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Newtonian quantum gravity

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Abstract: Newtonian Quantum Gravity (NQG) unifies quantum physics with Newton's theory of gravity and calculates the so-called "general relativistic" phenomena more precisely and in a much simpler way than General Relativity, whose complicated theoretical construct is no longer needed. Newton's theory of gravity is less accurate than Albert Einstein's theory of general relativity. Famous examples are the precise predictions of General Relativity at binary pulsars. This is the reason why relativistic physicists claim that there can be no doubt that Einstein's theory of relativity correctly describes our physical reality. With the example of the famous "Hulse-Taylor binary" (also known as PSR 1913 + 16 or PSR B1913 + 16), the author proves that the so-called "general relativistic phenomena" observed at this binary solar system can be calculated without having any knowledge on relativistic physics. According to philosophical and epistemological criteria, this should not be possible, if Einstein's theory of relativity indeed described our physical reality. Einstein obviously merely developed an alternative method to calculate these phenomena without quantum physics. The reason was that in those days quantum physics was not yet generally taken into account. It is not the first time that a lack of knowledge of the underlying physical phenomena has to be compensated by complicated mathematics. Einstein's theory of general relativity indirectly already includes additional quantum physical effects of gravitation. This is the reason why it cannot be possible to unite Einstein's theory of general relativity with quantum physics, unless one uses "mathematical tricks" that make the additional quantum physical effects disappear again in the end. © *2020 Physics Essays Publication*. [http://dx.doi.org/10.4006/0836-1398-33.1.99]

Résumé: La gravité quantique newtonienne (GQN) unifie la physique quantique avec la théorie de la gravité de Newton et calcule les phénomènes dits "relativistes généraux" plus précisément et d'une manière beaucoup plus simple que la relativité générale dont la construction théorique compliquée n'est plus nécessaire. La théorie de la gravité de Newton est moins précise que la théorie de la relativité générale d'Albert Einstein. Il est possible de citer comme exemple les prédictions précises de la relativité générale au niveau de pulsars binaires. C'est la raison pour laquelle les physiciens relativistes affirment que la théorie de la relativité d'Einstein décrit correctement notre réalité physique, sans aucun doute possible. L'auteur prouve, à l'aide du célèbre pulsar binaire de Hulse et Taylor (également connu sous le nom de PSR 1913 + 16 ou PSR B1913 + 16), que les phénomènes relativistes généraux observés au niveau de ce système solaire binaire peuvent être calculés sans aucune connaissance en matière de physique relativiste. Selon des critères philosophiques et épistémologiques, cela ne devrait pas être possible si la théorie de la relativité d'Einstein décrivait réellement notre réalité physique. De toute évidence, Einstein s'est contenté de développer une méthode ingénieuse pour calculer ces phénomènes sans tenir compte de la physique quantique. À l'époque, la physique quantique n'était en effet généralement pas prise en compte. Ce n'est pas la première fois que des mathématiques complexes doivent venir compenser un manque de connaissances des phénomènes physiques sous-jacents. La théorie de la relativité générale d'Einstein inclut déjà indirectement d'autres effets de la gravité de la physique quantique. C'est pourquoi il n'est pas possible d'associer la théorie de la relativité générale d'Einstein à la physique quantique, à moins de faire appel à la « magie mathématique » pour faire disparaître les effets supplémentaires de la physique quantique à la fin.

Key words: Quantum Gravity; General Theory of Relativity; General Relativity; Newton's Theory of Gravity; Quantum Gravity; Equivalence of Energy and Mass; Equivalence of Inertial and Heavy Mass; Gravitational Time Dilatation; Precession of Mercury's Perihelion; Binary Pulsar PSR B1913 + 16.

1. INTRODUCTION

The so-called relativistic phenomena exist without doubt, but the explanations of these phenomena by relativistic physics are illogical in many aspects.[1,2] Therefore, there must be another explanation for the observed so-called relativistic effects. Real science must always be ready to give up established views and rethink a problem from scratch, if there is a better or simpler explanation for a physical phenomenon. It will be demonstrated in this article that it is

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possible to calculate so-called "general relativistic phenomena" even more precisely than by general relativity within usual three-dimensional space. In some parts, authors' fundamental thoughts on the Newtonian quantum theory have already published in former articles.[3,4]

II. "NEWTONIAN QUANTUM GRAVITY" BASED ON THE EQUIVALENCE OF ENERGY AND MASS AND COMBINED NEWTON'S THEORY OF GRAVITY WITH QUANTUM PHYSICS

Einstein described the movement of masses or light influenced by gravitation within a four-dimensional space-time, whereas the masses and light move along geodesics without being accelerated. Newton described a gravitationally accelerated movement of masses and light caused by gravitation. For small velocities and also for small masses, Einstein's theory of gravitation goes over into Newton's theory of gravity. Newton's theory of gravity is able to explain gravitational effects quiet well, unless the velocities are very fast. For example, consider the orbital movement of Mercury around the Sun. According to Newton's theory of gravity, the orbit of Mercury changes its orientation by an angle of about 532 s in a century. However, the observations showed that the precession of Mercury's orbit is about 575 s per century, so that there results only a little difference of 43", which could be explained by Einstein's theory general relativity.[5] Newton postulated that the mass of an object falling under the influence of Earth's gravity has no effect on its acceleration, this means that all objects should accelerate toward Earth at 9.81 m/s^2 regardless of their mass. Therefore, it follows that an object with no mass, such as a photon, would follow the same rule. Therefore, also Newton's theory of gravity describes a deflection of light at the surface of the Sun, but only the half value of the real value that could be observed,[6]

$$\Delta\phi = \frac{2GM}{c^2 r} = 4.24 \times 10^{-6}\mathrm{rad} = 0.875''. \quad (1)$$

The simplest approach to explain the curvature of light beams near large masses and gravitational time dilatation different from general relativity is to take over Newton's concept of a gravitational acceleration also for light beams what is only at first sight a contradiction to the imagination of a constant velocity c of light within gravitational fields, as demonstrated in my former article: Failure of Einstein's Theory of Relativity. II. Arguments of Einstein disproving his own theory of general relativity and absurd consequences of relativistic physics.[7] As explained in detail in that article, an acceleration of electromagnetic radiation by gravity is the necessary precondition that the constant speed of light can always be measured, although there is a gravitational "time dilation" within different gravitational potentials. To be able to measure a constant velocity c, despite different gravitational potential, a light beam must get accelerated by gravity by the reciprocal factor than the "time" it gets decelerated (dilated) by gravity. (Of course a gravitational acceleration of electromagnetic radiation is forbidden according to relativistic physics because light moves unaccelerated on geodesics.) According to that, the frequency shift caused by gravity is compensated. Nevertheless a redshift or blueshift measured by Pound and Rebka for a light beam moving in the gravitational field of the Earth in their famous experiments was explained by a second kind of gravitational time dilatation.[7] In that article, an epistemological analysis of the relativistic application of the equivalence of gravitational and inertial mass proved that there result logical contradictions and absurd situations. It even turned out that the argumentation of relativistic physics disproves the relativistic view itself.[7] Instead of an illogical use of the equivalence of gravitational and inertial mass, I use the equivalence of energy and mass. The Newtonian quantum gravity is therefore based on the gravitational interaction between masses and between electromagnetic radiation and gravitational quanta,

Equivalence of energy and mass
→ Gravitational interaction of light,
Gravitational interaction of light
→ gravitational curvature of light beams,
Gravitational interaction of light
→ gravitational time dilatation.

In this case, a direct change in the frequency of a light beam caused by gravitation is allowed, while according to relativistic physics, only an indirect change in the frequency of a light beam caused by changing "time" within the gravitational field is allowed. A better theory of gravity must in contrast to Newton's theory of gravity be able to explain additional gravitational effects on masses and on light, which are till now described as so-called "general relativistic effects." Newton's imagination that also light is accelerated by gravity is rehabilitated. However, Newton did not know any gravitational quanta that need to be considered. The basic postulations of Newtonian quantum gravity are as follows:

1. Newton's theory of gravity can still be used as the basis of a new three-dimensional theory of gravity.
2. Gravity is caused by the emission of gravitationally effective quanta by masses. This hypothesis is based on the fact that gravitation must be based on something that exists. As the physical reality is based on quanta, of this "something" must be assumed that it is also composed of gravitationally effective quanta. The smallest gravitational quantum that, for example, we could call "graviton." This is reminiscent of the wave-particle dualism of photons. While the wave properties of photons are caused by the fact that the electromagnetic quanta alternately change their spatial orientation, this cannot be expected for the gravitationally effective quanta. The term "wave" for the movement of gravitationally effective quanta is therefore misleading. Instead, we should more appropriately speak of a "flow" of gravitational quanta. In contrast to electromagnetic radiation, we cannot directly observe gravitational quanta, which is why these assumptions must remain

hypothetical. However, less assumptions than that there has to be something that causes gravity and that this something must spread into space are not possible to explain gravity and therefore satisfies Ockham's razor, so that these hypotheses are nevertheless well founded.

