The natural processes behind the current theories of physics

Abstract

Wherever only theories explain physical phenomena, the natural process behind them has not yet been recognized. This document provides evidence that behind the current mainstream theories, there is a deeper level of knowledge in which natural and descriptive processes form the basis of all known physical phenomena. A logical chain of evidence is presented that points to a natural background to the theories. Two systematically independent derivations lead to a fundamental basis for the natural understanding of all physical processes that are well known through theoretical formulas. The derivations are based on the fact that behind the field constants permeability, permittivity and impedance, which are abstractly defined with amperes, natural values with units of meters, kilograms and seconds can be recognized. This result strongly suggests that the vacuum has an invisible but significant pressure and density. This implies the existence of a spatial content that has the properties of an ideal gas and was previously discussed as "ether". The speed of light can be verified as a resonance from the pressure and density of this medium. This finding means that dark matter and dark energy can be recognized as pressure and density values that are homogeneously distributed in space. This finding marks a paradigm shift in physics. This fact enables clear explanations for all fundamental physical processes and phenomena that were previously described abstractly using formulas. For example, gravity becomes recognizable as a normal force due to mutual shielding, while electromagnetic forces can be explained by a real mass flow. These findings form the basis for the long-awaited unification of the fundamental forces based on a functional explanation based on a common cause.

1 The results first

1.1 The illustrative processes behind the familiar formulas

The results of this derivation provide the basis for explainable and illustrative processes for all phenomena in physics that are known only via formulas[1].

- Light waves propagate in a medium that behaves like an invisible, ideal gas with pressure and density, which determines the constant speed of light.
- The deflection of light by mass is explained by a change in the refractive index of the medium near large masses.
- Gravity is created by local pressure differences as pressure forces in the medium due to mutual mass shielding, and masses are pressed together.
- Dark matter and dark energy can be recognized as homogeneous pressure and density values in space.
- The force due to the acceleration of a mass (F = m * a) is generated by the transfer of momentum to the surrounding medium.
- The kinetic energy of a mass, which results from the formula $\boldsymbol{E = 1/2 * m * v\text{^}2}$, is explained by the fact that the momentum is transferred to the medium, where the energy is generated, stored in the medium and released again.
- For the relativistic mass, which is known by the formula $\boldsymbol{mrel = m0/\sqrt{(1 - v\text{^}2/c\text{^}2)}}$, there is a logical explanation: the force increases as a result of dynamic pressure in the medium when approaching the energy transfer speed.
- The origin of Einstein's energy–mass equivalence, known by the formula $\boldsymbol{E = m * c\text{^}2}$, can be explained
- The structure of atoms is based on a dynamic model in the medium, whereby electrons and nuclei are held together by the pressure of the medium.
- The inexplicable, infinite "attraction" and "repulsion" of electrostatic forces are limited to their natural value.
- Magnetic fields show real but invisible mass flow in a medium that cannot be perceived directly.
- The electrostatic fields show asymmetry in a medium that cannot be perceived. The force on the electrons is exerted by this asymmetry. The movement of the electrons compensates for the asymmetry in the medium.
- The as yet unresolved contradictions in connection with black holes can be explained by the existence of a medium.
- The inexplicable, infinite "gravitational pull" near black holes is limited to natural value.
- The process of "ignition" for the Big Bang can be explained by a normal physical process.
- It becomes apparent that space (a vacuum) has energy, which is, however, at the level of -270°C (2.27 Kelvin) and is therefore difficult or impossible to evaluate.
- Einstein's assumption for the theory of relativity that the gravitational and inertial masses are identical is proven by showing that the underlying causes are the same.

[1] The detailed descriptions of these processes, some finished, some unfinished, can be found in various works at: https://www.researchgate.net/profile/Walter-Ruh

1.2 The deeper basis for all illustrative processes

After the field constants are defined abstractly by amperes, the natural values can be derived[2] using the units of meters, kilograms and seconds. This result indicates that the vacuum has an invisible but significant pressure and density. This implies the existence of a spatial content that has the properties of an ideal gas and was previously discussed as "ether".

The natural properties of space appear as an ideal gas with invisible pressure and density. The particles of this gas have a mass of m0.

The density is **rho_0** Pressure is **P0** Mass of the gas particle is **m0**

$\text{rho\_0} = 6.06 \times 10^{-3} \frac{kg}{m^3}$ $\text{P0} = 5.447 \times 10^{14}\,Pa$ $\text{m0} = 4.197 \times 10^{-40}\,kg$

1.3 How do these values come about?

The properties of space (vacuum) are traditionally characterized by the electric and magnetic field constants, permittivity and permeability. However, these abstractly defined quantities, related to amperes squared, elude general natural understanding. This conversion can be carried out using the previously unknown conversion factor **xCo.**

$\text{xCo} := \frac{A^4}{c^4 \cdot e\_e^2} = 4.823 \times 10^3 \frac{A^2 \cdot s^2}{m^4}$

The density **rho_0** results from the magnetic field constant permeability $\mu_0 = 1.257 \times 10^{-6} \frac{m\,kg}{A^2\,s^2}$

$\text{rho\_0} := \mu_0 \cdot \text{xCo} = 6.06 \times 10^{-3} \frac{kg}{m^3}$

The pressure **P0** results from the reciprocal of the electric field constant permittivity $\frac{1}{\varepsilon_0} = 1.129 \times 10^{11} \frac{m^3\,kg}{A^2\,s^4}$

$\text{P0} := \frac{1}{\varepsilon_0} \cdot \text{xCo} = 5.447 \times 10^{14}\,Pa$

The pulse density **Z0_m2** results from the impedance of the vacuum for the impedance $Z_0 = 376.73\Omega$

$\text{Z0\_m2} := \text{Z0} \cdot \text{xCo} = 1.817 \times 10^6 \frac{kg}{m^2 \cdot s}$

The speed of light c appears to be a normal transmission speed in the form of resonance from pressure and density.

$\text{c} := \sqrt{\frac{\text{P0}}{\text{rho\_0}}} = 2.998 \times 10^8 \frac{m}{s}$

The mass of the particle results from the Boltzmann constant **k_B**, the temperature $\text{T\_space} = 2.732\,K$ of the "empty space" and the mean square velocity of the gas particles according to the formula of gas theory.

$\text{m0} := \frac{3 \cdot \text{k\_B} \cdot \text{T\_space}}{\left(\text{c} \cdot \sqrt{3}\right)^2} = 4.197 \times 10^{-40}\,kg$

1.4 The properties of an ideal gas and the return of the ether

This shows all the signs of an ideal gas. The medium, which consists of very small particles of matter (also a mass), has the property that it is an all-pervading gas due to the size ratios of the atoms and therefore cannot be measured with any material measuring device. The presence of this medium can only be recognized by external observation, logic and mathematical deduction. This groundbreaking finding was derived in two ways:

[2] The detailed derivations of the spatial properties can be found in chapter 4 of this document.

