

Quantum Gravity**To Unification of Quantum Field Theory (QFT) and General Relativity Theory (ART)****Friedhelm M. Jöge****Independent scientist, Germany****Corresponding Author**

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Abstract

The idea that the energy of the gravitational field is an equivalent of the dark energy of the universe [1] leads to quantum gravity. The calculation of dark energy is based on quantum theory ($E = h\nu$) and the energy of the gravitational field is based on the theory of gravity (ART). The unification leads to quantum gravity.

The result leads to formulas (II), (III), (IV) and (V), see “Derivation of formulas for unification of QFT and ART”, next section.

For the first time, the unification of Quantum Field Theory (QFT) with General Relativity Theory (ART) was initiated with prospects of success. The way to Quantum gravity is shown. Further research is needed.

Keywords: Unification, Quantum Field Theory (QFT), General Relativity (ART), Dark Energy, Calculation, Gravitational Field, Universe

Definition of Symbols Used in Formulas E = Energy E_d = Dark Energy E_b = Energy Equivalent of Visible Baryonic Matter t = Time t_u = Age of the Universe $t_u = 13.75$ billion years $= 4.326 \cdot 10^{17} \text{ s} = 4,342 \cdot 10^{17} \text{ s}$ in 13,8 billion years t_p = PLANCK Time $t_{up} = t_u / t_p$ = Age of the Universe in PLANCK Time Units t_g = Period of Oscillation ¹⁾ $\hbar$ = PLANCK's quantum of action G = Constant of Gravitation c = Speed of Light**1. Introduction**

The unification of Quantum Field Theory (QFT) with General Relativity Theory (ART) is the dream of theoretical physicists. It has not been successful to date. However, a first approach has been made in this article and this first approach needs to be further formulated theoretically.

2. Derivation of formulas for unification of QFT and ART

The formula (1.2) in my article “Theory of Dark Energy” [2] and “Calculation of Dark Energy and Dark Matter” [3 page 1] and the

formulas (1) and (2) in the article “Energy of the Gravitational Field as an Equivalent of the Dark Energy of the Universe” [1] are as follows:

$$\begin{aligned} \mathbf{E_d} &= \mathbf{h \, t_{up} / t_p} & \text{(I)} \\ E_d &= (h/t_p^2) \cdot t_u & (1.2) \\ E &= (h/t_p^2) \cdot t & (1.2)' \end{aligned}$$

or in general form:

and

$$\begin{aligned} E_d &= E_g & \text{(a) by Valentyn Nastasenکو} \\ \mathbf{E_g} &= \mathbf{(h \, c^5 / G)^{1/2}} & (1) \\ E_d &= E_g \cdot (t_u / t_g) & (2) \end{aligned}$$

From this we can deduce:

$$\begin{aligned} t_u &= (c^5 / hG)^{1/2} \cdot t_p & \text{(II)} \\ t_u &= c^5 / G & \text{(III)} \\ E_d &= h \, t_g / t_p^2 & \text{(b)} \\ E_d &= h \, c^5 / (G \, t_p) & \text{(IV)} \\ t_g &= t_u & \text{(V)} \end{aligned}$$

to (b):

$$E_d = (h/t_p^2) \cdot t_u, E_d = E_g \cdot (t_u/t_g), E_d \cdot t_g = E_g \cdot t_u, (h/t_p^2) \cdot t_u \cdot t_g = E_g \cdot t_u, h/t_p^2 \cdot t_g = E_g$$

$$E_d = h \, t_g / t_p^2$$

Formula (1.2) and (2) provides the values $0.994 \cdot 10^{71}$ J and $1.58 \cdot 10^{70}$ J. See “Application”.

3. Application

The value of dark energy can be calculated in two different ways:

1. by using formula (1.2) given in my article “Calculation of Dark Energy and Dark Matter” [3 page 1]. It reads: $E_d = (h/t_p^2) \cdot t_u$. The value can be found in Table 1 on page 4 and is: $0.994 \cdot 10^{71}$ J.