3. These gravitons move radially away from the mass that emits the gravitons with the velocity c. Why nevertheless gravity acts instantaneously is explained later in this article. The only quanta, the speed of which we can measure directly and precisely, are the ones of which electromagnetic waves are composed. The speed of these quanta has the speed of light c. The simplest possible assumption is that all other quanta, such as the gravitationally effective quanta, also move at the speed of light. As we want to explain gravitation in this article independently of relativistic physics, we must be allowed to assume that the speed of light of the gravitationally effective quanta does not happen in a relativistic sense, but that the gravitational quanta absolutely move away from a mass at the speed of light. The model presented in this article is an alternative model, which can replace Einstein's theory of general relativity. If someone rejects these basic assumptions of my alternative model from the outset, because they do not suit relativistic physics, the person does not take a scientific, but a dogmatic or pseudoscientific point of view. Because this article has the intention to present a completely new perspective of gravitation, this article would make no sense, if I used the relativistic perspective instead. In the end, it turns out that the assumption that gravitational quanta move away from a mass at the speed of light makes it possible to calculate so-called general relativity phenomena even more precisely than by relativistic physics. Therefore, this assumption probably corresponds to reality.

III. FAILURE OF ARGUMENTS AGAINST THE SPREADING OF "GRAVITONS" WITH THE LIMITED VELOCITY *C* AND WHY GRAVITATIONAL FORCE ACTS INSTANTANEOUSLY

Van Flandern correctly concludes in his article from the year 1998 "The Speed of Gravity-What the Experiments Say" that gravity cannot have a finite velocity like c because else the obits of planets and stars would be instable.[8] He deduced that the velocity of gravity should be about 10×10^9 times faster than c ($10^{10} \times c$) or more, instead planetary of stellar orbits would be instable. The solution of this Problem Van Flandern saw in the general theory of relativity, which explains gravity not as a force, but by a change in spacetime. But the problem also persists: How the information of a permanently changing position of a galaxy is transmitted instantaneously to another galaxy cannot be explained by General Relativity.

The Newtonian quantum gravity, as it is introduced in this article, explains gravity by the emission of gravitational quanta ("gravitons"), which leave a mass radially with the velocity of c and interact with the quanta, photons, or masses consist of. But this is only a simplified model, as there remain a lot of questions. The reservoir of the gravitons or gravitational quanta is not explained. Is anything depleted by the emission of gravitons? Is anything increased by the absorption of gravitons? Do the gravitons have energy and momentum?

To understand the problem of gravity, we have to consider the deeper underlying physical process of gravity, which I tried to explain in my former article: "Unification of the four fundamental forces of nature by a binary quantum model."[4] In this article, I postulated that space is filled with quanta, which I called basic space-particles (bs-particles) and the questions mentioned above were answered. Gravity was explained by the emission of particles by masses (here called gravitons), which represent a part of the basic space-particles of space and cause a lack of basic space-particles in the surrounding of a mass. Hereby a "lower quantum pressure" of basic space-particles is caused in the surrounding of a mass and in the opposite direction of a "higher quantum pressure" of basic-space particles, latter causing gravity by an interacting of basic space-particles with the quanta that a mass or electromagnetic radiation consists of. As all basic space-particles of space are indirectly in contact with each other, it is possible that the information of a changed concentration of basic space-particles is transported instantaneously into space. Imagine the universe without any mass, which is filled with basic space-particles that cause a certain "quantum pressure" of basic space-particles in the universe. Then, imagine that suddenly a large single mass is emerging somewhere in the universe. If this mass is able to cause a "lower quantum pressure" of basic space-particles in its surroundings by the emission of gravitational quanta (gravitons), this "lower quantum pressure" at the position of the mass instantaneously results in a "higher quantum pressure" of basic space-particles in the other regions of the whole universe. The position of the mass does not matter in this context. This explains, why gravity acts instantaneously, although the gravitational quanta have only the velocity c of light. According to the fact that gravity is caused indirectly by the emission of gravitational quanta (gravitons) by masses, but it is actually caused by a direct interaction between basic space-particles (bs-particles) of space and the quanta that a mass or light beam consists of ("Advanced Newtonian quantum gravity"). According to the "Advanced Newtonian Quantum Gravity," which integrates the Binary Quantum Theory (BQT) of the author, gravitation is caused by a reduced quantum pressure in the surrounding of a mass and an increased quantum pressure in the opposite direction. This causes that a mass is pressed towards another mass what until today is wrongly regarded as an attraction between masses. Therefore, according to the "Advanced Newtonian Quantum Gravity" gravitation is a spatial force. To understand the postulated underlying quantum process of gravitation, it cannot be avoided to read my article "Unification of the four fundamental forces of nature by a binary quantum model."[4] By the presented binary quantum model, it is, for example, possible to derive the Planck constant and the fine-structure constant alpha. Nevertheless the assumptions in this article remain to a large extend hypothetical. Even if the binary quantum model presented in this article does not correctly describe the reality of the quanta that make up our world, it can be shown that it is possible to make very precise predictions of real phenomena within three-dimensional space, which are today calculated by general relativity, by assuming that quanta cause gravity and that these quanta move away from the mass at the speed of light. If gravity is not caused by a lower quantum pressure in the surroundings of a mass and thus an indirect increased quantum pressure in the opposite directions, as it is postulated by the binary quantum model, it remains unclear how gravity manages to spread instantaneously. A lower quantum pressure in the surroundings of a mass must instantaneously cause a relative positive quantum pressure in the other regions of the universe, so that the information about this higher quantum pressure does not have to be transmitted. According to that there happens only seemingly an instantaneous spread of gravity, while in reality this spread does not take place at all. As the propagation of gravity cannot take place instantaneously or at an infinite velocity, only an indirect gravitational effect can be real, e.g., by the described quantum pressure gradient. If not a quantum pressure gradient is responsible for the instantaneous gravitational effect, it must be another indirect process that would have to be found in the context of another theory.

It is psychologically understandable why we speak of gravity as an attraction. Although we perceive quantum pressure indirectly as gravity, we cannot see the quanta of space. Because we only see the mass on which we live, namely, the Earth, we assume that the mass of the Earth attracts us. The origin of the pressure from above is invisible to us. Asserting that something invisible pushes us onto the Earth, we psychologically experience as strange.

Van Flandern's imagination that an instantaneous spread of gravity could be explained by the theory of general relativity must be wrong. If masses indeed cause a change of space-time in their surroundings, as it is postulated by General Relativity, the information of this change is not instantaneously known everywhere in the universe, but would have to be transported at a certain speed to the other regions of the universe, so that an instantaneous spread of gravity is not possible in this case. The same problem arises with any other theory that assumes that masses cause a gravitational change in their surroundings that does not indirectly cause an immediate gravitational change in the other regions of the universe. From the author's point of view, the problem of an instantaneous gravitational spread can for the moment only be solved by a lower quantum pressure in the vicinity of a mass, which indirectly causes an instantaneous increased quantum pressure in the other regions of the universe. However, this probably presupposes that the universe is closed and not infinitely large. In addition, that the probably limited universe must contain all quanta that are necessary to cause energy, material structures and the observed interactions. Nevertheless the strength of gravity depends indirectly on the amount of the emitted gravitational quanta (gravitons) and the velocity of this gravitational quanta. Hereby the contradiction between the finite velocity of gravitons emitted by masses and the obviously instantaneously transmission of gravity can be solved. This enables us to calculate the strength of the gravitational interaction indirectly by the amount of gravitons that are emitted by masses and the relative velocity of these gravitons against other masses or photons.

IV. BY THE NEWTONIAN QUANTUM GRAVITY IT IS POSSIBLE TO CALCULATE SO-CALLED GENERAL RELATIVISTIC PHENOMENA BY SIMPLE MATHEMATICS WITHIN USUAL THREE-DIMENSIONAL SPACE, WHICH IS EXPLAINED BY THE EXAMPLE OF MERCURY AND OF THE DEFLECTING OF LIGHT AT THE SUN

Not to confuse the readers, in the following, I want to use the simplified model that gravity is caused by the emission of quanta, which interact with the quanta photons or masses consist of, and not the more complicated model of an indirect increase in the gravitational interaction caused by the emission of quanta (here called gravitons), as explained in my article: "Unification of the four fundamental forces of nature by a binary quantum model" 2016 in Physics essays.[4] For a better understanding of my complete model explaining gravity, I recommend to read this article. The combination of both theoretical aspects of gravity is called "Advanced Newtonian quantum theory." If a mass, like a planet, as well as a photon, was at rest against the Sun (which is of course not possible for a photon in reality), the relative value of the frequency with which quanta emitted by the Sun would meet the mass or the photon was 1. If the planet or a photon moves tangentially to the Sun with the velocity v, the velocity v_q of the gravitational quanta (gravitons) against the mass or the photon must have a faster velocity than before, so that the relative frequency the quanta of the planet or a photon meets the gravitons emitted by the Sun, must be by a certain factor greater than 1 (see Fig. 1).