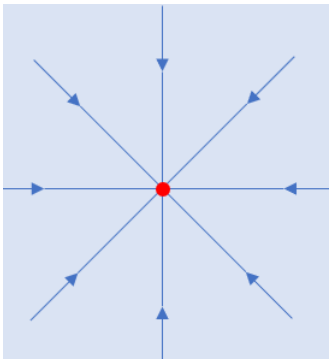
First, through an approach similar to that of a hacker using creative means and lateral thinking to find the key to accessing the space beyond. Second, the same result was achieved through stringent mathematical derivations and logical interpretation. In terms of its implications, this finding is similar to the paradigm shift from the geocentric to the heliocentric world view initiated by Galileo Galilei in the 17th century. The speed of light, like any other rate of energy transfer, is now derived from the resonance condition for kinetic and potential energy, namely, from the square root of pressure over density. This provides a natural explanation for all the properties of light.

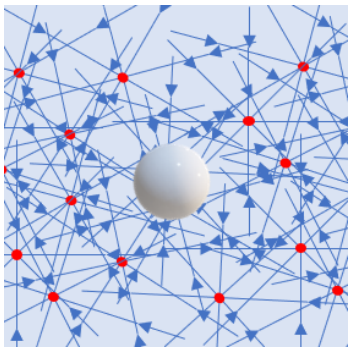
The assumption of an ether provides the basis for a clear explanation of all the principles of physics that were previously known only in theory.

2 The properties of an ideal gas in an unlimited pressure field (ether?)

The following explains the difference in the properties of the pressure when the pressure field is limited or unlimited. Simple considerations are used to think about what happens when one or two surfaces are placed in the space with these properties. Here, an engineer studies what can be done with such a medium. The following analogies show that the assumption of an ideal gas as the basis for all previously abstract forces does not appear to be quite so absurd.

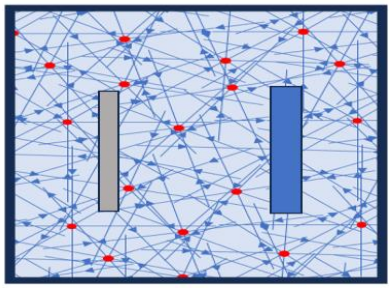
2.1 The normal, homogeneous pressure field





In a homogeneous pressure field, we have collisions of molecules at one point from all directions. The sum of all collisions from all directions over time cancels each other out. A sphere placed in this pressure field would have pressure on all sides (force per area) but no resulting force in any direction.

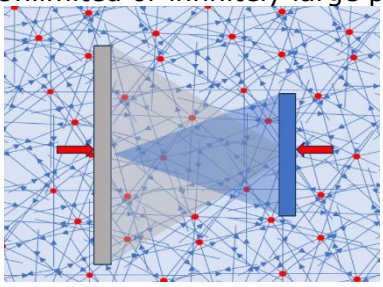
2.2 Two surfaces in the limited pressure field



If two surfaces are in a pressure field limited on all sides, the pressure between the surfaces is compensated by the wall. Therefore, an identical force acts on each side of the surface due to impacts from both sides. As the pressure forces are identical on both sides, there is no visible resultant force on the surfaces due to an asymmetry of the pressure. All standard pressure fields belong to this category.

2.3 Two surfaces in the unlimited pressure field

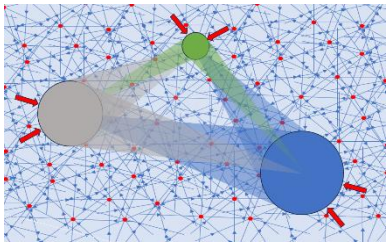
Unlimited or infinitely large pressure fields (e.g., explosion clouds) have completely different properties. If two surfaces are in an all-sided, unlimited (or infinitely large) pressure field (impacts from all sides from all directions), the pressure between the surfaces cannot be compensated by a wall. The surfaces therefore shield each other from the impacts from the direction of the respective outer side. A collision force appears.



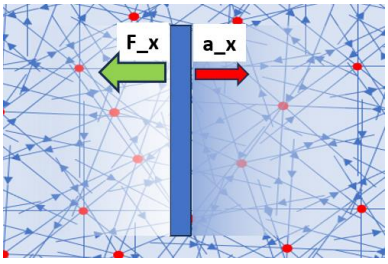
The assumption of an ideal gas with unlimited expansion provides a natural and logical explanation for the cause of gravity.

2.4 Three effective areas in the unlimited pressure field

If three spheres (active surfaces) are in an all-round, unlimited (or infinitely large) pressure field (impacts from all sides from all directions), the pressure between the active surfaces cannot be compensated. The surfaces therefore shield each other from the impacts from the direction of the respective outer side. A bilateral collision force appears in each patient. **This idea is identical to the visible "attractive forces" of mass due to gravity.**

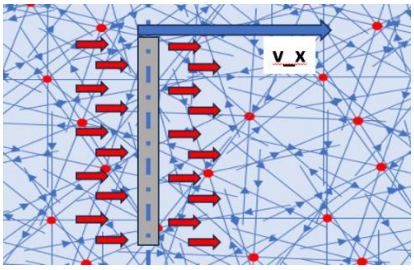


2.5 The accelerated surface in the unlimited pressure field



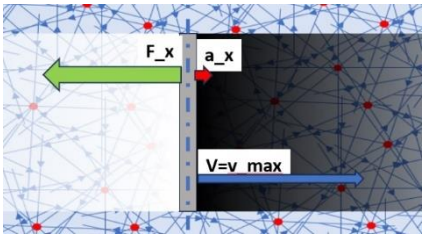
What happens when we accelerate a surface in this all-round, unlimited (or infinitely large) pressure field (impacts from all sides from all directions)? During acceleration,
we give all impacts at the front an additional impulse, and we weaken the reflection impulse of all impacts from behind (impact laws). This means that the force on all sides changes when at rest. This force increases at the front and decreases at the rear. This impulse to the pressure environment at the front and rear remains in the unlimited pressure field until an opposite impulse from this surface compensates for the action. Compare what happens when you accelerate the water in a bathtub by hand and stop it again (difference: shear forces, friction, etc.). **Assuming an ideal gas with unlimited expansion, the natural and logical explanation for the force is mass times the acceleration. (area proportional to mass)**

2.6 The area with speed in the unlimited pressure field



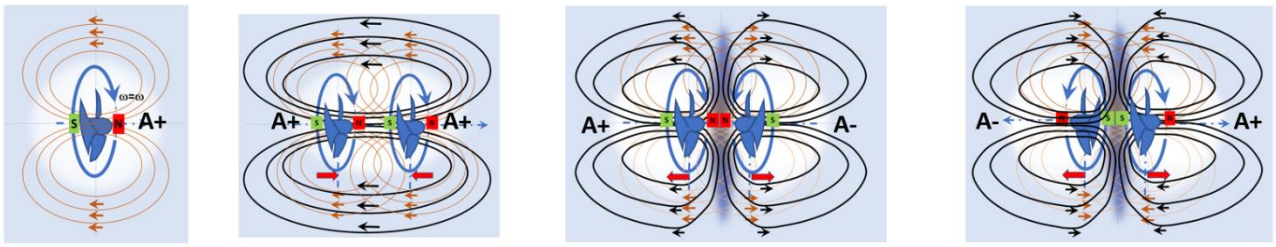
What happens if we move a surface at speed through this all-round, unlimited (or infinitely large) pressure field (impacts from all sides from all directions)? The acceleration has given the masses of the ideal gas an additional velocity vector at the front and back. This additional momentum of the pressure environment at the front and rear is the repository of kinetic energy. This energy travels along the surface until the opposite momentum of this surface compensates for the consequences of the acceleration, whereby the energy is released again. Compare what happens when you accelerate the water in a bathtub by hand and stop it again (difference: shear forces, friction, etc.). **The assumption of an ideal gas with unlimited expansion provides a natural and logical explanation for the creation, storage and release of the kinetic energy of mass.**

