

Dark matter and dark energy as fundamental properties of space

1 Introduction

The concepts of dark matter and dark energy were established as fundamental components of modern cosmology before the turn of the millennium. Nevertheless, their physical nature remains one of the greatest unsolved mysteries in physics. This represents an unsatisfactory situation, as a real physical equivalent must exist for these theoretically repeatedly confirmed entities.

However, this reveals a fundamental problem: theoretical physics can provide only theoretical answers. Even if a plausible explanation for dark matter and dark energy is formulated, it inevitably remains within a mathematical or conceptual framework. However, a theory alone does not create a physical reality; it can provide only an approximation of the actual processes.

2 Starting point: Natural physics

Theoretical physics, consisting of the theory of relativity and quantum physics, is a remarkable, highly intellectual body of thought that has proven itself in countless experimental confirmations. However, these theories may be precise and successful; they are not identical to nature itself.

"Wherever physical phenomena are explained exclusively by theories, the underlying natural process remains unrecognized."

With an unbiased view and the realization that nature does not manifest itself in theories, the true processes behind these theoretical constructs can be revealed through logical analysis and fundamental mathematics. On this basis, the nature of dark matter and dark energy can be determined. As a result, natural processes behind the theoretical explanations emerge everywhere.

3 Starting point: The interaction of fundamental constants

Current physical theories describe space via two fundamental parameters: the permittivity ϵ_0 and the permeability μ_0 . These parameters determine the electromagnetic properties of the vacuum and interact directly with the speed of light, which means that they play a central role in understanding the physical structure of space.

$$c := \sqrt{\frac{1}{\epsilon_0 \mu_0}} = 2.998 \times 10^8 \frac{\text{m}}{\text{s}}$$

Light is a wave! Every wave and every pendulum is naturally based on the resonance between kinetic and potential energy (everything else is mystical nonsense). There is no plausible reason why this should be any different from light. It is therefore reasonable to assume that the light wave is also based on a fundamental resonance principle—most likely on a natural mechanism that is determined by the interplay of pressure and density in space.

$$c := \sqrt{\frac{\text{Druck}}{\text{Dichte}}} = 1 \frac{\text{m}}{\text{s}}$$

This connection suggests that, logically and visually, the reciprocal of the permittivity ϵ_0 conceals a pressure and the permeability μ_0 a density. This indicates that space is not simply an empty stage on which theoretical concepts are staged but rather has fundamental physical properties itself.

3.1 The search for the starting point of the solution

A central approach to determining the physical structure of space lies in the analysis of the permeability μ_0 and permittivity ϵ_0 , which are defined as squares. The ampere itself is an abstract unit based on a self-referential definition of the elementary charge¹. Accepting this abstract definition prevents access to the underlying natural processes. It is necessary to question these structures, and the fundamental properties of the field constants must be revealed.

4 Derivation of natural space constants

In this section, we use unconventional hacking methods to decipher the puzzle piece by piece and find the natural definition of the space constants behind the abstract definition. The starting point is to look at the quotient Qx , which is obtained by the magnetic field constant dividing and then by μ_0 by the square of the elementary charge e multiplied by A^4 . This value still contains the physical properties of space but without the undesirable involvement of the abstract ampere.

$$Qx := \frac{\mu_0 \cdot A^4}{e^2} = 4.895 \times 10^{31} \frac{m \cdot kg}{s^4}$$

An analysis of the unit of Qx shows that this value of course is composed of density and velocity.

$$\text{density} \cdot \text{velocity}^4 = \frac{kg}{m^3} \cdot \left(\frac{m}{s}\right)^4 = \frac{m \cdot kg}{s^4}$$

In the context of permeability and permittivity, the speed of light c is the only relevant speed. If the value of Qx is divided by the fourth power of the speed of light, the space density ρ_0 , which corresponds to the permeability, is obtained.

$$\rho_0 := \frac{Qx}{c^4} = 6.06 \times 10^{-3} \frac{kg}{m^3}$$

The natural values for space can be derived from the known relationship between permeability, permittivity and the impedance of the vacuum.

$$P_0 = \rho_0 \cdot c^2 = \frac{Qx}{c^2} = 5.447 \times 10^{14} \text{ Pa}$$

The reciprocal of the permittivity ϵ_0 results in the pressure P_0 , and the impedance of the vacuum corresponds to Z_0 , which represents the momentum density.

$$Z_0 = \rho_0 \cdot c = \frac{Qx}{c^3} = 1.817 \times 10^6 \frac{kg}{m^2 \cdot s}$$

This finding shows that space density (dark mass) and space pressure (dark energy) are quantities whose fundamental natural value can be derived directly from the properties of the field constants.

5 Consequences for dark energy and dark matter

Since space has a defined density and pressure, dark matter and dark energy are not separate entities but are hidden in these spatial properties. The uniform distribution of density and pressure in space explains why dark matter and dark energy have thus far remained invisible and could not be detected directly.

¹ **Definition PTB:** The ampere, symbol A, is the SI unit of electric current. It is defined by setting the elementary charge e to the numerical value $1.602\ 176\ 634 \times 10^{-19}$, expressed in the unit C, which is equal to A s, where the second is defined by $\Delta\nu Cs$

6 Conclusion

The derivation of the fundamental properties of space shows that space is more than a mere void. The idea that space itself has density and pressure properties represents a new paradigm in physics. Dark matter and dark energy are therefore not separate entities but inherent properties of space itself. This perspective makes it possible to explain phenomena such as gravity and other forces of attraction in a natural way. It also makes it clear that there is an immense amount of energy stored in space that could be harnessed.

This clarifies the whereabouts of dark energy and dark matter: both are homogeneously distributed in space. Any other distribution would be illogical because if these masses were unevenly distributed, they would have been discovered long ago.

7 The energy of space - an inexhaustible resource?

The fact that space itself contains an unimaginable amount of energy is one of the most fascinating findings to emerge from this derivation. A simple calculation shows that a single cubic meter of space contains an energy of 8.17×10^{14} joules—a gigantic amount of energy.

$$E_{m^3} := \frac{3}{2} \cdot P_0 \cdot m^3 = 8.173 \times 10^{14} \text{ J}$$

To put this into a tangible perspective, if the entire energy of a cube with an edge length of just ten meters could be fully utilized, this would correspond to Switzerland's total annual primary energy requirement of approximately 810 petajoules (PJ).

8 Dark energy - found but not usable?

Dark energy is not just a theoretical concept but also a real physical quantity that is invisibly hidden itself. The difficulty lies in its physical nature. The structure of space does not exist in a directly usable form, but at an extremely low thermodynamic level of **-270.45 °C (approximately 2.7 Kelvin)**, it is close to absolute zero. The crucial question remains: will the innovative power of mankind ever be able to overcome this enormous challenge?

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Further works on the subject of "natural physics", whether finished or unfinished, with correct or incomplete approaches and models, on these or similar topics, which are based on mathematically underpinned philosophical considerations for real and natural physics, are available at:

WANCHAI AG: <https://wanchai.ch/>

Researchgate.net: <https://www.researchgate.net/profile/Walter-Ruh>

Academia.edu: <https://independent.academia.edu/WalterRuh>

viXra.org: https://vixra.org/author/walter_ruh