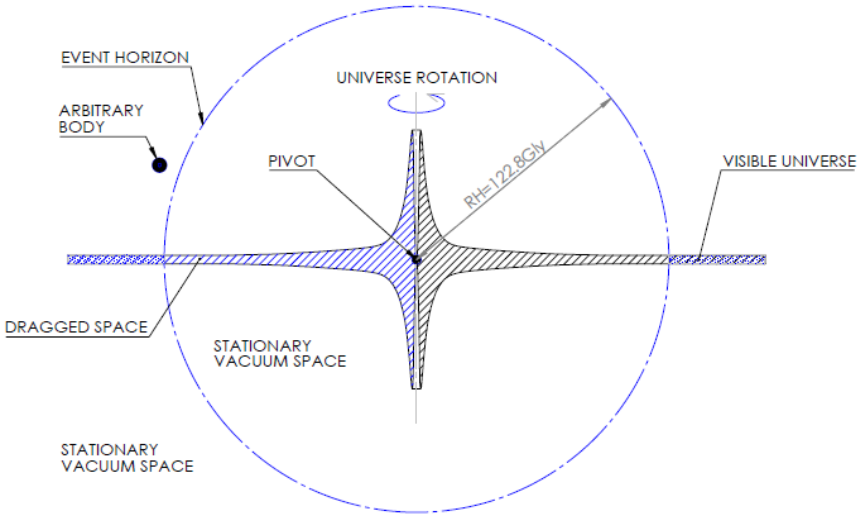

Fig. 2 - Cross section at the rotation axis of the matter universe

Note: Fig -1 and Fig. 2 are based on Spiral galaxies explanation for their shape and the velocity curve flattening

The entire universe is composed of an absolute, infinite vacuum space that is eternal and permeates everywhere. Time in vacuum space is absolute and passes without relating to anything. Somewhere in the infinite vacuum space exists our finite-matter universe. Quantum theory teaches that vacuum space is not a total void but is rather endowed with fluctuating fields of energy. From these fluctuating fields of energy various pairs of matter and antimatter particles (also designated virtual particles) pop out and immediately after that annihilate each other. I hypothesize that these virtual particles that always exist in the vacuum space are the source of matter in the universe. A profound question is how from the virtual particles long-lived particles can be created. My speculative claim, based on quantum physics, is that a neutron and an antineutron do not annihilate each other because they both have no electric charge. It is also important to note that the spins of both neutrons and antineutrons are ½, meaning that both rotate in the same direction. After the first pair of neutron and antineutron were created, more neutrons and antineutrons over a long time clamped together to build a spinning primeval neutron star. The growth of this primeval neutron stopped, by an explosion, when it reached a size such that the acceleration on its surface reached the maximum possible acceleration in the universe. The hypothesis is described in The origin of matter

The explosion of the primeval neutron star marks the creation of our matter universe. (Note: according to other theories the explosion occurred 13.7 billion years ago). Our matter universe is composed of two distinct parts: a massive spinning neutron star, I designate the Pivot and a ring-shaped visible universe that orbits this Pivot. The Pivot is the remainder of the exploded primeval spinning neutron star. The Pivot, from the quantum physics point of view, is composed

of neutrons and antineutrons packed at the highest possible density in the Universe. From a general relativity point of view, the Pivot is a Kerr black hole. Therefore, the visible ring-shaped universe must reside outside the event horizon of the Pivot and therefore an observer located in the visible universe (e.g., in our Milky Way) cannot observe the Pivot. An important result from Kerr's black hole solution is the frame dragging of the vacuum space in the matter universe by the spinning Pivot. The frame dragging was verified in the Gravity Probe B experiment. The results measured in this experiment were minuscule because the frame dragging was done on Earth. However, around massive bodies such as neutron stars and black holes frame dragging is considerable. As mentioned above vacuum space is not a total void, but rather is a fluid that has physical properties. The vacuum space has measurable physical properties such as permittivity and permeability. Maxwell used these properties to calculate correctly the speed of light in the vacuum.