2.7 The surfaces accelerated at maximum speed in the unlimited pressure field



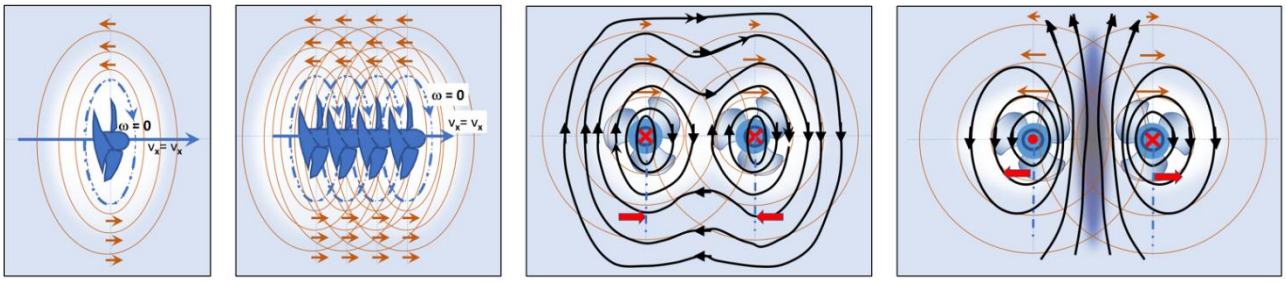
What happens if we want to accelerate a surface in this all-sided, unlimited (or infinitely large) pressure field (impacts from all sides from all directions) up to the limit of the energy transfer speed? The maximum speed of the particles?
The masses (collisions) in front of the moving surface can no longer move away (dynamic pressure), and the collisions from behind can no longer follow (lack of pressure). This leads to infinite forces if the surface is to be accelerated to the maximum energy transfer speed.
The assumption of an ideal gas with unlimited expansion provides a natural and logical explanation for the observation of relativistic mass.

2.8 Rotating propeller unlimited pressure field



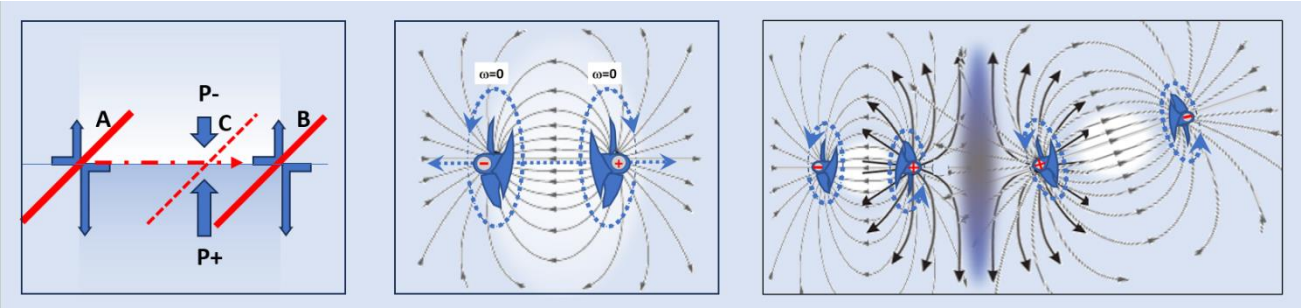
What happens if we place a single rotating propeller A+ in this unlimited pressure field with an ideal gas? What happens if we place two equally rotating propellers A+A+ one after the other? What happens if we place two equally rotating propellers A+A- against each other? What happens if we place two equally rotating propellers A-A+ against each other? In all variants, there is a mass flow near this medium and consequently also forces.
This is very similar to known relationships with magnetic dipoles

2.9 Standing propeller with an unlimited speed pressure field



What happens if we move a single nonrotating propeller at one speed in this unlimited pressure field with an ideal gas? What happens if we place several nonrotating, equally oriented propellers at one speed? What happens if we move two "chains" of nonrotating, equally oriented propellers next to each other in the same direction (now viewed from behind)? What happens if we (with the same perspective) move two "chains" of nonrotating, equally oriented propellers next to each other in opposite directions? In all the variants, there is a mass flow near each propeller in this medium, and consequently, there are also forces.
This is very similar to the known relationships with electric fields, which are responsible for the forces between conductors.

2.10 A surface that moves in the pressure field and two unequally oriented propellers that are separated from each other.



Something unusual but logical occurs when a surface in this unlimited pressure field is moved from **A** to **B at** an angle of 45° to the direction of movement. A force is needed to move this surface.

As a result, there is eternal asymmetry in this unlimited space until this asymmetry is compensated for by an opposite movement. A local force acts on a 45° surface placed in this asymmetrical space at location **C** (due to the asymmetry of the space). If you imagine the same thing in 3-dimensional space and pull a pair of propellers apart with force, the result is a 3-dimensional asymmetry in the form of an energy imbalance. This imbalance can only be compensated by the opposite movement of a similar propeller. As a result of the imbalance, there is a local "collision force" for the two propellers to be pulled apart. This only applies to propellers who belong together in pairs and are separated by force. The resulting unbalanced fields can only be united in parallel. When differently poled fields approach each other, a "repulsive force" results due to the incompatibility of the fields.
This is very similar to the known relationships between electrostatic fields and the forces of attraction and repulsion.

2.11 Summary

These descriptions of the properties of an unlimited space with pressure and density are fundamental. All considerations are at the level of natural mechanics, without any theory.
The influences on moving and stationary surfaces are logical conclusions based on mechanical shocks and the properties of an ideal gas with unlimited expansion. The basic comparisons with stationary and rotating propellers are primitive, but the result is in striking agreement with known field lines of electric, magnetic and electrostatic fields.
Of course, I do not think that an electron is in reality a propeller, but it seems to have many similar properties. We know that an electron has
energy in the form of Bohr's magneton[3]. We know that the electron has a spin and therefore rotates, and we now also know that an elementary charge represents a surface.

The task is now to describe these properties mathematically and integrate them into the existing field equations. This is beyond the author's capabilities, which is why talented scientists are needed.

