

The true nature of dark energy and dark matter

Prologue: The concepts of dark matter and dark energy were recognized as fundamental components of modern cosmology before the turn of the millennium. However, their true physical nature remains one of the most challenging mysteries in physics. This is an unsatisfactory situation, as there must ultimately be a real physical equivalent for these entities, which have been confirmed theoretically many times. However, this reveals a fundamental problem: theoretical physics can provide only theoretical answers. Even if it formulates a solution for dark matter and dark energy, this inevitably remains within the theoretical framework—a purely mathematical or conceptual explanation. However, a theory alone does not create physical reality.

"Wherever only theories explain physical phenomena, the natural process behind them has not yet been recognized!"

With an unbiased view, a critical attitude toward existing theories, logical analysis and fundamental mathematics, the true nature of dark matter and dark energy can be deciphered.

Assumptions: A first and obvious assumption is that dark matter and dark energy are homogeneously distributed throughout the universe. Otherwise, they would have already been detected by conspicuous local increases in mass or significant symmetry perturbations. A second plausible assumption is that the fundamental physical properties of space are given by permittivity and permeability. It logically follows that dark matter and dark energy are possibly hidden precisely in these fundamental properties of space.

Anticipation of the results: These assumptions can be derived stringently in the following. A factor **X_Con** can be determined such that the permeability can be converted into the density of the space. The reciprocal of the permittivity results in space pressure using the same factor.

$X_Con := \frac{A^4}{c^4 \cdot e^2} = 4.823 \times 10^3 \frac{A^2 \cdot s^2}{m^4}$	$\mu_0 = 1.257 \times 10^{-6} \frac{m \cdot kg}{A^2 \cdot s^2}$ <p>density rho_I0 = natural value of permeability</p> $rho_I0 := \mu_0 \cdot X_Con = 6.06 \times 10^{-3} \frac{kg}{m^3}$	$\epsilon_0 = 8.854 \times 10^{-12} \frac{A^2 \cdot s^4}{m^3 \cdot kg}$ <p>pressure P0 = natural value of the reciprocal of permittivity</p> $P0 := \frac{X_Con}{\epsilon_0} = 5.447 \times 10^{14} Pa$
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These findings show that dark matter and dark energy are not isolated phenomena but rather fundamental properties of space itself, which are hidden in those that have thus far been defined in abstract terms of physical constants. This corresponds to the logical assumption.

Remarkable finding: One cubic meter of space contains an energy of **8.17 × 10¹⁴ joules**. Switzerland's total annual primary energy requirement is approximately 810 petajoules (PJ). If this free energy could be extracted completely, a cube with an edge length of 10 m would cover this demand. In practice, however, this remains impossible, as from today's perspective, energy at extremely low temperatures is available and cannot be easily harnessed technically. **270.45 °C (approx. 2.7 Kelvin)**

Logical proof of the existence of dark energy: It has long been known that nothing can be cooled to absolute zero temperature. The reason for this is now obvious: energy continuously flows from the space into the object to be cooled.

Starting point for the search

New insights usually arise where contradictions and inconsistencies become apparent. A central paradox of classical physics is the assumption that a proton holds the electron by an "attractive force", whereas at the same time, an infinite force should arise at a minimum distance—a concept that is neither naturalistic nor realistically comprehensible.

"Attractive forces" are not mechanistically real. In fact, such interactions can be explained only by pressure forces (collision forces). Additionally, there is no simple mechanism in which an infinitely small distance can generate a force that is large.

Starting point for the solution

In solution, the electrostatic force between protons and electrons can be analyzed. The conventional formula **F_{e_p} (1)** for the "attractive force" of the proton on the electron in its first orbit according to **Bohr's atomic model** is as follows:

$$F_{e_p} := \frac{1}{\epsilon_0} \cdot \frac{e^2}{4 \cdot \pi \cdot a_0^2} = 8.239 \times 10^{-8} \text{ N} \quad (1)$$

F_{e_p} = electrostatic force between a proton and an electron on the first Bohr orbit

e = elementary charge of the electron and proton

a₀ = Bore radius of the first path

ε₀ = electric field constant

μ₀ = permeability of the vacuum (magnetic field constant)