The Pivot influences the visible universe in two ways:

1) Gravity of the Pivot. I claim that the gravity force between two celestial bodies originates the quantum strong force that exists between two subatomic particles (neutrons and/or protons). In other words, the strong force and gravity are the same. Measurements show that the strong force at the subatomic scale is quite big, however, at the cosmological scale the strong force is minuscule. Nevertheless, because of the enormous numbers of subatomic particles in a celestial body, there is still a considerable force between these bodies. See THE ORIGIN OF GRAVITY

2) Frame dragging of the vacuum space. The dragged space by the spinning Pivot dictates the shape of the matter universe. The Pivot drags space around it according to general relativity. The equation is given in Frame-dragging. The dragged space has a flat disk shape located on the equatorial plane of the Pivot and a spiral shape around its axis of rotation. It is important to note that in the places that space is not dragged vacuum space is stationary and permeates everywhere, including the vacuum space inside the event horizon of the Pivot and also the center of the Pivot.

Fig. 2 explains why our visible universe has the shape of a flat disk. An arbitrary body that is located outside the equatorial plane i.e., outside the dragged space. This body is attracted to the Pivot by gravity. To stay in its orbit at radius r it must have always a tangential velocity that can be calculated from Newton's gravitational law.

$$v_0 = \sqrt{\frac{G \cdot M_{pivot}}{r}}$$

However, the vacuum space at the location of the arbitrary body is stationary. Therefore, the vacuum space will resist the body's motion and thus the body will gradually lose its velocity and eventually spiral towards the Pivot. I claim that the body will not hit the Pivot because it must cross the dragged space where the space velocity is higher than the light velocity and therefore will be ejected as radiation from the spirals around the axis.

On the other hand, matter e.g., Galaxy A and Galaxy B, that are located on the equatorial plane and are dragged with vacuum space will not fill any drag from space and therefore will continue their motion forever. It is to be noted that the motion of Galaxy A and B must be such that it will satisfy both the velocity of dragged space calculated from general relativity as well as the velocity of Newton's law. The solution is to change the distance between two celestial bodies that is described as described by Newton with the geodesic as calculated by general relativity.

See: Could Newtons gravity theory be reconciled with Einsteins general relativity theory

It will be explained now how special relativity and general relativity agree with the Pivot structure.

Special relativity is based on two postulates. The first postulate of special relativity is that the laws of physics are invariant in all inertial frames of reference (that is, frames of reference with no acceleration or gravity). From this postulate, it can be concluded that special relativity is applicable only outside the matter universe, where there is no gravity.

In Fig. 1 the reference frame "SPACE" is stationary. Reference frame S is moving relative to reference frame "SPACE" with a velocity v. Special relativity claims that there is a time dilation between frame S and reference frame "SPACE" according to:

$$t_s = \frac{t_{space}}{\sqrt{1-\frac{v^2}{c^2}}} \qquad \text{Eq. (1)}$$

From Eq. (1) it is clear that time dilation exists only when there is a relative velocity between frame SPACE and frame S. When v=0 there is no time dilation and $\Delta t=t_s-t_{space}=0$. This claim solves the twin paradox. At first, the twins are located at point A. One of the twins takes a journey to another star located at point B at a velocity of v. During the entire journey there is a time dilation between A and B according to Eq. 1. However, as the moving twin lands on the star at B, there is no time dilation between the time at B and the time at A, and both are equal to the time t_{space} of the vacuum space. During the journey back from B to A time dilation exists, but as the moving twin lands on point A there is no time dilation i.e., the twins remain at the same age. To sum up – special relativity applies to the vacuum space.

General relativity is applicable in our matter universe that is described in Fig – 1and Fig. -2. where there is gravity and also frame-dragging.

The question is how special relativity is also applicable in our matter universe where gravity pervades everywhere.

