The Heisenberg principle as the source of space-time curvature

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Abstract

So far, all attempts to detect dark matter have failed. Today no conclusive physical background has been found for dark energy. If gravity were not infinite but finite, as it occurs in various quantum gravity theories, dark energy and dark matter could be explained as dissolved gravitational energy in the growing universe and thus one of the greatest mysteries in physics could be solved.

1. Introduction

The theory of relativity describes the attraction of masses through space-time curvature. But how can masses cause space-time curvature? Is there a physically tangible background for this, beyond the abstract energy-momentum tensor (1) as the “source term”? And does this make it easier to see whether gravity is infinite or just finite? To date, gravitational theories with arbitrarily large but finite range, however, either violate basic physical requirements, do not limit to general relativity or both.

The mass of a body consists entirely of nucleons, which have angular momentum. If one applies quantum mechanical calculation models for nucleons, it becomes clear that mvr in a nucleon does not satisfy the Heisenberg inequality (2). The inequality would also not be satisfied if v were zero or undefined. This is even more obvious for even smaller particles. However, since the spin of such particles is a very relevant parameter, it follows that the radius of this particle would have to be quantized, i.e., effectively much larger. But if this were the case, mass up to this radius R (i.e., the range of this force) would be attracted inwards like mass points inside the particle, which corresponds precisely to gravity.

Formally, a nucleon would bei then R large. G would be the constant that holds the formal, oversized nucleon together. Since a nucleon has several relative velocities as it rotates in the universe around itself, around the Earth, around the sun, around the center of the Milky Way, etc., different gravitational ranges come into play according to $R=c/8\pi f$:

$$R = \frac{h}{2\pi mv} = \frac{h}{4\pi^2 mfr} = \frac{2\pi mch}{16\pi^2 mfh} = \frac{c}{8\pi f}, \qquad r = \frac{4h}{2\pi mc} = 0.8412356\, fm \quad (1)$$

From this formula we see, that the range of the force depends only from c and f (from the rotation around themselves, around the earth, around the sun, etc.). With the construct of the effective radius, there would be a force that attracts other masses within this radius with mg=mMG/r2, i.e., the Newtonian gravitational force. This gravitational force is proportional to the square of the distance, since in a nucleon the density gradient is dρ = m/r2. According to the formula dρ=ω2r/ß (ß=G) from density gradient centrifugation, the value mG/r is obtained for this gravitational potential.

$$d\rho = \frac{\omega^2 r}{ß}, \quad \frac{m}{r^2} = \frac{4\pi^2 f^2 r}{ß}, \qquad v2 = \frac{mG}{r} \quad (2)$$

Even if a proton rotation cannot be described in the classical sense, the other rotational movements in the universe can definitely be included in the calculations in a classical way. The gravitational range for gravitation within a galaxy is approximately 10^{22} to 10^{23} m.

2. Does the new theory contradict the theory of general relativity?

This theory does not contradict the general theory of relativity (1), rather it supports the idea of space-time curvature, since the effective, enlarged space R^3 itself exerts a force (apparent force) on masses. The geometric mean of the maximum range R is the root of R multiplied by the smallest length, the Planck length lp. The average gravitational force (inside and outside the nucleon) is inversely proportional to the square of this average, which interestingly corresponds to the right-hand side of Einstein's field equation (1):

$$\frac{1}{l_p R} = \frac{\frac{hG}{c^3}\frac{8\pi f}{c}}{{l_p}^3} = \frac{8\pi G}{c^4}\frac{E}{V_p} = \frac{8\pi G}{c^4}\omega_p \quad (3)$$

After transformation, the spatially limited gravitational energy per volume Eg=m2G/RV looks like the cosmological constant lambda (1) from Einstein's field equations:

$$Eg \;= \frac{m^2 G}{RV} = \frac{8\pi G}{c^2}\cdot \rho \cdot mcf \;=\; \Lambda \cdot mcf, \qquad \Lambda = \frac{Eg}{F} \quad (4)$$

F=mcf is a force that, multiplied by 8πR, corresponds to the energy mc2 of the matter. From this, Ω, the proportion of dark energy, can be calculated as follows under the assumption of limited gravity made above:

$$\Omega = \frac{\Lambda c^2}{3H_0^2} = \frac{8\pi E_g R}{Vmc^2}\frac{c^2}{3H_0^2} = 8\pi\left(\frac{m^2 G}{R}\right)\frac{Rc^2}{3Vmc^2 H_0^2} = \frac{R_s c^2}{H_0^2 r^3} = \frac{\frac{2mG}{R}}{v^2}\frac{R}{r^3}Mps^2$$

$$= \frac{6v^2}{v^2}\frac{r}{Mps}\frac{R}{r^3}Mps^2 = \frac{6R}{r^2}Mps = 6*\frac{8}{15^2}*3.262\,(MLj) \approx 0.7 \quad (5)$$

(6 is the quotient of visible and dark matter to visible matter). From a number of different observations, the value of the cosmological constant is now actually estimated to be ΩΛ ≈ 0.7, which means that around 70% of the energy density in the universe is in the form of dark energy.