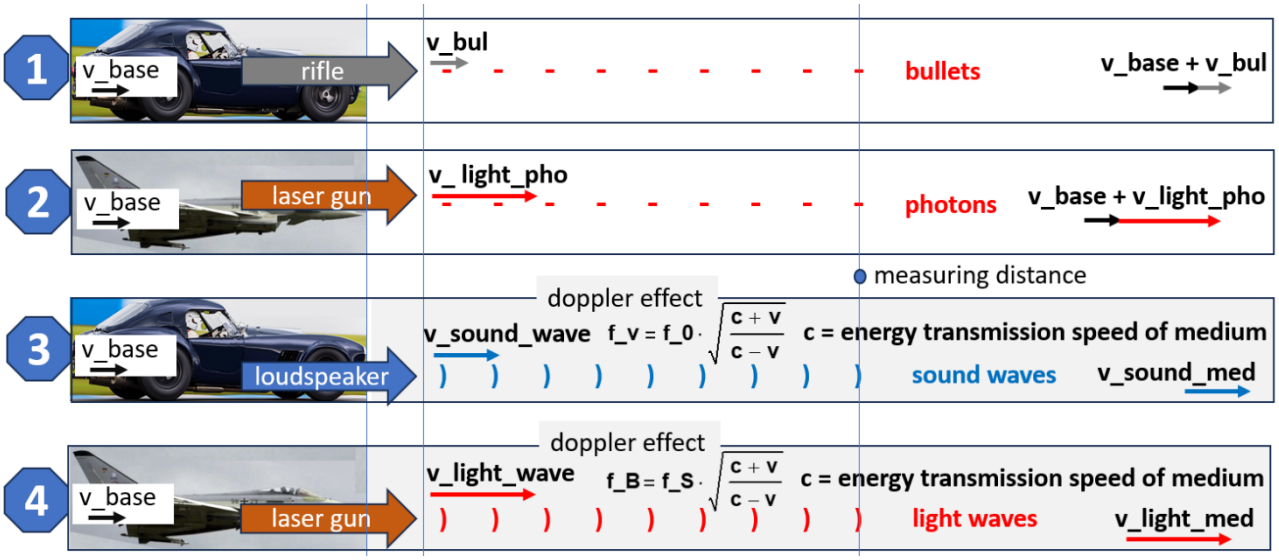
[3] Bohr's magneton, defined as $9.274*10^{-24}$ J/T results in a pure energy of $2.426*10^{-19}$ *J with the new definition of the ampere.

3 The natural and logical indications of the presence of a medium

In the following, various indications are sought and analyzed that suggest that something must be present in the space previously defined as empty. The term "ether" is frowned upon. It is irrelevant what name is ultimately given to this property, vacuum medium, space gas, microsubstance, etc., but in terms of functionality, it will correspond to the "ether" that was rejected in the past.

3.1 The constant speed of light as an indication of the presence of a medium

By precisely observing and analyzing the constant speed of light, there is an indication that space is not empty.



1. If a bullet (mass) is fired from a fast-moving car into an empty space (air resistance is not a contradiction to the principle), the resulting velocity relative to the ground at a short distance from the starting point is the result of the velocity of the fast-moving car and the muzzle velocity of the rifle.
2. If a photon (mass) is "fired" from an even faster flying airplane into an empty space, the resulting speed relative to the ground would have to be the result of the speed of the fast-flying airplane and the "muzzle velocity" of the light. This is clearly not the case with light, **so it can be ruled out that the light beam is emitted as a mass particle with speed c**.
3. If a sound source "radiates" sound from a fast-moving car into a space with discrete properties (transfers energy to the space), the resulting speed relative to the ground from this point onward is determined solely by the properties of the space, as the stationary space, with its properties, has taken over the energy and determines the speed of transmission. The additional energy caused by the speed of the vehicle, which is added to (or removed from) the sound energy, appears as a **Doppler effect** in the sound waves.
4. It is generally known and proven that the speed of a fast-moving source has **no influence** on the resulting speed of light. This suggests that the stationary space, with its properties, takes over the radiated energy and that the speed of light from this point onward is determined solely by the properties of the space. A concrete idea would be that the light is transmitted as a wave (resonance of kinetic and potential energy) of the medium. An additional indication of this approach is that **the light wave is also subject to the Doppler effect**.

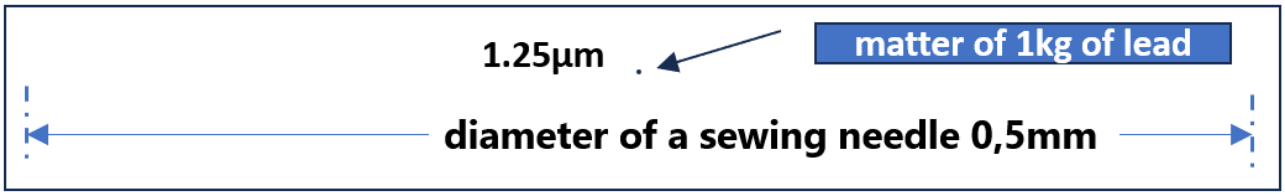
Properties Matrix			Addition of velocity in empty space	Doppler effect	
			A	B	
Mass from moving source	Bullet	1	YES	No	A-2 "NO" states that the light beam is not made up of photons with mass
	Photon	2	YES / NO	No	
Energy transfer to a medium	Sound Source	3	No	YES	B-4 "YES" indicates that there is a medium for Doppler
	Light source	4	No	YES / YES	

In conclusion, the presence of the "Doppler" property alone is a great indication of the presence of a medium. This is because the Doppler property means that more energy must be absorbed per length (shorter wavelength). **This is only possible if a medium with a variable energy density is present.**

3.2 The properties of mass as an indication of the presence of a medium.

3.2.1 The properties of matter as part of mass

It has long been known that an atom consists mainly of empty space. The famous comparison is that the nucleus of an atom is the size of a pea, and the diameter is the size of a soccer stadium, which is generally known and undisputed. This shows the proportions. The actual matter of mass is just an incredibly small breath in space. Let us think this through carefully with a kilogram of lead. One kilogram of lead results in a sphere with a diameter of 5.5 centimeters due to the density of lead. The actual matter that represents the mass, however, with the assumed density ($9.617*10^{17}$ kg/m^3) for collapsed matter)[4] only results in a tiny sphere of approx. **1.25 µm** in diameter (a pin is approx. 400 times thicker).



This "sphere" has an effective area (projection surface) of **1,241 µm^2**. In addition, now let us imagine that we move this nothing of a surface through **empty space**/accelerate it in **empty space**. How much resistance do you expect from this breath of nothing when accelerating? What kind of forces do you expect when you quickly move this **nothing** back and forth in an empty **space**? How can this micro-micro area exert a force? If you have little feeling for mechanical and natural properties and dimensions, you do not expect to feel any resistance. The resistance you feel when moving this active surface in an **empty space** should be slight to imperceptible. **However, it is not**! This "ball" is still the lead, and you know approximately how much force is required to shake a kilogram back and forth. There is only one explanation for this: there must be an immensely strong and effective partner in the space who is responsible for the force on this "ball". To help you imagine this: Imagine that the same "bead" had to be moved back and forth quickly in thick tar. The force would obviously be greater here. With this visual consideration, it is immediately clear that the cause of the force would be tar. These logical considerations about mass and matter point to an invisible but incredibly powerful partner in the form of a medium with gigantic properties in space, which is responsible for the force.