The derivation

The formula for the force **F_{e_p} (1)** can be broken down into two factors via transformation: a first factor, which is the quotient of the square of the elementary charge and is defined, and a second factor, which is the purely geometric relationship of the permittivity ("ampere-free" and is a function of the radius attenuation of radiation **(2)**).

$$F_{e_p} := \frac{e^2}{\epsilon_0} \cdot \frac{1}{4 \cdot \pi \cdot a_0^2} = 8.239 \times 10^{-8} \text{ N} \quad (2)$$

Since the permittivity and elementary charge are constants, this quotient must also be a constant. This results in a new **"Universal Cosmic Constant" UCC (3)**, which is independent of the abstract definition of the ampere and reveals a more fundamental physical meaning.

$$\text{UCC} := \frac{e^2}{\epsilon_0} = 2.899 \times 10^{-27} \frac{\text{m}^3 \cdot \text{kg}}{\text{s}^2} \quad (3)$$

This constant has lost reference to the ampere **but still contains, in encrypted form**, natural information about the permittivity and the square of the elementary charge.

This illustrates that the definitions of the permeability and the elementary charge can, in principle, be freely chosen as long as the square of the elementary charge divided by the permittivity, corresponds to the value of the Universal Cosmic Constant (UCC) (3)

The task is now to identify the natural definitions and properties of the elementary charge of the electron and the permittivity. The quotient of the newly defined elementary charge squared, divided by the newly defined permittivity, must necessarily correspond to the universal cosmic constant (UCC).

Let us now look from a formally new perspective. Instead of the permittivity of the formula for the "attractive force" **(1)** ϵ_0 , we can also **use the permeability μ_0** in combination with the square of the speed of light c^2 . This gives us **F_e_p (4)**.

$$F_{e_p} := e^2 \cdot \mu_0 \cdot c^2 \cdot \frac{1}{4 \cdot \pi \cdot a_0^2} = 8.239 \times 10^{-8} \text{ N} \quad (4)$$

The elementary charge can be **e (5)** replaced by ampere according to definition **A**, second **s** and the number of electrons per ampere and second **N_C**

$$e := \frac{A \cdot s}{N_C} = 1.602 \times 10^{-19} \text{ C} \quad (5)$$

The permeability μ_0 **(6)** can be replaced by the definition force over the ampere squared.

$$\mu_0 := \frac{1.25664 \times 10^{-6} \cdot \text{N}}{\text{A}^2} = 1.25664 \times 10^{-6} \frac{\text{m} \cdot \text{kg}}{\text{A}^2 \cdot \text{s}^2} \quad (6)$$

If these two values are inserted into formula **(4)** and transformed, this produces a new form of the formula for the force **F_e_p (7)** (with the correct result). This formula consists exclusively of natural constants, whereas the values defined with the abstract ampere **e** and μ_0 have been completely omitted.

$$F_{e_p} := \frac{1.25664 \times 10^{-6} \text{ N}}{4 \cdot \pi \cdot a_0^2} \cdot \left(\frac{c \cdot s}{N_C} \right)^2 = 8.239 \times 10^{-8} \text{ N} \quad (7)$$

This formula can be deciphered with little understanding of mechanistic and natural explanations. The first term describes a **local force** that radiates into the environment and, analogous to any other radiation, attenuates in inverse proportion to the spherical surface. The second term can be the recognized **natural definition of the electron, e_m2 (8)**, on its orbit at radius **a0**

the natural definition of an elementary charge

$$e_{m2} := \left(\frac{c \cdot s}{N_C} \right)^2 = 2.307 \times 10^{-21} \text{ m}^2 \quad (8)$$

Since the first term represents the cause and this force is generated together with the proton (identical charge), this term must have an identical charge, and a further parameter at the base (at zero distance) must be included (reciprocal value of the permittivity). From this, the space pressure can be used as the calculated **reciprocal value of the permittivity, P0 (9)**.

the natural definition of the reciprocal of permittivity

$$P_0 := \left(\frac{1.25664 \times 10^{-6} \text{ N}}{e_{m2}} \right) = 5.447 \times 10^{14} \text{ Pa} \quad (9)$$

Confirmation with the UCC

The value of the elementary charge **e_m2** squared, multiplied by the pressure **P0** (which corresponds to the reciprocal of the permittivity), gives the value **(UCC_P0) (10)**. The value initially agreed with the defined **UCC**, which was determined from the elementary charge squared over the permittivity **(11)**. This confirms the consistency of this approach.

$$UCC_{P0} := e_{m2}^2 \cdot P_0 = 2.899 \times 10^{-27} \frac{\text{m}^3 \cdot \text{kg}}{\text{s}^2} \quad (10) \qquad \frac{UCC_{P0}}{UCC} = 1 \quad (11)$$

This proves beyond a doubt that this model is capable of electrical engineering and **describing natural values and fundamental physical processes** via natural cause-and-effect principles.