In this case, the relative frequency, with which the quanta (gravitons) emitted by the Sun encounter a mass or a photon, increases by a certain factor in relation to the velocities. This factor I is called the "gravitational factor of motion" γ',

$$v_q^2 = c^2 + v^2,$$
$$v_q = \sqrt{c^2 + v^2} = \gamma'. \quad (2)$$

For relative values in dependence of the velocity c, we obtain

$$\gamma' = \sqrt{1 + \left(\frac{v}{c}\right)^2}. \quad (3)$$

This must cause additional gravitational acceleration or motion effects, which cannot result according Newton's theory of gravity. The "gravitational factor of motion" γ' in dependence of the velocities of the tangentially moving objects corresponds relatively to an additional gravitational acceleration effect. This means that the gravitational constant G of Newton's theory of gravity changes in dependence of the velocity of the tangentially moving objects and is not as constant, as we thought. Let us first only have a look on a

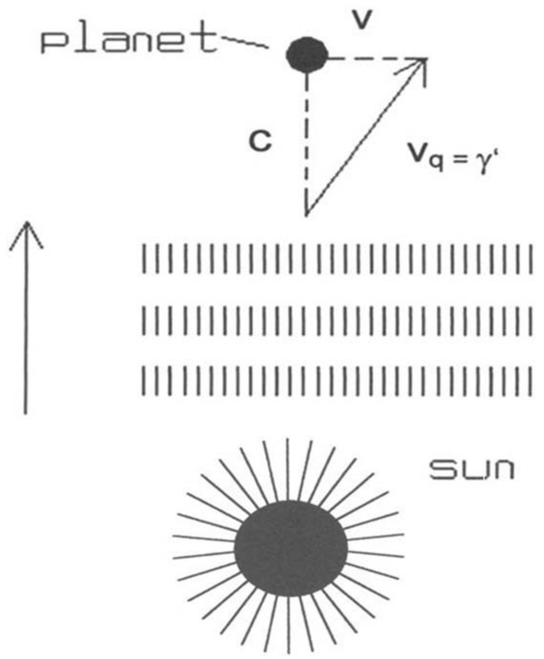

FIG. 1. Gravitational quanta (gravitons) emitted by the Sun which meet a tangentially moving planet or light beam.

light beam moving tangentially to the Sun. Because of the mutually interaction between the gravitationally interacting quanta in space (basic space-particles), caused by the emission of gravitons emitted by the Sun (or in the simplified version of Newtonian quantum gravity between gravitons) and the quanta a photon consists of, we have to square the "gravitational factor of motion" and we obtain for G'

$$G'=(\gamma')^2 \times G=\left[\sqrt{1+\left(\frac{v}{c}\right)^2}\right]\times G. \quad (4)$$

If we substitute in the velocity c of a light beam for the additional gravitational acceleration of the light beam towards the Sun, we obtain

$$G'=(\gamma')^2 \times G = \left[\sqrt{1+\left(\frac{c}{c}\right)^2}\right]^2 \times G = 2 \times G. \quad (5)$$

According to the Newtonian quantum gravity, the bending of a light beam at the surface of the Sun must have double the value than it was predicted by Newton's theory of gravity. Also. Einstein's theory of General Relativity predicted double the value than Newton's theory of gravitiy,[9]

$$\begin{aligned}\Delta\phi &= 2 \times \frac{G' \times M}{c^2 \times r} \\ &= 2 \times \frac{2 \times G \times M}{c^2 \times r} = 8.48 \times 10^{-6}\text{rad} = 1.75''\end{aligned}. \quad (6)$$

No four-dimensional space time, no Einstein equations, no tensors, and no geodesics are needed to explain this so-called relativistic phenomenon. Newton's formula for the force of gravitation is given by

$$F = \frac{GMm}{r^2}. \quad (7)$$

(where G stands for the Newtonian Gravitational Constant, M stands for the mass of the Sun, and m stands for the mass of a planet.) But considering a variable gravitational strength G' (corresponding to a changed Newtonian gravitational constant G), a light beam is confronted with so that we have to introduce a dynamic gravitational constant and must use the following formula:

$$F = \frac{G' \times M \times m}{r^2}. \quad (8)$$

Let us now have a look at a planet moving tangentially to the Sun: we get for the "gravitational factor of motion" γ' in the case of a planet (mass), which should also consist of some kind of quanta, the velocity factor,

$$\begin{aligned} v_q^2 &= c^2+v^2, \\ v_q &= \sqrt{c^2+v^2}=\gamma'. \end{aligned} \quad (9)$$

For relative values in dependence of the velocity c, we obtain

$$\gamma' = \sqrt{1+\left(\frac{v}{c}\right)^2}. \quad (10)$$

Because of the mutually interaction between the gravitationally interacting quanta, caused by the emission of gravitons emitted by the Sun and the quanta a mass consists of, we have to square the "gravitational factor of motion" to get the changed gravitational constant G'. The same we would have to consider, if the Sun moved against Mercury, so that we would get instead of the Newtonian gravitational constant the increased "gravitational constant" G',

$$G' = (\gamma'_{\text{planet}})^2 \times (\gamma'_{\text{sun}})^2 \times G. \quad (11)$$

As the Sun is approximately at rest against the common center of mass of the Sun and the planet, which is within the Sun, the gravitational factor of motion for the Sun (γ'_{sun}) has the relative value as 1,

$$\begin{aligned} G' &= (\gamma'_{\text{planet}})^2 \times (\gamma'_{\text{sun}})^2 \times G, \\ G' &= (\gamma'_{\text{planet}})^2 \times (1)^2 \times G, \\ G' &= (\gamma'_{\text{planet}})^2 \times G. \end{aligned} \quad (12)$$

If two masses are at rest against each other, we obtain the usual Newtonian gravitational constant G,

$$G' = (\gamma'_{m_1})^2 \times (\gamma'_{m_2})^2 \times G,$$
$$G' = (1)^2 \times (1)^2 \times G, \quad (13)$$
$$G' = G.$$

Instead of the Newtonian gravitational constant G for the gravitational interaction of Mercury moving around the Sun, for the increased "gravitational constant" G', we obtain

$$G' = (\gamma')^2 \times G,$$
$$G = \left[\sqrt{1+\left(\frac{v}{c}\right)^2}\right]^2 \times G,$$
$$G' = \left[1+\left(\frac{v}{c}\right)^2\right] \times G, \quad (14)$$
$$G' = G + \left(\frac{v}{c}\right)^2 \times G.$$

By this knowledge, Newton's should therefore have had to multiply his formula for the force of gravitation by the gravitational factor of motion, and the formula for the force of gravitation should have been in

$$F = \frac{G' \times M \times m}{r^2},$$
$$F = \frac{\left[1+\left(\frac{v}{c}\right)^2\right] \times G \times M \times m}{r^2}. \quad (15)$$

For the calculations of additional gravitational acceleration effects by the motion of masses such as a planet or a star, we have to consider the intersection of the three-dimensional body, namely, the so-called cross section. According to Newton's theory of gravity, the orbit of Mercury changes its orientation by an angle of about 532 arcseconds in a century. But the observations showed that the precession of Mercury's orbit is about 575 arcseconds per century, so that there results only a little difference of 43 arcseconds which could be explained by Einstein's theory general relativity.[5]

The relative value of gravitational quanta coming from the Sun, which meet the planet or another mass that moves tangentially towards the Sun, respectively, around the Sun, depends not only on the velocity of the planet or mass but also on the cross section of the mass. For a body with the relative radius of 1, the relative value for the cross section ($r^2 \times \pi = 1^2 \times \pi$) corresponds to the factor π, so that not only the velocity v of the planet plays a role with respect to the value of the interaction between the gravitational quanta emitted by the Sun and the quanta the planet consists of but also the relative value π for the cross section of the planet. While the relative radius of the cross section of a three-dimensional mass or elemental particle has the value 1, the gravitational quanta and the quanta that build up electromagnetic radiation have to be considered to be two-dimensional structures without a cross section, as I described it in my article: "Unification of the four fundamental forces of nature by a binary quantum model".[4] In the direction of the movement of the gravitational quanta and also of the electromagnetic radiation, which consists of packets of quanta with different orientations, these structures have to be one-dimensional. Otherwise, it would not be possible for electromagnetic waves to pass through a narrow slit. Therefore, electromagnetic waves have no cross-section in the direction of their movement, so that the factor π did not play a role in the formula for a light beam. If we consider, beside the velocity factor, the relative cross section π of the planet, respectively, the mass, by which we multiply the velocity factor, finally for the increased "gravitational constant" G' because of the movement of the planet around the Sun, we obtain

$$G' = G + \pi \times \left(\frac{v}{c}\right)^2 \times G,$$
$$G' = \left[1+\pi \times \left(\frac{v}{c}\right)^2\right] \times G. \quad (16)$$

By this knowledge, Newton should, therefore, have had to multiply his formula for the force of gravitation by the gravitational factor of motion, and the formula for the force of gravitation should have been in the case of a planet that moves around the Sun,

$$F = \frac{G' \times m_1 \times m_2}{r^2},$$
$$F = \frac{\left[1+\pi \times \left(\frac{v}{c}\right)^2\right] \times G \times m_1 \times m_2}{r^2}. \quad (17)$$

For the difference between the Newtonian gravitational constant G and the new dynamic gravitational constant G' for the three-dimensional mass of Mercury, we obtain

$$\Delta G = G' - G,$$
$$\Delta G = \left[1+\pi \times \left(\frac{v}{c}\right)^2\right] \times G - G,$$
$$\Delta G = G - G + \pi \times \left(\frac{v}{c}\right)^2 \times G, \quad (18)$$
$$\Delta G = \pi \times \left(\frac{v}{c}\right)^2 \times G.$$