[4] The density can be assumed arbitrarily for the argumentation as long as the value is assumed to be in the known order of magnitude for matter in the density of the black hole. The value used here is not assumed to be arbitrary but is based on a value derived below.

Specifically, a force of 1 Newton is generated when a kilogram of lead is accelerated at 1 m/s^2. If we were to experimentally assume that an ambient medium could be present, the development of the force would be divided into a greater force on the front and a reduced force on the back (imagine a hand moving quickly in water). This inevitably results in greater pressure on the front and reduced pressure on the back. Together, the two changes in pressure on the surface result in the observed force.

$$a\_x := \frac{1 \cdot m}{s^2} \qquad F\_front := mkg \cdot \frac{1}{2} \cdot a\_x = 0.5\,N \qquad F\_back := mkg \cdot \frac{1}{2} \cdot -a\_x = -0.5\,N \qquad F\_tot := F\_front - F\_back = 1\,N$$

$$\Delta P\_front := \frac{F\_front}{(1.241 \cdot \mu m^2)} = 4.029 \times 10^{11}\,Pa \qquad \Delta P\_back := \frac{F\_back}{(1.241 \cdot \mu m^2)} = -4.029 \times 10^{11}\,Pa \qquad \Delta P\_tot := \Delta P\_front - \Delta P\_back = 8.058 \times 10^{11}\,Pa$$

$$F\_tot := \Delta P\_tot \cdot 1.241 \cdot \mu m^2 = 1\,N$$

This force should be generated by a change in pressure on the surface of **1.241µm^2** !

This would mean that a pressure change at the front **ΔP_front** and a pressure change at the front **ΔP_back** would have to occur at the rear for the resulting force **F_tot to** arise. To a first approximation, this is an improbable, absurdly high pressure. If this ad hoc number game is correct, it would mean that the invisible but incredibly powerful partner would have to be a medium with great pressure.

3.2.2 The kinetic energy of the mass

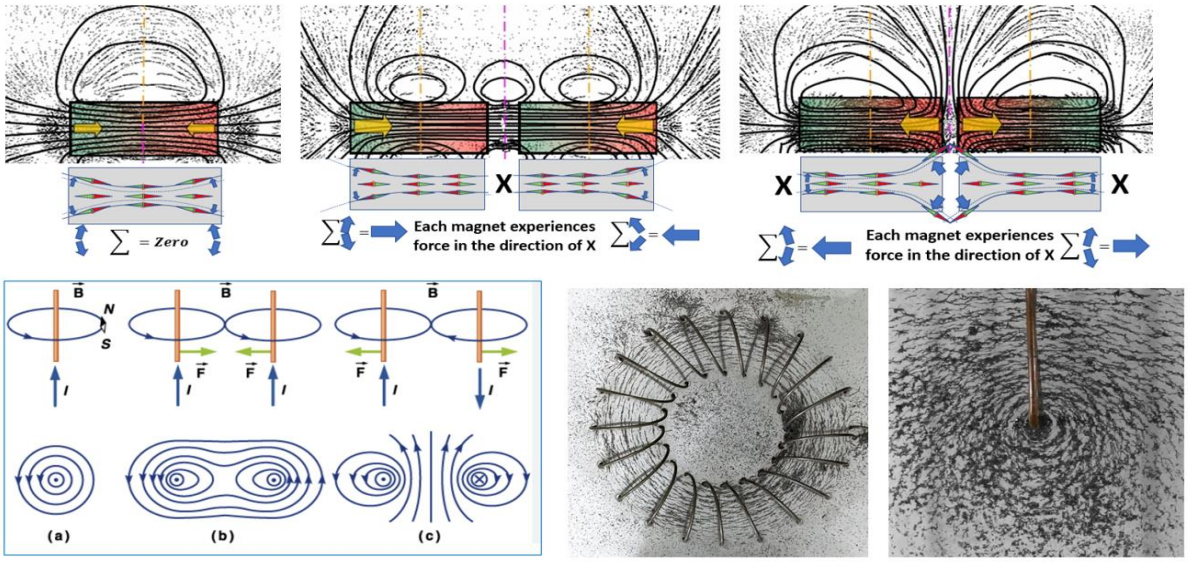
It is known that mass in motion is linked to energy. It deliberately says "linked" and not "the mass has energy". This mass is only a supersmall ball of matter, and no property of the ball can be recognized far and wide, with which the energy should be stored and released again. From a philosophical point of view, if the matter (the mass) were to actively apply this force, there would have to be a consciousness (to recognize the acceleration) and a mechanism (to actively cause the force) on the small globule. However, there is neither such consciousness of the mass nor a recognizable mechanism. The mode of operation would be quite simple if the energy is stored and released by the strong partner in space in the form of a small change in pressure coupled with a small volume. This, in turn, indicates pressure in space.

3.2.3 The relativistic mass

It is known that at high speeds, mass can only be accelerated with increased force. At 99% of the speed of light, the force required to accelerate 1 m/s^2 for one kilogram is no longer 1 Newton but 7,089 Newtons. At 99.9% of the speed of light, the force required for the same acceleration is 22,366 newtons. How is the little ball supposed to know how much force is now required at high speed, and how is the mechanism that applies this force supposed to work? This becomes very simple if you imagine a surrounding medium in which the speed of energy transfer is at most the speed of light. This property arises from the dynamic pressure of the medium, which can no longer give way in the direction of movement at the front. At the speed of light, the dynamic pressure of the medium would be infinite, as the entire space in front would have to be pushed away in the direction of movement. The results of this study agree 100% with the known formula.

3.3 The properties of magnetic fields as an indication of the presence of a medium.

The properties of magnetic fields also provide an indication of the existence of a medium. When looking at field line images, the idea involuntarily arises that these images could originate from a flux. In normal language, we also refer to this as magnetic flux. If we assume that there are no mystical or inexplicable forces in nature, then there must be something invisible and mechanical that produces these forces. From a purely visual and intuitive point of view, this most likely indicates the mass flow of a medium that we do not yet know.