Dark energy and dark mass as the homogeneous content of space

With pressure **P0** instead of the reciprocal value of the permittivity **(12)**, the natural values for permeability **(13)** and impedance **(14)** result from the known relationship.

instead of the reciprocal value of the permittivity, we get P0:

$$P0 = 5.447 \times 10^{14} \text{ Pa} \quad (12)$$

instead of permeability we get rho_0:

$$\rho_0 := \frac{P0}{c^2} = 6.06 \times 10^{-3} \frac{\text{kg}}{\text{m}^3} \quad (13)$$

instead of the impedance we get rho_l0:

$$\rho_{l0} := \frac{P0}{c} = 1.817 \times 10^6 \frac{\text{kg}}{\text{m}^2 \cdot \text{s}} \quad (14)$$

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.

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 that emerges from the natural observation of the processes behind the theories of physics. 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.

$$E_{\text{m}^3} := \frac{3}{2} \cdot P0 \cdot \text{m}^3 = 8.173 \times 10^{14} \text{ J}$$

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).

Dark energy - found but not usable?

The analysis of the natural foundations behind theoretical physics reveals a fundamental insight: dark energy is not just a theoretical concept but a real existing physical quantity that is invisibly hidden itself. The difficulty lies in its physical nature. This energy is not simply present in a usable form but exists at an extremely low thermodynamic level in the structure of space - 270.45 °C (approx. 2.7 Kelvin) - close to absolute zero. The crucial question remains: will the innovative power of mankind ever be able to overcome this enormous challenge?

Utilization of space energy through nuclear fission

Interestingly, this energy is already being used by nuclear fission. The previous assumption that energy is an intrinsic property of mass is not sufficient as an explanation. Nuclear fission destroys mass, and the energy released comes from space. The same amount of energy that was used to create the mass in the Big Bang is released again when it is destroyed.

Utilization of energy through a technologically generated temperature gradient

The thermodynamic processes for generating energy are based on temperature differences. As the space energy is less than approximately 2.7 Kelvin, a mechanism would have to be developed to achieve a lower temperature than the cosmic microwave background level. This would allow energy to enter the system flow and be harnessed.

Utilization of space energy through an artificially generated pressure gradient

Mechanical energy generation requires pressure differences. The pressure field of pressure gradients with masses can be generated. One possible approach would be to develop a process that uses resonances to generate asymmetrical interactions in a vacuum in a targeted manner so that a usable force is created.

Direct use of spatial energy through technologically generated resonances

Light waves can be used to generate local resonances in space, leading to a direct conversion process of space energy into usable energy. A technical solution would therefore have to create a way of converting omnipresent vacuum energy into usable electrical energy in a targeted manner.

Conclusion

If the conversion of usable energy succeeds, this would be a technological achievement: an unlimited, clean energy source that solves the global energy problem but does not exacerbate the problem of global warming.

Determination:

This work is 'presented is'. The results are new and revolutionary. The presentation does not conform to the usual standards of scientific work, just as the results do not conform to generally accepted theories. The following tools were involved in its creation: Word and Excel from Windows, Mathcad 15 and, of course, ChatGPT to improve comprehensibility and grammatical correctness.

78 years old and deeply grateful

The brooding search for the natural processes behind the theories of physics has accompanied me for more than 65 years. My sincere thanks go to all the great companions who have actively and positively supported me on my professional path outside of this search. I am infinitely grateful to my wonderful, beloved wife, who has given me joy, peace and a happy family. She initially created an environment that made this work possible. I owe it to the PC tools to be able to put my thoughts on paper in a meaningful way. I am also particularly grateful to those who put obstacles in my way, ignored me and bullied me. They too have helped me get to where I am today.

Galileo Galilei said approximately four hundred years ago

**"All truths are easy to understand
once they have been discovered; the important thing is to discover them!"**

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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>

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