If we go from the imagination, that the gravitational force is caused by the emission of gravitational quanta (gravitons), which move with the velocity c away from a certain mass, the amount of the gravitational quanta emitted by the Sun that cause a gravitational interaction with the quanta Mercury consists of, is increasing by the factor $(\gamma')^2$. Hereby results an additional gravitational acceleration of Mercury by the factor $(\gamma')^2$, so that this must also increase the velocity of the planet by the same factor. If the velocity is increasing by the factor $(\gamma')^2$, in a certain time, there is a traversed, larger angle by the radius of the elliptical orbit of Mercury also by the factor $(\gamma')^2$. Each angular position ϕ_1 therefore changes by the factor $(\gamma')^2$, so that for the changed angular position ϕ_2 against Newton's theory of gravity, we obtain

$$\begin{aligned} \phi_2 &= (\gamma')^2 \times \phi 1, \\ \phi_2 &= \sqrt{\left[1+\frac{v^2}{c^2}\right]}^2 \times \phi 1, \\ \phi_2 &= \left[1+\left(\frac{v}{c}\right)^2\right] \times \phi 1. \end{aligned} \tag{19}$$

As a planet is a three-dimensional mass, we have to multiply the velocity factor $(\gamma')^2$ by the cross section π of the planet, because of the cross section the planet meets more gravitons coming from the Sun than in the case of a two-dimensional electromagnetic wave, what causes an additional gravitational acceleration,

$$\phi_2 = \left[1+\pi\times\left(\frac{v}{c}\right)^2\right] \times \phi 1. \tag{20}$$

Therefore, we obtain for the angular difference $\Delta\phi = \phi_2 - \phi_1$ against Newton's theory of gravity

$$\begin{aligned} \Delta\phi &= \phi_2 - \phi_1, \\ \Delta\phi &= \left[1+\pi\times\left(\frac{v}{c}\right)^2\right] \times \phi 1 - \phi 1, \\ \Delta\phi &= \pi\times\left(\frac{v}{c}\right)^2 \times \phi_1. \end{aligned} \tag{21}$$

To calculate the change in the angular position for the whole movement of the planet on its elliptical orbit, we have to use the mean velocity of Mercury around the sun, which is 47.88 km/s. This is related to the speed of light with a relative velocity of $1.5971\times10^{-4}\ c$, so that we get for the changed precession of Mercury against Newton's theory of gravity according to our considerations above:

$$\begin{aligned} \phi_2 &= \left[1+\pi\times\left(\frac{v}{c}\right)^2\right] \times \phi 1, \\ \phi_2 &= \left[1+\pi\times(0.00015971)^2\right] \times \phi 1, \\ \phi_2 &= [1+\pi\times 0.000000025507] \times \phi 1, \\ \phi_2 &= 1.000000080134 \times \phi 1. \end{aligned} \tag{22}$$

For the angular difference $\Delta\phi = \phi_2 - \phi_1$ of the precession of Mercury between the angle of Newton's theory of gravity and the Newtonian quantum gravity, we obtain

$$\begin{aligned} \Delta_\phi &= \left[1+\pi\times(0.00015971)^2\right] \times \phi 1 - \phi 1, \\ \Delta_\phi &= [1+\pi\times 0.000000025507] \times \phi 1 - \phi 1, \\ \Delta\phi &= 1.000000080134 \times \phi 1 - \phi 1, \\ \Delta\phi &= 0.000000080134 \times \phi 1. \end{aligned} \tag{23}$$

As there results an alteration for each angular position along the whole route of Mercury's way from perihelion to perihelion, that is, 2π, which we have to put in for the angular ϕ_1, so that we get for the alteration of the angular position per one revolution around the Sun

$$\begin{aligned} \Delta\phi &= 0.000000080134 \times \phi 1, \\ \Delta\phi &= 0.000000080134 \times 2\pi, \\ \Delta\phi &= 0.000000503497\ \text{rad}. \end{aligned} \tag{24}$$

According to my considerations contrary to Newton's Theory of Gravity, we therefore get an alteration of the angular position of Mercury's perihelion per one revolution around the sun of 5.03497×10^{-7} rad, which are 2.8848×10^{-5} degrees. The time Mercury needs for one revolution around the sun is 87.969 days. These are per year (365.256 days:87.969 days) 4.1521 revolutions around the sun. To get the conveniently cited alteration of the angular position of Mercury's perihelion in degrees per hundred years, we have to multiply the alteration of the perihelion position per year by 4.1521×10^2,

$$\Delta\phi = 0.000028848^\circ \times 4.1521 \times 100 = 0.011978^\circ. \tag{25}$$

Expressed in arcseconds, these are 43.12''

$$\Delta\phi = 0.011978^\circ \times 60 \times 60 \times \pi = 43.12'' \tag{26}$$

According to Einstein's Theory of General Relativity, the additional advancing of the perihelion's position per hundred years is opposed to Newton's Theory of Gravity 43.03'' angular seconds. The observation for the additional moving forward of Mercury's perihelion is about 43.11'' ± 0.45 "per hundred years.[6] By simple considerations, other so-called general relativistic phenomena can also be calculated. According to Kepler's second law, at the same time, the same area of an elliptical planetary orbit is always traversed by its radius. If an angle changes by a relative value larger than before, as shown in Eq. (22), the area must by this relative value squared be larger than before, so that we obtain for the relative change of the value for ΔA

$$\Delta A = \left[\pi\times\left(\frac{v}{c}\right)^2 \times A\right]^2. \tag{27}$$

Substituting the relative value 1 for the area A as predicted by Newton's theory of gravity using Kepler's second law, we obtain

$$\Delta A = \left[\pi \times \left(\frac{v}{c}\right)^2 \times 1\right]^2. \tag{28}$$

Substituting the value 47.88 km/s as the velocity of Mercury (1.5971×10^{-4} c), we obtain

$$\begin{aligned} \Delta A &= \left[\pi \times \left(\frac{v}{c}\right)^2 \times \mathrm{A}\right]^2, \\ \Delta A &= \left[\pi \times \left(\frac{v}{c}\right)^2 \times 1\right]^2, \\ \Delta A &= 0.000000080134, \\ \Delta A &= 0.0000000000000064215. \end{aligned} \tag{29}$$

According to Kepler's second law, ΔA and Δt are proportional, but if the radius is traversing a larger part of the area of the planetary orbit at the same time, which is ΔA larger, the time required by the radius for traversing this area is Δt shorter, so that Δt must have a negative algebraic sign, and we obtain for the relative time change,

$$\Delta t = -0.0000000000000064215. \tag{30}$$

Using the absolute value of a second for time, we obtain an absolute for the time change per revolution of Mercury

$$\Delta t = -0.0000000000000064215\,\mathrm{s}. \tag{31}$$

According to our considerations, the time required for Mercury for one revolution around the sun is less than Newton expected by the factor of -6.42139×10^{-15}. As Mercury requires 87.969 days ($\Delta t_1 = 7600521$ s) for one revolution, Mercury requires about 4.88×10^{-8} seconds less per each revolution around the Sun,

$$\begin{aligned} \Delta t &= -0.0000000000000064215 \times 7600521\,\mathrm{s}, \\ \Delta t &= -0.000000048806\,\mathrm{s}. \end{aligned} \tag{32}$$

According to this the revolution of Mercury or of another planet around, the Sun must be faster than Newton would have expected.

V. BY THE "NEWTONIAN QUANTUM GRAVITY" IT IS ALSO POSSIBLE TO CALCULATE THE CORRECT VALUES OF SO-CALLED "GENERAL RELATIVISTIC PHENOMENA" OBSERVED AT THE BINARY PULSAR PSR B1913 + 16

I revised my predictions using other so-called "general relativistic phenomena," for example, the phenomena observed at the "Hulse-Taylor binary," which is also known as PSR 1913 + 16 or PSR B1913 + 16.[10,11] In this case, the calculations are a little bit more difficult, as in this case, there are two stars, a pulsar, and its unseen companion. Both the pulsar and its companion follow eccentric elliptical orbits around their common center of mass. The eccentricity of the pulsar's elliptical orbit is given by $e = 0.617$. The minimum separation is called periastron, and the maximum separation is called apastron. The period of the orbital motion is 7.75 h, and the stars are nearly equal in mass, about 1.4 solar masses ($m_p = 1.441$ solar masses, $m_c = 1.387$ solar masses). At the periastron, the velocity of the pulsar around the common center of mass is about 450 km/s, at the apastron about 110 km/s. The periastron separation is 746 600 km, and the apastron separation is 3 153 600 km. The ratio of the distances between the largest separation (apastron) and the smallest separation (periastron) is 4.22:1 (see Fig. 2).