The general theory of relativity postulates a hypothetical particle with spin number 2 that mediates the gravitational force: the graviton. This is by definition massless, but there is now also a consistent field theoretical description of a massive spin-2 particle. The corresponding theory is an extension of the general theory of relativity with a very special mathematical structure, called Ghost-Free Biometric Theory (Bimetric Theory for short). This is because their special structure avoids a mathematical inconsistency, a so-called ghost, that was a problem in previous proposed theories. Biometric theory describes both a massive and a massless spin-2 particle interacting with each other. Gravitation can hereby indeed have a finite range, as suggested by recent theoretical developments. These modifications to general relativity introduce specific mass terms for spin-2 and spin-0 gravitons, resulting in a finite-range gravity theory that smoothly transitions to general relativity in the massless limit. While experimental data supports the local weak-field predictions of this theory, it also leads to intriguing consequences such as the elimination of black hole event horizons and the introduction of oscillatory behavior in the expansion of the universe. Additionally, in certain scenarios, the presence of tachyonic massive gravitons can drive late-time accelerated expansion in the universe, making it an attractor of the mod. These findings challenge traditional notions and highlight the complexity and richness of gravitational theories.

In both Newton's and Einstein's theories, gravity is not limited in its range, it just becomes significantly weaker with increasing distance. Nevertheless, there are considerations and quantum gravity theories in which gravity would be a quantized quantity, that is, it could only take on multiples of a certain value. In this case, it would be quite possible that a limited range would be an accurate description, because at a certain distance one times this value is undershot and would therefore remain zero times the elementary gravity. However, such quantum gravity theories are currently still the subject of research.

3. Proofs of the model

Twelve trans-Neptunian objects that orbit the Sun beyond 240 AU (semimajor axis) have very similar orbit directions (18), which cannot be a coincidence and is why a ninth planet the size of 5 Earth masses is suspected beyond Neptune, which follows the orbit of these planets influenced. But the search for this planet has so far been unsuccessful. The protons that cause the Sun's gravitational field, whose radial field ends at $c/8\pi f$ = 240 AU according to this theory, also rotate relative to the galactic center at a speed of 220 km/s. In this direction, the field has a greater range due to the very low rotation frequency of $c/8\pi f$, so that these objects are still attracted to the Sun, but in orbital planes that are arranged towards the galactic center. The fact that the similar orbital planes of objects beyond 240 AU point exactly in this direction supports the radially limited gravity, which is not infinite, as Newton's theory suggests. This theory can be proven by demonstrating a rotation of the orbital plane of these objects by 1.29 arcseconds per year or 129 arcseconds per century, since according to the theory the orbital plane should always point exactly towards the center of the galaxy.

Another indication of the correctness of limited gravity is a publication by Nhat-Minh Nguyen, Dragan Huterer and Yuewei Wen (17), who report that they found evidence of suppression of structural growth in the cosmological model, i.e., that large structures in the universe do not develop according to the theory of relativity would condense. This publication appeared in Physics. Rev. Lett. 131, 111001, it was published on September 11, 2023. Because gravity is limited, no denser structures can form at a galaxy distance > 10^{23} m, since there is no gravity between the galaxies to promote densification would.

Ultimately, the observed proportion of visible (4.9%) and dark matter (26.7%) can be precisely determined from this theory if massive gravitons are assumed as dark matter, while dark, free energy (68.5%) can be calculated from the quotient R/Dg (Dg = diameter of an average-sized galaxy, R = range of gravity) and the proportion of dark matter, assuming that both quantities arose from the dissolved gravitational energy in the expanding universe. In a galaxy cluster with an average of n =

500 galaxies, the typical distance between the galaxies is rg = 1 mpc. If one assumes that today, due to the limited gravitational range, a galaxy is gravitationally bound to only 10 other galaxies in the immediate vicinity, one obtains a gravity that is 20.4 times smaller compared to the gravity in the formerly smaller cluster in the young universe, in which all galaxies in the cluster were still in a gravitational bond to one another.

$$\frac{\frac{n^2 m^2 G}{R}}{\frac{10 n m^2 G}{r_g}} = \frac{n}{10}\left(\frac{R}{r_g}\right) = \frac{500}{10} \cdot 2.452 = \ 20.4 \quad (6)$$

(R=c/8πf=8 million ly). This means that today there is 20.4-1=19.4 times more dark energy and dark matter than visible matter, which is also what is observed (68.4%+26.7%)/4.9% = 19.4). This validates the model of resolved gravitational energy in the expanding universe and the finite gravitational range.