3.4 The properties of the light wave as an indication of the presence of a medium

How light can take place at an absolutely constant speed as a wave in an empty space contradicts the simplest laws of logic and provides an indication of an existing medium. Every wave, every oscillation must naturally be a resonance process between kinetic and potential energy. Potential energy requires spring/pressure, and kinetic energy requires mass/density. The transmission speed in a medium is the result of the square root of pressure over density.

$$c_{liquid,\,gas} := \sqrt{\frac{K}{\rho}} = 1\,\frac{m}{s} \qquad \sqrt{\frac{Pa}{\frac{kg}{m^3}}} = 1\,\frac{m}{s}$$

The speed of light, in turn, is given by the square root of the reciprocal of the permittivity over the permeability. By pure analogy (there are analogies everywhere in nature), the probability is therefore very high that the reciprocal of the permittivity could be a pressure and the permeability a density.

$$c\_cal\_\varepsilon\mu := \sqrt{\frac{\frac{1}{\varepsilon_0}}{\mu_0}} = 2.998 \times 10^8\,\frac{m}{s} \qquad \sqrt{\frac{1}{\frac{Permittivity}{Permeability}}} = 2.998 \times 10^8\,\frac{m}{s}$$

3.5 Refutation of the evidence by Michelson and Morley?

The Michelson–Morley experiment of 1887 aimed to confirm the existence of the "ether" through visible interference. The results of this experiment, as well as all subsequent experiments, were always negative with regard to the proof of the ether. All the results confirmed that the speed of light was always constant. However, the assumption that it follows from this that no aether exists is a false conclusion. This conclusion is based on an assumption as to how the unknown aether should behave in the experiment. The experiments therefore have no probative value with regard to the ether, as the assumed preconditions are based on a prediction of how a completely unknown medium must behave. An experiment in which the foundations are based solely on logical predictions about the behavior of something new and unknown could be seen as an expression of scientific arrogance.

3.6 The starting point for deriving the properties of a medium lies in the definition of the current

The preceding indications provide convincing and relevant circumstantial evidence, but proof is required to confirm them. The following sets out the reasoned search for the ports of entry to provide evidence.

3.7 The current in amperes

There is no natural explanation for how electricity works, even though it is omnipresent and forms the basis of our society. Current is measured in amperes, and the associated fields are theoretically well documented. However, it remains unclear exactly what electricity is and how the associated electromagnetic forces act over distances. According to the 1948 definition, electricity is defined abstractly with itself via two effects, while the new 2019 definition is scientifically very precise but equally abstract. It would be desirable to gain deeper knowledge in this area.

3.8 We are looking for the natural definitions of the field constants

With the abstract definition of the ampere, field constants are therefore also defined abstractly. This is the first approach to obtaining new insights. Abstractly defined field constants such as the permeability, permittivity and impedance of a vacuum must be analyzed in depth. These field constants have an all-pervading property. There is a blatant philosophical contradiction that requires analysis: if the vacuum is truly empty, then the vacuum can have no permeability, no permittivity and no impedance. NOTHING can naturally have no property! This contradiction cannot be explained either philosophically or in terms of real physics. This inconsistency can only be resolved if the values of the field constants are brought to natural and real values with comprehensible properties. This is exactly what is subsequently derived from creativity and logic. The results show the permeability, permittivity and impedance of the natural properties of these materials.

3.9 We are looking for the natural definition of the elementary charge

The abstract definition of the ampere also results in the abstract definition of the elementary charge by Coulomb. Electrons are known to be "attracted" to the nucleus by electrostatic forces. In principle, an "attractive force" without mechanical force absorption is a dubious concept. According to the definition of an electron with $1.602*10^{-19}$ *C, there is currently no natural mechanism for recognizing how this "attractive force" comes about. According to previous references on spatial pressure, it would be desirable if the elementary charge could be defined as a surface. Defining the elementary charge as a surface would result in a natural collision force together with the spatial pressure. This definition can be found with simple mathematical derivation and logic. The basis for the derivation is the known force between protons and electrons in the first orbit according to Bohr's atomic model.

4 The two derivations of the spatial properties

In the following, the natural properties of space are derived using two derivations. The first is in the form of a solvable mental exercise, and the second is a mathematical derivation with a compelling interpretation.

4.1 Deriving the spatial properties by solving a puzzle

The transmission speed in a medium is the result of the square root of pressure over density. The speed of light, in turn, is given by the square root of the reciprocal of the permittivity over the permeability. By analogy (nature has analogies everywhere) it is likely that the reciprocal of permittivity could be a pressure and permeability in reality a density? An attempt is made to confirm this assumption. In the following, this puzzle is solved in the manner of a hacker. We start with the permeability **mu0**. Unfortunately, this field constant is related to the abstractly defined ampere and is therefore not generally understandable. As with many puzzles, it is necessary to add something first before the solution can be recognized. Therefore, the permeability is multiplied by A^4 and divided by e_e^2. This gives us an "ampere-free" value, **URK_mu**.

$$mu0 = 1.257 \times 10^{-6} \frac{m \cdot kg}{s^2 \cdot A^2}$$

$$URK\_mu := \frac{mu0 \cdot A^4}{e\_e^2} = 4.895 \times 10^{31} \frac{m \cdot kg}{s^4}$$

It is imperative that this value of **URK_mu** still contains basic information about the nature of electricity and the field constants (encrypted), but without amperes appearing as a unit of measurement. The aim of the puzzle is now to decode this value and break it down into its real and natural components.

Mathematically, this is not possible, but the goal can be achieved through creative thinking, logic and an understanding of correlations and probabilities.

The starting point for solving this puzzle is the permeability freed from unit ampere A.

$$URK\_mu := \frac{mu0 \cdot A^4}{e\_e^2} = 4.895 \times 10^{31} \frac{m \cdot kg}{s^4}$$

The analysis of the unit of **URK_mu** shows that the value is probably composed of density and velocity. This certainly makes for some interesting considerations/number games.

$$\left(\frac{kg}{m^3}\right) \cdot \left(\frac{m}{s}\right)^4 = 1 \frac{m \cdot kg}{s^4}$$

Logic and probability: The speed must be the speed of light **c**; any other speed is inconceivable in this context.

$$c := \sqrt{\frac{1}{eps0 \cdot mu0}} = 2.998 \times 10^8 \frac{m}{s}$$

Using **URK_mu** and $\mathbf{c^2}$ instead of the reciprocal of the permittivity **1/eps0,** the pressure of the space P0 is obtained

$$P0 := \frac{URK\_mu}{c^2} = 5.447 \times 10^{14} Pa$$

Using **URK_mu** and $\mathbf{c^4}$, the density of the space **rho_0** results for the permeability **mu0**

$$rho\_0 := \frac{URK\_mu}{c^4} = 6.06 \times 10^{-3} \frac{kg}{m^3}$$

URK_mu and $\mathbf{c^3}$ give the impedance of the space.

$$Z0\_em2 := \frac{URK\_mu}{c^3} = 1.817 \times 10^6 \frac{kg}{s \cdot m^2}$$

The speed of light **c** is of course unchanged.

$$c := \sqrt{\frac{P0}{rho\_0}} = 2.998 \times 10^{8} \frac{m}{s}$$

Therefore, the electron can be recognized as a natural quantity. The conventional value of the electron can be calculated from the defining force of the ampere $F\_Def = 2 * 10^{-7} N$, the number of electrons **N_C** per second per ampere and the permeability **mu0**. Consequently, the real and natural electrons become e_m2

$$e\_e := \sqrt{\frac{F\_Def \cdot 2 \cdot \pi}{\left[\left(\frac{N\_C}{s}\right)^2 \cdot mu0\right]}} = 1.602 \times 10^{-19} C$$

$$e\_m2 := \sqrt{\frac{F\_Def \cdot 2 \cdot \pi}{\left[\left(\frac{N\_C}{s}\right)^2 \cdot rho\_0\right]}} = 2.307 \times 10^{-21} m^2$$