The ratio of the apastron separation and the periastron separation is 4.22:1, while the ratio of the velocity at the apastron and the velocity at the periastron must have about the reciprocal value. For the given velocities, at the periastron 450 km/s and the apastron (110 km/s), we obtain the ratio of 4.1:1. If the velocity is about four times slower at the apastron than at the periastron, this ratio must also be represented with respect to the mean velocity, as the pulsar must in this case also need on its orbit four times more time on the side of the apastron than on the side of the periastron. This means that the mean velocity of the pulsar on its orbit must be about four times closer to the velocity at the apastron than to the velocity at the periastron. Using the ratio of 4.1:1 for the given velocities, we obtain for the difference x between the mean velocity and the lowest velocity of the pulsar at the apastron

$$\begin{aligned} 450\,\mathrm{km/s} - 4.1x &= 110\,\mathrm{km/s} + x, \\ 340\,\mathrm{km/s} &= 5.1x, \\ X &= \frac{340\,\mathrm{km/s}}{5.1x} = 66.67\,\mathrm{km/s}. \end{aligned} \tag{33}$$

This means that the mean velocity of the pulsar must be about 176.67 km/s ($= 0.00059c$):

$$v_m = 110\,\mathrm{km/s} + 66.67\,\mathrm{km/s} = 176.67\,\mathrm{km/s}. \tag{34}$$

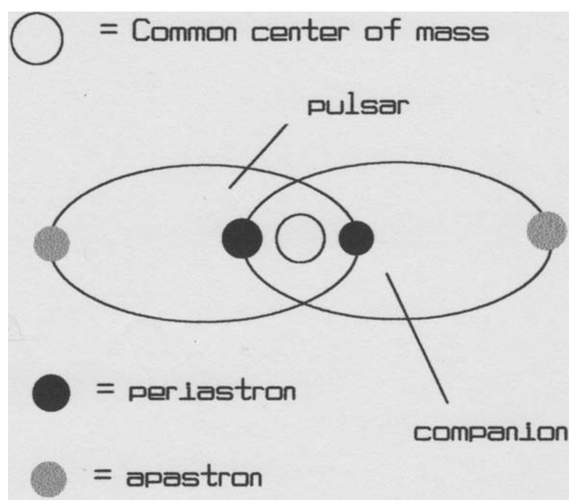

FIG. 2. The pulsar and its companion move around the common center of mass.

For the pulsar and the companion around the common center of mass, we obtain in this case for the changed gravitational constant G' considering only the "gravitational factors of motion"

$$G' = \left(\gamma'_P\right)^2 \times \left(\gamma'_C\right)^2 \times G. \tag{35}$$

The velocities of the stars are inversely proportional to their masses, so that we obtain for the mean velocities the following relationship:

$$\begin{aligned} v_P &= \frac{m_c}{m_p} \times v_c = 0.9625 \times 183.54\,\text{km/s} = 176.67\,\text{km/s}, \\ v_c &= \frac{m_p}{m_c} \times v_p = 1.0389 \times 176.67\,\text{km}/s = 183.54\,\text{km/s}. \end{aligned} \tag{36}$$

The average mean velocity of the pulsar and its companion is

$$v_{\text{P/C}} = \frac{176.67\,\text{km/s}}{183.54\,\text{km/s}} = 180.11\,\text{km/s}. \tag{37}$$

For simplification, we can use for the changed Newtonian gravitational constant G' the mean value of the "gravitational factors of motion," so that we obtain for G' (at first, considering only the "gravitational factors of motion")

$$\begin{aligned} G' &= \left(\gamma'_P\right)^2 \times \left(\gamma'_C\right)^2 \times G, \\ G' &= \left(\gamma'_{P/C}\right)^2 \times \left(\gamma'_{P/C}\right)^2 \times G, \\ G' &= \left(\gamma'_{P/C}\right)^4 \times G. \end{aligned} \tag{38}$$

We obtain further

$$\begin{aligned} G' &= \left(\gamma'_{P/C}\right)^2 \times \left(\gamma'_{P/C}\right)^2 \times G, \\ G' &= \left[\left(\gamma'_{P/C}\right)^2\right]^2 \times G, \\ G' &= \left[\sqrt{1 + \left(\frac{v_{P/C}}{c}\right)^2}\right]^2 \times G, \\ G' &= \left[1 + \left(\frac{v_{P/C}}{c}\right)^2\right]^2 \times G, \\ G' &= \left[1 + 2 \times \left(\frac{v_{P/C}}{c}\right)^2 + \left(\frac{v_{P/C}}{c}\right)^4\right] \times G. \end{aligned} \tag{39}$$

The right term in the brackets is very small, so that we can neglect it and get

$$G' = \left[1 + 2 \times \left(\frac{v_{P/C}}{c}\right)^2\right] \times G. \tag{40}$$

Considering the cross section for masses, as explained above at the example of Mercury, we obtain for the increased changed gravitational constant G',

$$G' = \left[1 + 2 \times \pi \times \left(\frac{v_{P/C}}{c}\right)^2\right] \times G. \tag{41}$$

Newton's formula for the force of gravitation must be multiplied in the case of the binary stars moving around each other according to our considerations,

$$\begin{aligned} F &= \frac{G' \times m_C \times m_P}{r^2}, \\ F &= \frac{\left[1 + 2\pi \times \left(\frac{v_{P/C}}{c}\right)^2\right] \times G \times m_C \times m_P}{r^2}. \end{aligned} \tag{42}$$

For the difference between the Newtonian gravitational constant G and the new dynamic gravitational constant G' for the three-dimensional masses of the pulsar and its companion, we obtain together

$$\begin{aligned} \Delta G &= G' - G \\ \Delta G &= \left[1 + 2\pi \times \left(\frac{v_{P/C}}{c}\right)^2\right] \times G - G, \\ \Delta G &= G - G + 2\pi \times \left(\frac{v_{P/C}}{c}\right)^2 \times G, \\ \Delta G &= 2\pi \times \left(\frac{v_{P/C}}{c}\right)^2 \times G. \end{aligned} \tag{43}$$

We obtain together for the altered angular positions of the pulsar and its companion at the periastron position against Newton's theory of gravity as already explained above at the example of Mercury,

$$\phi_2 = \left[1 + 2\pi \times \left(\frac{v_{P/C}}{c}\right)^2\right] \times \phi 1. \tag{44}$$

For the difference $\Delta\phi = \phi_2 - \phi_1$, we obtain

$$\begin{aligned} \Delta\phi &= \phi_2 - \phi_1, \\ \Delta\phi &= \left[1 + 2\pi \times \left(\frac{v_{P/C}}{c}\right)^2\right] \times \phi 1 - \phi 1, \\ \Delta\phi &= 2\pi \times \left(\frac{v_{P/C}}{c}\right)^2 \times \phi 1. \end{aligned} \tag{45}$$

As we want to calculate the altered situation against Newton's theory of gravitation only for the pulsar, we have to divide the changed angle in two parts, whereas now we have to again use the different gravitational factors of motion with the correct velocities of the pulsar and the companion (ϕ_1 on the right-hand side of the equation corresponds to the angular value given by Newton's theory of gravitation with the relative value 1),

$$\Delta\phi = 2\pi \times \left(\frac{v_P}{c}\right)^2 \times \frac{\phi_1}{2} + 2\pi \times \left(\frac{v_c}{c}\right)^2 \times \frac{\phi_1}{2}. \qquad (46)$$

It is now important to realize that the changes in angles of the pulsar and its companion are not equal according to Newton's theory of gravity but behave inversely proportional to their masses, so that we obtain

$$\Delta\phi = 2\pi \times \left(\frac{v_P}{c}\right)^2 \times \frac{\frac{m_c}{m_p} \times \phi_1}{2} + 2\pi \times \left(\frac{v_c}{c}\right)^2 \times \frac{\frac{m_P}{m_c} \times \phi_1}{2}. \qquad (47)$$

Only regarding the movement of the pulsar around the common center of mass, we obtain a relative angular change for the orbit of the pulsar:

$$\begin{aligned} \Delta\phi &= 2\pi \times \left(\frac{v_P}{c}\right)^2 \times \frac{\frac{m_c}{m_p} \times \phi_1}{2}, \\ \Delta\phi &= \pi \times \left(\frac{v_P}{c}\right)^2 \times \frac{m_c}{m_p} \times \phi 1. \end{aligned} \qquad (48)$$

But there is an important difference between the orbit of Mercury—where Sun keeps at the position of the elliptical focus, so that the gravitational effect of the Sun against Mercury remains unaltered—and the two stars, which are moving around their common center of mass. The gravitational effect of each star with respect to the common center of mass is changing with the distance of each star from the common center of mass. The major semiaxis of the elliptical orbit of the pulsar and its companion is given by a. For the minimum distance of the pulsar on the major axis from its elliptical focus, we obtain

$$q = a \times (1 + e) = a \times (1 - 0.617) = a \times 0.383. \qquad (49)$$

For the maximum distance of the pulsar on the major axis from its elliptical focus, we obtain

$$Q = a \times (1 + e) = a \times (1 + 0.617) = a \times 1.617. \qquad (50)$$

From the data of the distances at the apastron and the periastron, we can observe, that the relative gravitational effect, which is caused in the common center of mass by each star at the periastron, is about 18 times stronger than at the apastron, where the relative gravitational effect is 1 in respect of the gravitational effect at the periastron. As the gravitational effect is reciprocal to the distance squared, we obtain the following for the relative gravitational effect at the periastron compared with the gravitational effect at the apastron:

$$\frac{a \times (1 + e)^2}{a \times (1 - e)^2} = \frac{1.617^2}{0.383^2} = 17.8. \qquad (51)$$