4. Meaningfulness of a quantum-theoretical description of gravity

Quantum mechanics is (just) a special description of the physics of subatomic particles. The only difference to classical physics is that Heisenberg's principle (9) is more effective here, since we are dealing with very small quantitative quantities for which Heisenberg's inequality is not always fulfilled. Based on the ratio of its De Broglie wavelength and its radius, a particle is also predetermined whether it behaves more like a particle or more like a wave (particle-wave dualism of small particles, e.g., probability of residence of electrons in atoms). If the ratio is large, as with electrons and quarks, the particle will behave like a wave; if the ratio is small, as with protons, the particle no longer exhibits wave properties. Therefore, proton-based processes such as gravity cannot be captured in quantum theory or expressed as a wave function. All "mysterious" observations in quantum physics can be traced back to Heisenberg's inequality and this particle-wave duality. It has long been understood that electromagnetic energy is emitted in quanta (photons), but there are also forms of energy that are not quantized, such as dark energy. The hydrogen problem, for example, can be solved using Heisenberg's inequality and wave equations. The GUT theory, a quantum theoretical summary of the weak electromagnetic interaction and nuclear force, has proven to be invalid, and the Planck scale is also not valid, since the 4 fundamental forces in the Big Bang were never the same at any point in time, which is due to the causes described here gravity results. Therefore, instead of continuing to strive for a quantum mechanical description of gravitons, it only makes sense to combine the four fundamental forces in a different theoretical way into a TOE formula. Heisenberg's inequality has several formulations and you always have to treat them specifically, e.g., with a certain formulation $\Delta L \Delta \phi >= h/2$ according to Pierre A. Milette (8) you can calculate the spin of particles from the inequality. From this you can see that the spin measurement just shows the value of the inequality divided by $\Delta\phi = 2\pi$ (5), while the real angular momentum and rotational speed are much lower. With this knowledge, one can rightly doubt the fact that nucleons, for example, do not actually rotate. The gravitational force from the general theory of relativity is also not sufficiently understood because the background that leads to this force was not yet known. For example, G is not constant and varies slightly (13) when the earth's magnetic field varies, as was shown by measurements in the GRACE mission (11,12), since, according to this theory, gravity is based on the rotation of protons in space and this can be influenced by magnetic fields. This can also be seen, for example, in the fact that the old original kilogram in Paris had steadily lost weight for some unknown reason, while the earth's magnetic field has been steadily decreasing for centuries. This can be explained by the fact that the proton rotation speed v decreases in the decreasing earth's magnetic field and the weight of a body $mg = mMG/r$ also decreases due to the decrease in $G = v^2r/m$. This problem, however, cannot be solved by the newly introduced silicon ball. Gravity is also probably not infinite but rather limited, which can explain dark matter and dark energy, namely that at a certain distance gravity ends and as a result of further expansion there is free energy in the empty spaces and mass-laden gravitons within the galaxies as a balance have formed. Such a process is also known, for example, from electricity theory. If the electric charge disappears (e.g., electrons are knocked out in the light bulb), photons are emitted to compensate for this (10). Thanks to all of these new findings, many puzzles in physics can be solved, for example the puzzle about the different proton radius. Based on new findings (new physics), it is also very likely that a singularity in the Big Bang and the generation of quarks through an energy density can be ruled out, which favors the theory of the generation of originally neutral quarks from electromagnetic radiation.

5. Conclusions

The construct of the effective radius can be used to explain not only gravity itself (also illustrated), but also the non-quantizability of ART, dark matter and energy, the unification of the four fundamental forces and even the Hubble voltage. It would also explain why only Andromeda and the Milky Way attract each other and other galaxies in our Local Group do not, and why the Virgo cluster appears to be attracted to the large attractor. In the broadest sense, dark matter would be the graviton energy within galaxies (massive gravitons) and dark energy would be free energy, both of which arose from gravitational energy that dissipated as the universe expanded due to the limited range. One would also understand physically why masses ultimately curve space-time. The nucleon radius (with mvr<h/2π) is converted by the minimum permissible torque (Heisenberg's principle) into an effective radius R (mvR=h/2π), within which cohesive forces of a gravitational nature act. The effective radius R=c/8πf would be equal to the frequency-dependent, finite gravitational range, which can be very different depending on the (different) rotation speeds of the nucleons in space. Since the gravitational force is based on Heisenberg's inequality, a fundamental principle of quantum theory, this may open up new paths for a quantum theoretical description of gravity.

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