2. by using formula (1) and (2) given in the article “Energy of the Gravitational Field as an Equivalent of the Dark Energy of the Universe” [1]. It reads: $E_g = (h \, c^5 / G)^{1/2}$ and $E_d = E_g \cdot (t_u/t_g)$. The value is: $1.58 \cdot 10^{70}$ J.

The value for path 1 is 84,1 % higher than for path 2. This seems like a big difference, but at this scale it becomes more relative. It should also be noted that the value is a reasonable approximation considering that other calculations between theory and verification were wrong by over 100 order of magnitude.

The formula (1) is provisionally, points in the right direction towards quantum gravity, but requires further theoretical efforts.

Formula (II) provides a value for the age of the universe that is in very good agreement with the known value given in the literature; is stated: $4.342 \cdot 10^{17}$ s ; is calculated: $3.67 \cdot 10^{17}$ s.

The relatively good agreement of the value of the age of the universe shows the fundamental correctness of formula (II). Formula (II), (III) and formula (IV) thus a confirmation of the path found to the unification of quantum theory (QT) and general relativity (ART) or quantum gravity.

Thus, formula (1.2) delivers exactly what Prof. Dr. Alexandre Tkatchenko from the University Luxembourg says: Accurate Calculating the value of Dark Energy could help bring together two of the largest fields in physics: Quantum Field Theory (QFT) and the General Theory of Relativity (ART) developed by ALBERT EINSTEIN.

4. Conclusion

Formula (V) shows the unification of the quantum field theory (QFT) with the general theory of relativity (ART) and leads to the result: “The age of the universe is equal to one oscillation period”¹⁾.

This leads to the following questions:

- In both small and large things there is the characteristic of coming and going. On a small scale we know quantum fluctuation. Is there only one quantum with this property or are there many of this kind? This also includes arguments for the “many-worlds theory”.
- Is there an expansion and opposite contraction of the universe? This has been discussed many times.

This first approach needs to be further formulated theoretically.

The phenomenon of coming and going also exists in nature, also known as the cycle of nature.

Examples of this include:

- Nature changes between the seasons, such as spring, summer, autumn, and winter, day and night. Humans also have their own rhythm of day (activity, work) and night (sleep, rest).

- Dying / pass away and becoming:

The seed must “die” in order to produce ears of corn.

Water that evaporates and forms clouds rains down again.

- Bible verses:

about going out and coming in: Psalm 121:8 “The *LORD* keep your going out and your coming in from now on end forevermore”.

“Going out and coming in” translates a Hebrew expression referring to daily activities. Going out referred the man's leaving home in the morning to labor and coming in referred to his returning home after work activities of the day the believer could be confident of the *LORD*'s presence and protection.

about day and night:

Psalm 74:16 “Yours is the day and yours is the night; you have given the stars and the sun their paths.”

Heaven and earth will be recreated.

The idea of a new heaven and a new earth is found in the Bible, especially in: Isaiah 65:17. “For behold, I create new heavens and a new earth; and the former things shall not be remembered or come into mind” and Revelation 21:1. “And I saw a new heaven and a new earth; for the first earth passed away, and the sea was no more”.

- Circular economy:

recycling plastic waste and save petroleum oil.

References

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3. Jöge, F. M. (2019). Calculation of Dark Energy and Dark Matter. *International Journal of Physics and Astronomy*, 7(1), 1-7.
4. Gornitz, T. H. Quantum cosmology explains “dark matter” and the structure of interactions and makes “dark energy” superfluous.

¹⁾ “Oscillations are fundamental oscillations of the cosmic space [4, pg.15]. THOMAS GÖRNITZ says: “Structural quanta emerge from a quantum-theoretical description of “oscillation states” of a system around its ground state. They produce many effects. The AQIs of protyposis are also structural quanta and not particles. One can interpret them as the „fundamental oscillations of the cosmic space”.