We obtain the same value, if we use the ratio of the periastron and apastron separation squared,

$$\frac{(3153600\,\text{km})^2}{(746600\,\text{km})^2} = 4.22^2 = 17.8. \qquad (52)$$

For the medium relative gravitational effect caused in the center of mass by each star, we obtain

$$\frac{17.8 + 1}{2} = 9.4. \qquad (53)$$

This means that the medium gravitational effect, which is caused by each star in the common center of mass is about 9.4 times stronger, than in the case of an elliptical orbit where the relative gravitational effect in the center of mass remains unaltered. If the mean gravitational effect caused by each star in the common center of mass is about 9.4 times stronger, then in the case of an elliptical orbit, the gravitational effect remains unaltered in the center of mass, or 1, the change in the angular position must be larger by the factor 9. 4, so that we obtain

$$\Delta\phi = 9.4 \times \pi \times \left(\frac{v_P}{c}\right)^2 \times \frac{m_c}{m_p} \times \phi 1. \qquad (54)$$

To get the alteration of the angular position of the periastron for the pulsar for a whole rotation around the common center of mass, we have substitute ϕ_1 again for the value of 2π

$$\begin{aligned} \Delta\phi &= 9.4 \times \pi \times \left(\frac{v_P}{c}\right)^2 \times \frac{m_c}{m_p} \times \phi 1, \\ \Delta\phi &= 9.4 \times \pi \times \left(\frac{v_P}{c}\right)^2 \times \frac{m_c}{m_p} \times 2\pi, \\ \Delta\phi &= 9.4 \times \pi \times \left(\frac{v_P}{c}\right)^2 \times 0.9625 \times 2\pi. \end{aligned} \qquad (55)$$

If we introduce now the mean velocity of the pulsar of 176.67 km/s (= 0.00059c), we obtain

$$\begin{aligned} \Delta\phi &= 9.4 \times \pi \times \left(\frac{v_P}{c}\right)^2 \times 0.9625 \times 2\pi, \\ \Delta\phi &= 9.4 \times \pi \times (0.00059)^2 \times 2\pi, \\ \Delta\phi &= 9.4 \times 0.000000348 \times 0.9625 \times 2\pi^2, \\ \Delta\phi &= 0.0000622\,\text{rad}. \end{aligned} \qquad (56)$$

So that we obtain for the alteration of the angular position for the pulsar at the periastron per revolution around the common center of mass 6.22×10^{-5} rad, which is about 0.0036 angular degrees. As the time required for the pulsar for one revolution around the common center of mass is

7.75 h, which are 1131 revolutions per year, we get an alteration of the pulsar's position at the periastron per year of about 4.1°,

$$\Delta\phi = 0.0036^\circ \times 1131 = 4.1^\circ. \tag{57}$$

This means that the periastron is advancing at about 4 angular degrees per year, as is also predicted by Einstein's Theory of General Relativity. Depending on the method, the observed alteration of the periastron's angular position is 4.0 or 4.2 per year.[10,11] According to our considerations above, the area (ΔA) of the elliptical orbit of the pulsar and its companion, which is traversed by the radius of both stars in a certain time, should be on average by the factor 9.4 larger than the corresponding parts of elliptical orbits where the gravitational effect in the center of mass would remain unaltered, or 1, so that we would expect

$$\Delta A' = 9.4 \times \Delta A. \tag{58}$$

If the gravitational effect is stronger by factor 9.4, the radius of the elliptical orbit of the pulsar and its companion must be smaller by the factor of $9.4^{1/2}$, so that the area (ΔA_1) must be smaller by the latter factor squared $[(9.4^{1/2})^2 = 9.4]$, which means, that factor 9.4 in the former equation is a canceling out factor,

$$\Delta A_1' = 9.4 \times \frac{\Delta A}{\left(\sqrt{9.4}\right)^2} = \Delta A. \tag{59}$$

As ΔA and Δt are proportional,

$$\Delta t_1' = \Delta t_1. \tag{60}$$

Therefore, in this case, factor 9.4 is of no relevance for our calculations. If an angle changes by a relative value larger than before $\Delta\phi$, the area must change by this relative value squared $(\Delta\phi)^2$ be larger than before, so that we obtain

$$\begin{aligned}\Delta A &= \left[2 \times \pi \times \left(\frac{v_{P/C}}{c}\right)^2 \times A\right]^2,\\ \Delta A &= \left[2 \times \pi \times \left(\frac{v_{P/C}}{c}\right)^2 \times 1\right]^2,\\ \Delta A &= 4 \times \pi^2 \times \left(\frac{v_{P/C}}{c}\right)^4.\end{aligned} \tag{61}$$

As we want to calculate the altered situation against Newton's theory of gravitation only for the pulsar, we have to divide the area in two parts for the pulsar and the companion, whereas now, we have to again use the different gravitational factors of motion with the correct velocities of the pulsar and the companion (A on the right-hand side of the equation corresponds with the value given by Newton's theory of gravitation and has the relative value 1),

$$\Delta A = 4 \times \pi^2 \times \left(\frac{v_P}{c}\right)^4 \times \frac{A}{2} + 4 \times \pi^2 \times \left(\frac{v_C}{c}\right)^4 \times \frac{A}{2}. \tag{62}$$

It is now important to realize that the areas the two radii of the pulsar and its companion traverse in a certain time are not equal according to Newton's theory of gravity but behave inversely proportional to their mass, so that we must correctly write

$$\Delta A = 4 \times \pi^2 \times \left(\frac{v_P}{c}\right)^4 \times \frac{\frac{m_c}{m_p} \times A}{2} + 4 \times \pi^2 \times \left(\frac{v_C}{c}\right)^4 \times \frac{\frac{m_P}{m_C} \times A}{2}. \tag{63}$$

Only considering the pulsar, we obtain

$$\begin{aligned}\Delta A &= 4 \times \pi^2 \times \left(\frac{v_P}{c}\right)^4 \times \frac{\frac{m_c}{m_p} \times A}{2},\\ \Delta A &= 2 \times \pi^2 \times \left(\frac{v_P}{c}\right)^4 \times \frac{m_c}{m_p} \times A.\end{aligned} \tag{64}$$

For the elliptical orbit of the pulsar, if we substitute the mean velocity 176.67 km/s ($0.00059c$) of the pulsar and again the relative value 1 for the area, we obtain

$$\begin{aligned}\Delta A &= 2 \times \pi^2 \times \left(\frac{v_P}{c}\right)^4 \times \frac{m_c}{m_p} \times A,\\ \Delta A &= 2 \times \pi^2 \times \left(\frac{v_P}{c}\right)^4 \times \frac{m_c}{m_p} \times 1,\\ \Delta A &= 2 \times \pi^2 \times (0.00059)^4 \times 0.9625,\\ \Delta A &= 2 \times \pi^2 \times 1.212 \times 10^{-13} \times 0.9625,\\ \Delta A &= 2.392 \times 10^{-12} \times 0.9625,\\ \Delta A &= 2.30 \times 10^{-12}.\end{aligned} \tag{65}$$

According to Kepler's second law, ΔA and Δt are proportional, but if the radius is traversing a larger part of the area of the planetary orbit at the same time, which is larger by ΔA, the time required by the radius for traversing this area is shorter by Δt, so that Δt must have a negative algebraic sign and therefore for the relative alteration of the time, which the pulsar needs for one revolution, we therefore obtain

$$\Delta t = -2.30 \times 10^{-12}. \tag{66}$$

According to Newtonian quantum gravity, we obtain a relative alteration of -2.30×10^{-12}. Einstein's Theory of General Relativity predicts an alteration of -2.40×10^{-12}, while the observed relative alteration of time in respect to the arrival at the periastron is (–2.30 ± 0.22) × 10^{-12} per one revolution.[10,11] Tayler and Weisberg wrote 1982 in their publication[11] that "…A convenient form of the relevant expression is

$$\dot{P}_b = -\frac{192\pi G^{5/3}}{5c^5}(P_b/2\pi)^{-5/3}(1-e^2)^{-7/2} \times \left(1+\frac{73}{24}e^2+\frac{37}{96}e^4\right)m_p m_c(m_p+m_c)^{-1/3} \quad (8)$$

By inserting the measured values of P_b, e, m_p, and m_c from Table 2 and 3, one obtains the prediction (–2.403 ± 0.005) × 10^{-12}, in excellent agreement with the observed value (–2.30 ± 0.22) × 10^{-12}…."