This is an adventurous but creative and logical derivation. The result can be easily checked. Assuming that a single electron **e_m2** on a surface is in the pressure field of **P0,** the force **F_e_m2** on both sides is a known force that occurs everywhere in electrical engineering. If we assume that this force is projected onto a spherical surface as a field weakening, then a pressure force of **F_e_m2_a0 results** on a second electron **e_m2 at a** distance **a0** (radius of the electron on the first orbit), which corresponds 100% to the previously postulated nonsensical attractive force.

$$F\_e\_m2 := P0 \cdot e\_m2 = 1.257 \times 10^{-6} N$$

$$F\_e\_m2\_a0 := \frac{F\_e\_m2 \cdot e\_m2}{a0^2 \cdot 4 \cdot Pi} = 8.239 \times 10^{-8} N$$

4.2 Systematic derivation of the natural value of the elementary charge with m, kg and[5]

The electrostatic force on the electron in the ground state of the hydrogen atom is given by:

$$F_{ee} = \frac{1}{\varepsilon_0} \frac{e_e\, e_e}{4\pi\, {a_0}^2} = 8.239 \times 10^{-8} N$$

When ε_0 is replaced with $\varepsilon_0 = \frac{1}{\mu_0 c^2} = 8{,}854 \times 10^{-12} \frac{A^2\, s^4}{m^3\, kg}$, the force equation is converted into:

$$F_{ee,b} = \mu_0 c^2\, {e_e}^2\, \frac{1}{4\pi\, {a_0}^2} = 8.239 \times 10^{-8} N$$

By replacing the squared value of the charges, ${e_e}^2$with $\frac{A^2\, s^2}{{N_C}^2} = 2.567 \times 10^{-38} C^2$you obtain a different expression for the force:$F_{ee,c} = \mu_0 c^2\, \frac{A^2\, s^2}{{N_C}^2}\, \frac{1}{4\pi\, {a_0}^2} = 8.239 \times 10^{-8} N$

If the magnetic permeability is a constant $\mu_0 = 4\pi\, \times\, 10^{-7} \frac{m\, kg}{A^2\, s^2}$, an alternative expression for the force is obtained:

$$F_{ee,d} = 4\pi\, \times\, 10^{-7} \frac{m\, kg}{A^2\, s^2}\, c^2\, \frac{A^2\, s^2}{{N_C}^2}\, \frac{1}{4\pi\, {a_0}^2} = 8.239 \times 10^{-8}$$

By simplifying the above expression, the final formula for the force $F_{ee,e}$ is obtained:

$$F_{ee,e} = 4\pi\, \times\, 10^{-7} N\, \frac{\left(\frac{c\, s}{N_C}\right)^2}{4\pi\, {a_0}^2} = 8.239 \times 10^{-8} N$$

[5] The change in presentation is since this part of the work has been reviewed and edited by an active professor of physics. He found no logical errors or mathematical mistakes in my derivation except the presentation. This is a copy of his original resulting file.

This equation models point radiation into space, as shown in Figure 1. The basic force $F_0 := 4\pi \times 10^{-7} N$ radiates onto a spherical surface $A_{sph} = 4\pi\ {a_0}^2$.

Part of this spherical surface A_{part} experiences the corresponding force F_{part}. The real value for the electron with natural units results in $A_{part} = e_{m2} := \left(\frac{c\ s}{N_C}\right)^2$.

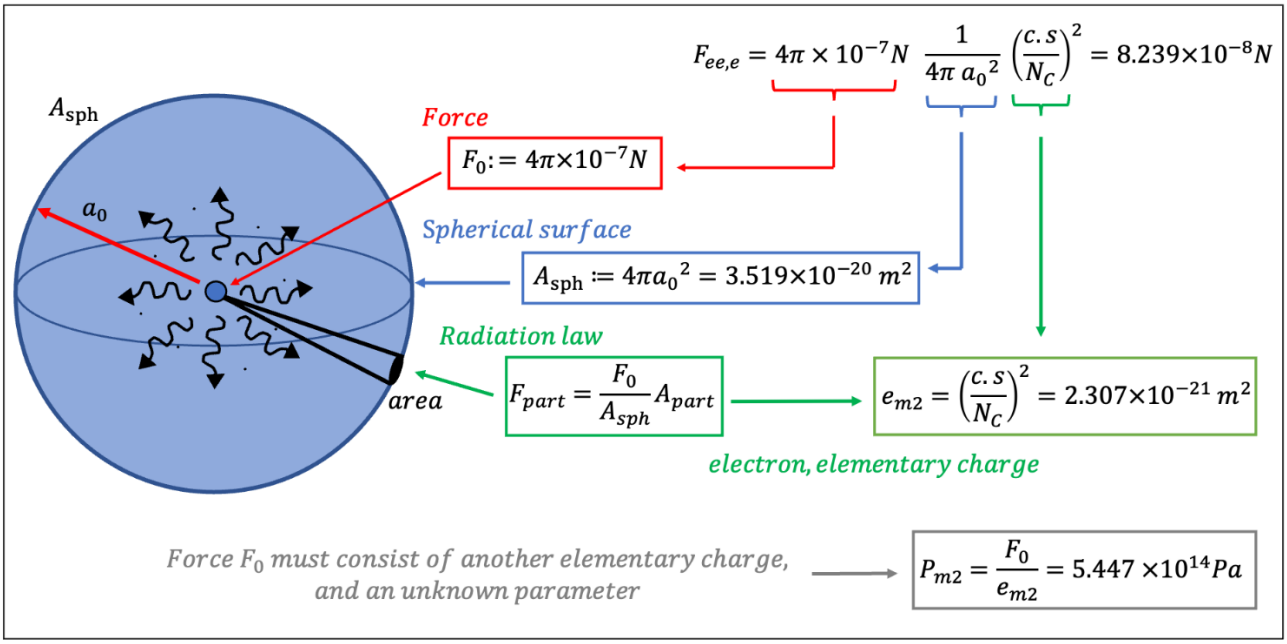


Figure 1: Illustrative diagram of the logical process used to derive the

of the natural constants of space is used.

Since we are dealing with the force between two charges, the basic force must logically be F_0which must be the result of another parameter and the countercharge (the same quantity). The second parameter results from dividing the force F_0 by the charge $e_{m2}$and results in a pressure P_0:

$$P_0 = \frac{F_0}{e_{m2}} = 5.44 \times 10^{14} Pa$$

The newly derived value of the elementary charge e_{m2} leads to the natural field constants, which are represented as the density for the permeability and the permittivity as the reciprocal of a pressure:

$$\mu_{m2} := \frac{\mu_0\ {e_e}^2}{{e_{m2}}^2} = 6.06 \times 10^{-3} \frac{kg}{m^3}$$

$$\varepsilon_{m2} := \frac{\varepsilon_0\ {e_{m2}}^2}{{e_e}^2} = 1.836 \times 10^{-15} \frac{1}{Pa}$$

The vacuum impedance is then understood as the momentum density:

$$Z_{m2} := \sqrt{\frac{\mu_{m2}}{\varepsilon_{m2}}} = 1.817 \times 10^{6} \frac{kg}{m^2\ s}$$

4.3 The identical results of the two derivations

The two derivations show that the conventional but abstract properties of space, which are described by the electric and magnetic field constants, permittivity and permeability, have a natural background. These natural values represent the real properties of space.