In our matter universe, celestial bodies such as Galaxy A and Galaxy B must be in a constant circular motion around the Pivot. (Note: Galaxy A and Galaxy B are located at different radii (R_A and R_B) from the Pivot, therefore, they have different orbital velocities V_A and V_B.). This situation that seems to contradict the first postulate of special relativity is possible only if the time duration of the measurement is small enough such that the reference frame of the galaxy remains approximately parallel to the reference frame of the Pivot and then Eq. (1) is applicable. As the circular motion of the galaxy never stops there will always be time dilation between any galaxy and the Pivot.

The question is how special relativity is also applicable in our matter universe in which gravity pervades everywhere. To explain better this issue, I would like to refer to the known case of the global positioning system (GPS). The GPS is a verified technology and is used many million times a day by users all over the world. The GPS includes a relativistic correction factor that is comprised of both gravitational time dilation and special relativity time dilation. Not using the relativistic correction factor renders the GPS useless. More details in Is_Special_Relativity_compatible_with_General_Relativity I claim that the situation of the matter universe is similar to the GPS. Just replace Earth with the Pivot and the satellite with a galaxy.

Special relativity can be used in our matter universe in a special case if the duration of the measurement is small such that the reference frame on Galaxies A and B remain parallel. The kinetic time dilation of Galaxy A relative to Galaxy B can be calculated using Eq. (1)

$$\Delta t_{s(A-B)} = \frac{t_{space}}{\sqrt{1-\frac{v_A^2}{c^2}}} - \frac{t_{space}}{\sqrt{1-\frac{v_B^2}{c^2}}} \qquad \text{Eq. (2)}$$

According to general relativity, there is also a gravity time dilation for any celestial body. It is dependent on its orbital radius as shown in Eq. (3)

$$t_{g-A} = \frac{t_{space}}{\sqrt{1-\frac{2\cdot G\cdot M_{Pivot}}{r\cdot c^2}}} \qquad \text{Eq. (3)}$$

To find the gravitational time dilation between Galaxy A and Galaxy B:

$$\Delta t_{g(A-B)} = \frac{t_{space}}{\sqrt{1-\frac{2\cdot G\cdot M_{Pivot}}{R_A\cdot c^2}}} - \frac{t_{space}}{\sqrt{1-\frac{2\cdot G\cdot M_{Pivot}}{R_B\cdot c^2}}} \qquad \text{Eq. (4)}$$

Finally, the total time dilation between two galaxies A and B located in the matter universe is the sum of the kinematic time dilation + the gravitational time dilation, i.e., Eq. (2) +Eq. (4).

Note: While the kinematic time dilation is important in the GPS, it can be proven that it is negligible in the matter universe.

To Sum up:

The suggested structure of the entire universe unifies the three theories.

First is that the entire universe is composed mainly of vacuum space. In the vacuum space, the theory that governs is **special relativity**. In the vacuum space, there are no gravitational forces therefore the first postulate of special relativity is valid.

Second, **quantum physics** teaches that the energy of vacuum space is the source of matter. The matter is accumulated gradually in space to create a spinning primeval neutron star. This primeval neutron star 1) Has gravity which is the manifestation of the strong force in the neutron star at cosmological scales. 2) Drag the vacuum space with it.

When the spinning primeval neutron star reaches a maximal acceleration, it explodes into two distinct parts – 1) The majority of the primeval neutron remains at its place – I designate it the Pivot. 2) The visible matter started to orbit the Pivot. The motion of the matter universe is dictated by Newton's law and the dragging of space by the Pivot. Celestial bodies can exist only in the dragged space such that there is no relativity velocity between the body and space. The physics of the matter universe is governed by **general relativity**.

An additional speculative remark. The creation of our matter universe gives rise to the possibility that additional matter universes may exist in the infinite vacuum space. I say "speculative" because, unlike our matter universe, we currently have no observations to confirm the existence of additional universes.