The prediction calculated by applying General Relativity using tensor calculations and the mathematical construct of four-dimensional space-time was "in excellent agreement with the observed value,"[11] but the prediction calculated by applying Newtonian quantum gravity using simple mathematics is in perfect agreement with the observed value. Using the absolute value of a second for time, we obtain for the absolute time change per revolution about

$$\Delta t = -2.3 \times 10^{-12}\, s. \quad (67)$$

As the pulsar and its companion need about 7.75 h ($\Delta t_1{}'$ = 27 907 s) per one revolution around the common center of mass, the pulsar and its companion therefore need 6.4 × 10^{-8} s less per revolution to reach the position of the periastron,

$$\Delta t = -2.3 \times 10^{-12} \times 27\,907\,\text{s}, \quad \Delta t = -6.4 \times 10^{-8}\,\text{s}, \quad (68)$$

Accordingly, the revolution of the pulsar and its companion around the common center of mass is faster than Newton would have expected. Per year (1131 revolutions), this is about 7.2 × 10 $^{-5}$ s,

$$\Delta t = -1131 \times 6.4 \times 10^{-8}\,\text{s}, \quad \Delta t = -7.2 \times 10^{-5}\,\text{s}. \quad (69)$$

This additional gravitational effects at the binary pulsar PSR B1913 + 16 are said to prove that Einstein's theory of general relativity must be right and represent our physical reality.[10,11] The calculations using Newtonian quantum gravity are much simpler and deliver even more precise predictions of the observed values, as demonstrated at the example of the binary pulsar PSR B1913 + 16. That this possibly proves that General Relativity must be merely a mathematical construct to compensate a lack of knowledge about the underlying physical process and uses some kind of scientific fiction of a four-dimensional space-time to compensate this lack of knowledge.

VI. THE VARIANCE OF THE VELOCITY OF LIGHT IS NO CONTRADICTION AGAINST THE FACT THAT WE ALWAYS MEASURE A CONSTANT VELOCITY *C* ON EARTH, SO THAT ALSO SO-CALLED "SPECIAL RELATIVISTIC PHENOMENA" CAN BE FOUNDED ON A GRAVITATIONAL PARTICIPATION OF ELECTROMAGNETIC RADIATION

According to Newton's mechanics, the frequency of a light beam must slow down, if the light beam is confronted by a stronger gravitational field. But as Newton postulated that "time" passes uniformly, according to Newton, we are only allowed to assert that the frequency has slowed down, but not the time itself. If we allow Newton's physics to measure time by frequencies, also according to Newton's mechanics, there would result a gravitational "time" dilatation. If a light beam that moves vertically towards a mass is accelerated towards the mass by gravitational interaction, the distance the light beam moves per second increases, but as the time gets slower the nearer the light beam gets to the mass, the velocity keeps c, despite the acceleration of light beam. If a light beam that moves vertically away from a mass when it is accelerated towards the mass by gravitational interaction, what corresponds with a deceleration in the direction of the light beam, the distance the light beam moves per second decreases, but as the time gets faster the farther the light beam moves away from the mass, the velocity keeps c, despite the deceleration of the light beam, so that the constant speed c always results, despite the acceleration or deceleration of the light beam. See in detail my last two articles. Experiments prove that we always measure a constant velocity c within the gravitational field of Earth. The acceleration of electromagnetic radiation by gravity, what is forbidden according to relativistic physics, is the necessary precondition that the constant speed of light can always be measured independently of the gravitational "time dilation" because only then the gravitational "time dilatation" is compensated. This was explained in detail in my former articles.[2,7] As I have pointed out many times in my earlier articles, all empirical experiments concerning so-called special relativistic phenomena were interpreted in a biased way, so that Einstein's theory of special and general relativity has only seemingly been verified and instead sometimes even was falsified. But even the basis of Einstein's theory of special relativity has proved to be illogical and contradictory.[1,4,7] Because we measure a constant velocity of light on Earth, despite the variable velocity of light, this proves that the velocity of light must orient on the predominating gravitational field of Earth. This means that with respect to the sum vector of the velocity vectors given by the direction of an emitted light beam with respect to the light source and the direction of the movement of the light source itself must be always c in the gravitational field of Earth. That the velocity of light must orient on predominating gravitational fields, I explained by the minimum energy principle.[3,4] This behavior is obviously energetically favorable for electromagnetic radiation. The participation of electromagnetic radiation in the gravitational interaction can even explain phenomena till now known under the names "dark matter" and "dark energy."[3,4]

VII. FAILURE OF ARGUMENTS AGAINST THE VARIANCE OF THE VELOCITY OF LIGHT CONCERNING EMITTING LIGHT SOURCES, FOR EXAMPLE, THE "DE SITTER EFFECT" AND THE EXPERIMENT OF ALVÄGER

The de Sitter effect was described by Willem de Sitter in 1913, which he used to support the special theory of relativity against a competing emission theory by Walther Ritz that postulated a variable speed of light.[12] De Sitter showed that Ritz's theory predicted that the orbits of binary stars would appear more eccentric than consistent with experiments; however, the experimental result was negative. This was confirmed by Brecher in 1977 by observing the x-rays spectrum.[13] In Ritz's theory, all electrodynamic action, not just light, propagates in a vacuum at the velocity c with respect to the emitting source. William de Sitter considered, that if light was sent in the direction of Earth with different velocities by stars of a binary solar system, because of the many years the light from the stars needs to reach the Earth, the light sent off from the stars at different positions would cause that a binary solar system should be seen from the Earth as blurred blotches and not clearly and discretely, as it is in reality. However, if the light orients itself on the predominating gravitational field, it will orient itself after a very short time on the stronger common gravitational field of both stars, and the speed of light $c+v$ and $c-v$ both light beams will assume the same velocity c with respect to the common gravitational field of both stars, so that we nevertheless observe the stars of binary solar systems clearly and not as blurred blotches. Einstein's postulation of an invariant velocity c of light is not needed, and this argument fails in this context. Also, the experiment of Alväger performed in 1964 at the CERN Proton Synchroton, Switzerland using π^0 particles moving with the velocity of about c emitted γ rays, which seemed to prove that the velocity of light must be constant as postulated by Einstein's theory of relativity.[14] The experiment of Alväger showed that the emitted γ rays have a velocity of about c and not, as the physicists expected it according to Newton's Mechanics, almost double the velocity of light. The result of this experiment was seen again as an argument for Einstein's theory of special relativity, which postulates that the velocity of electromagnetic radiation is independent from the motion of the radiation source. The arguments used by de Sitter and Alväger to support Einstein's theory of relativity lose their meaning, if we realize that the velocity of light must orient on the predominating gravitational field.

VIII. THE LATEST ILLUSORY TRIUMPH OF EINSTEIN'S THEORY OF GENERAL RELATIVITY: THE DIRECT DETECTION OF "GRAVITATIONAL WAVES" BY THE LASER INTERFEROMETER GRAVITATIONAL-WAVE OBSERVATORY (LIGO AND VIRGO)

To detect so-called gravitational waves directly, the following huge devices were built, using huge Michelson–Morley Interferometers, as for example, LIGO in USA and Virgo in Europe. On September 14, 2015, two detectors of the Laser Interferometer Gravitational-Wave Observatory (LIGO) first simultaneously observed a transient gravitational-wave signal. On December 26, 2015, a gravitational-wave signal produced by the coalescence of two stellar-mass black holes was observed by the twin detectors of the Laser Interferometer Gravitational-Wave Observatory (LIGO). On August 17, 2017, the advanced LIGO and advanced VIRGO gravitational-wave detectors made their first detection of gravitational waves produced by colliding neutron stars.[15,17] In my former article "On the new theory of gravitation," I thought that the gravitational field of Earth is so predominant that it would not be possible to detect "gravitational waves" passing through a Laser Interferometer Gravitational-Wave Observatory because the constant velocity of light should be guaranteed by the predominant gravitational field of Earth. Although the detection of the "gravitational waves" mentioned above is questioned by several scientists because of insufficient calibration, I assume that fluctuations of the flow of gravitational quanta ("gravitons") can occur, e.g., caused by colliding neutron stars. "Thinking within the box" of relativistic physics, such a direct detection of "gravitational waves" by Laser Interferometer Gravitational-Wave Observatories must of course be interpreted as a dilation and contraction of the postulated "four-dimensional space-time," as the velocity of the laser rays moving within the vacuum tubes must always be c. "Thinking outside the box" of relativistic physics "gravitational waves" must be interpreted as a change in the strength of the predominant gravitational field of Earth for a short moment, caused by fluctuations of the flow of gravitational quanta arriving from a distant object, also resulting in a change in the velocities of the laser rays, which should be able to cause an interference pattern.

IX. ADVANTAGES OF NEWTONIAN QUANTUM GRAVITY

1. The mathematics is very simple, so that high school pupils can understand and calculate so-called "general relativistic phenomena," while, in contrast, the theory of general relativity is quite difficult to understand.
2. The predictions of Newtonian quantum gravity are more precise than that of General Relativity.
3. The real three-dimensional space is not questioned and the mathematical construct of four-dimensional space and four-dimensional geodesics is not needed.
4. The Newtonian quantum gravity is based on logical assumptions, in contrast to the theory of relativity.
5. The Newtonian quantum gravity integrates quantum physics, in contrast to the theory of relativity.
6. In combination with the binary quantum model of the fundamental forces of physics (Advanced Newtonian quantum gravity), it is the only model that I know which can explain, why gravity happens instantaneously, although the gravitational quanta (gravitons) only move with the velocity c away from a mass.

X. DISADVANTAGE OF NEWTONIAN QUANTUM GRAVITY

To be able to calculate the additional gravitational quantum physical phenomena, which are indirectly calculated also by General Relativity, the Newtonian quantum gravity needs absolute velocity values of the astronomical objects moving against each other and interacting gravitationally with each other, or velocities in relation to the speed of light, because the velocities must be compared to the velocity of gravitational quanta (gravitons) that are moving away from a mass with the velocity c (and also from electromagnetic radiation in the case of my explanation of "dark energy" and "dark matter").[3,4]

XI. INDIRECT PROOF, WHY THE IMAGINATION MUST BE CORRECT THAT GRAVITATION IS INDIRECTLY CAUSED BY A HIGHER QUANTUM PRESSURE FROM THE OPPOSITE DIRECTION THAN THE POSITION OF A MASS

Any theory of gravity explained by quantum physics assuming that gravity is directly transmitted by gravitational quanta that are emitted by the masses with a finite speed has a major problem. There are three fundamentally different states, in which a mass can be against another mass. (1) The mass is at rest compared with another mass. (2) The mass moves toward or away from the other mass. (3) The mass moves circularly or perpendicularly to the flow of the gravitational quanta (gravitons) that come from the other mass (see Fig. 3).

In the first case, if a mass is at rest compared with another mass, there results no problem, as the relative value of the cross section of the mass, which is oriented perpendicular to the flow of the gravitons coming from the other mass, is already included in the gravitational constant G of Newton's theory of gravity. In the third case, the additional relative value of the cross section of the mass, which is oriented in a line with the flow of the gravitons coming from the other mass, gets relevant, because of the perpendicularly movement of the mass, so that the additional factor π emerges, as described in Section IV. If one rejects the model presented here, one must be able to explain why it is necessary to introduce the factor π above in the formula for masses like Mercury, why this is not necessary for electromagnetic radiation, and why by the insertion of the factor π one can get even more precise results for the orbital movements of masses than with Einstein's theory of general relativity. If one is not able to explain this, first one must go from the imagination that the assumptions postulated in this article are correct. In the second case, we have to consider another situation: If the mass is moving toward another mass, there must result a stronger gravitational interaction, because the mass meets more gravitational quanta coming from the other mass. If the mass is moving away from another mass, there must result a weaker gravitational interaction, because the mass meets less gravitational quanta coming from the other mass. In my article "On the new theory of gravitation," I still assumed this concept.[3] However, this is obviously not observed in nature. This proves that there must be an indirect mechanism that explains gravity. Going from the imagination that the emission of gravitational quanta (gravitons) causes higher quantum pressure in the opposite direction, the problem is solved: According to the author's binary quantum model, gravitation arises indirectly by the emission of gravitational quanta by a mass, which generates a higher quantum pressure on the opposite side. How this is explained in detail has to be read in my article "Unification of the four fundamental forces of nature by a binary quantum model."[4] (1) If a mass moves away from another mass, the described increased quantum pressure is weakened by the factor by which the number of gravitons decreases, which meet the moving mass. However, because of the movement of the mass towards the quanta, which cause the higher gravitationally effective quantum pressure from the opposite side, this quantum pressure increases by the same factor, so that both effects are neutralized. (2) If a mass moves towards another mass, the described increased quantum pressure is strengthened by the factor by which the number of gravitons increases, which meet the approaching mass. However, because of the movement of the mass away from the quanta, which cause the higher gravitationally effective quantum pressure from the opposite side, this quantum pressure decreases by the same factor, so that both effects are neutralized. If one rejects the model presented here, one must be able to explain, why using a gravitational model with quanta, which are emitted or transmitted by masses, there does not result different gravitational effects, when a mass moves towards another mass or away from another mass.

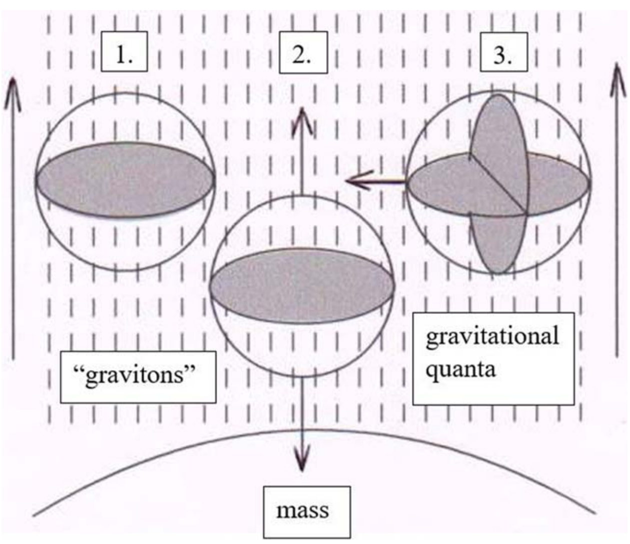

FIG. 3. (Color online) There are three fundamentally different states in which a mass can be against another mass.

XII. THE QUANTUM PRESSURE OF SPACE EXPLAINS THE PHENOMENON OF INERTIAL MASS AND THE EQUIVALENCE OF INERTIAL AND GRAVITATIONAL MASS

Imagine a single large mass in the universe, whereas the universe is filled with gravitational quanta and other quanta, so that there results a certain quantum pressure. Nobody could say that the mass is at rest or moves at a certain velocity. If the mass emits gravitational quanta, these quanta also move in the direction of the particles or quanta, of which the mass consists itself, as the mass has a certain extension. In other words, according to the model introduced in this article, the mass continuously causes a higher quantum pressure of space also on the quanta that the mass consists of, so that the mass is pushed towards the position that it is located, or, if it moves, towards each new position on its way, so that the mass moves on forever, unless a force acts on the mass. If we tried to move the mass, we would have to overcome by a certain force the capacity of the mass to push itself to its position, which we would notice as a gravitational resistance. This corresponds to Newton's first law of motion: "In an inertial frame of reference, an object either remains at rest or continues to move at a constant velocity, unless acted upon by a force." Today it is differentiated between inertial and gravitational mass, but both have the same origin. Therefore, the "Advanced Newton quantum gravity" can explain the equivalence of inertial and gravitational mass. As pointed out in detail in my last article, the explanation of the equivalence of inertial and gravitational mass by Einstein's theory of relativity is illogical and even contradicts relativistic physics.[2]

XIII. CONCLUSIONS

Einstein's theory of general relativity is a mathematical construct founded on illogical conclusions to calculate so-called general relativistic phenomena, which are not relativistic in reality. However, as the relativistic physicists using Einstein's theory of general relativity can calculate values very precisely that play a role in nature, they are led astray. In this article, I introduced a theory called "Newtonian quantum gravity" that combines Newton's theory of gravity with quantum physics in order to be able to calculate gravitational motion effects, which are until today called "relativistic" phenomena. The mathematically thinking relativistic physicists find Einstein's ideas ingenious because Einstein's mathematics of a four-dimensional space-time, based on his illogical derivation of gravitational time dilatation, which he reasoned with the equivalence of gravitational and inertial mass, delivers correct mathematical results.[7] However, a theory based on illogical assumptions does not get better by the fact that the mathematics based on these assumptions finally yields correct results. While relativistic physicists acknowledge that the theory of general relativity must be wrong because of its lack of a quantum physical foundation, almost every day physicists proclaim that this theory has been again confirmed by a very precise test. Einstein's theory of general relativity is a mathematical construct founded on illogical conclusions to calculate so-called general relativistic phenomena, which are not relativistic in reality. Einstein's postulation that the velocity of light (and therefore also the velocity of "time") must be constant within any inertial system, independent from the velocity or the gravitational potential, is not real either. However, as the relativistic physicists using SR can calculate values very precisely that play a role in nature, they are led astray. The author advises to give up the theory of relativity in order to enable a paradigm shift in physics.

XIV. FINAL REMARKS

Hanns Ruder, a former relativistic astrophysicist at the University of Tübingen (Germany), once in a discussion in Ansbach, Bavaria, in the year 2012 conceded that he does not understand Einstein's general theory of relativity, but that its mathematics provides accurate predictions up to the 12th decimal place, what forces us to place the reality of general relativity above our logical understanding. Therefore, we had to accept that Einstein's theory represents the reality of our world. With the precise predictions up to the 12th decimal place he meant the quantitative predictions that Tayler and Weisberg had calculated by General Relativity for the binary pulsar PSR B1913 + 16, which could be verified by astronomical observations. As shown in this article, we get this predictions even more precisely by (Advanced) Newtonian quantum gravity. Many physicists admit that they do not understand the theory of relativity of Einstein and that they just apply it in their daily work. Attitudes such as that of Professor Ruder helped to prevent physicists from seeking an alternative theory that is logical and intelligible and can deliver the same predictions. As the physicists are used to Einstein's relativistic mathematics and the Einstein field equations to calculate so-called "general relativistic" phenomena and as the computers are programmed worldwide to calculate with this equations, the physicists should be allowed to calculate as usual because the reprogramming of the computers would be too time-consuming and expensive. But it should be made clear at the physical faculties of the universities that these are merely useful computational methods representing a fictional reality that has nothing to do with our real physical world. Latter is the reason why generations of physicists were not able to unify Einstein's theory of general relativity with quantum physics. How should it be possible to combine quantum physics with something that does not exist? In the Middle Ages, planets moved on epicycles, today on geodesics, which are both unreal artificial constructs, so that after more than hundred years it is time to replace Einstein's theory of relativity and bring physics back to reality.

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