Using creative means and lateral thinking, the natural values and units behind the field constant were sought in chapter 4.1. The permeability μ_0 is calculated from the value of the elementary charge **e_e**, unit **A** and the speed of light**.** The beauty of physics is demonstrated by the fact that, ultimately, everything is based on the speed of light **c.**

Density rho_0:	Pressure P0:	Impedance Z0_m2:	Speed of light c:
$\frac{1}{c^4}\cdot\frac{\mu_0\cdot A^4}{e\_e^2}=6.06\times10^{-3}\frac{kg}{m^3}$	$\frac{1}{c^2}\cdot\frac{\mu_0\cdot A^4}{e\_e^2}=5.447\times10^{14}Pa$	$\frac{1}{c^3}\cdot\frac{\mu_0\cdot A^4}{e\_e^2}=1.817\times10^{6}\frac{kg}{s\cdot m^2}$	$\sqrt{\frac{P0}{rho\_0}}=2.998\times10^{8}\frac{m}{s}$

With stringent mathematical derivation and logical interpretation, the same result was achieved in chapter 4.2.

Density	**Pressure**	**Impedance**	**Speed of** Light
$\rho_0=6.06\times10^{-3}\frac{kg}{m^3}$	$P_0=5.447\times10^{14}Pa$	$\rho_{I0}=1.817\times10^{6}\frac{kg}{m^2\,s}$	$c:=\sqrt{\frac{P_0}{\rho_0}}=2.998\times10^{8}\frac{m}{s}$

The space has natural properties: density ρ_0 instead of permeability μ_0, pressure P_0 instead of the reciprocal of permittivity $\frac{1}{\varepsilon_0}$ and a pulse density ρ_{I0} for the impedance.

The speed of light c appears to be a normal transmission speed in the form of resonance from pressure and density.

In terms of its implications, this realization is similar to the paradigm shift from the geocentric to the heliocentric world view initiated by Galileo Galilei in the 17th century. The speed of light, like any other rate of energy transfer, is now derived from the resonance condition for kinetic and potential energy, namely, from the square root of pressure over density. This provides a natural explanation for all the properties of light.

4.4 The conversion factor xCo

It must be possible to find a common conversion factor **xCo** with which the conventional values of the field constants can be converted into natural space constants.

$$xCo\_rho\_0:=\frac{rho\_0}{\mu_0}=4.823\times10^{3}\frac{A^2\cdot s^2}{m^4}\qquad xCo\_P0:=\frac{P0}{\left(\frac{1}{\varepsilon_0}\right)}=4.823\times10^{3}\frac{A^2\cdot s^2}{m^4}\qquad xCo\_Z0:=\frac{Z0\_m2}{Z0}=4.823\times10^{3}\frac{A^2\cdot s^2}{m^4}$$

$$xCo=4.823\times10^{3}\frac{A^2\cdot s^2}{m^4}$$

4.5 The space has "free energy"

As a consequence of these results, we also realize that space is filled with energy. The space has pressure **P0**. When there is pressure, there is also energy.

The vacuum has an invisible pressure of $P0 = 5.447 * 10^{14}$ Pa per cubic meter, which gives a "free energy" of 817 terajoules.

$$E\_m3\_P0 := \frac{3}{2} \cdot P0 \cdot m^3 = 8.17 \times 10^{14} J$$

At first glance, this is a large amount of energy per cubic meter. The 100% exploitation of the free energy of a cube with an edge length of approximately 10 meters could cover Switzerland's entire annual primary energy requirement of approximately 810 petajoules (PJ). Unfortunately, the exploitation of this energy is not easy, as this energy is at the level of -270.45 degrees Celsius (approx. 2.7 degrees Kelvin).

5 Derivation of the properties of the medium[6]

To better understand the properties of the medium surrounding the space, we hypothesize that an ideal gas permeates the entire space. Using this model, we can derive additional properties of permeability and permittivity based on the kinetic theory of gases. The theory links the pressure P_0 and the density ρ_0 of this hypothetical gas. The basic equation from kinetic theory is [2]:

$$P_0 V_0 = \frac{1}{3} N m_0 {v_0}^2$$

Here, m_0 and v_0 are the mass and velocity, respectively, of the gas particles. Using the previously calculated values for pressure and density, we find that the particle velocity v_0 surprisingly exceeds the speed of light, calculated as $v_0 = \sqrt{3}c$. This observation is consistent with the kinetic gas theory, which states that the particle velocity exceeds the linear energy transfer velocity in any medium.

The mass of the smallest particle, m_0, is determined using the following formula of kinetic theory [2] :

$$\frac{1}{3} N m_0 {v_0}^2 = N k_B T_0$$

In this equation, k_B is the Boltzmann constant and T_0 is the temperature of the gas.

If the temperature of space (T_{space}) is $2.72K$, the particle mass is calculated as follows:

$$m_0 = \frac{3 k_B T_{space}}{{v_0}^2} = 4.197 \times 10^{-40} kg$$

These findings lead us to the assumption that space is not a void but is filled with an all-pervading "ether". This concept helps to explain phenomena that are currently defined in abstract terms, such as the curvature of space. It also provides fundamental elements for the development of a comprehensive theory of everything (TOE).

[6] The change in presentation is since this part of the work has been reviewed and edited by an active professor of physics. He found no logical errors or mathematical mistakes in my derivation except the presentation. This is a copy of his original resulting file.

6 The additional features of space

With the new value for the space pressure, two additional constants can now be derived. Although this does not directly affect the goal of deriving the aether, it is a necessary prerequisite for explaining gravitation using the aether and pressure in space. Therefore, the gravitational constant can be broken down into factors using the pressure of space, which in turn provides precise insights into how gravity works.

6.1.1 Correction of the gravitational constant to the natural value

The known gravitational constant **Gx** does not correspond to the natural value. All natural effects emanating from a point are projected onto a spherical surface. The denominator of the formula for gravitation must necessarily be a spherical surface (4 pi times the radius squared). For the result to be correct again, the gravitational constant **Gx** must be extended by 4 Pi. This results in the natural value of **Gx4Pi**.

$$Gx = 6.674 \times 10^{-11} \frac{m^3}{kg \cdot s^2} \qquad F\_So\_Erd := \frac{Gx \cdot m\_So}{r\_SoEr^2} \cdot m\_Erd = 3.545 \times 10^{22} N$$

$$Gx4Pi := 4 \cdot Pi \cdot Gx = 8.387 \times 10^{-10} \frac{m^3}{kg \cdot s^2} \qquad F\_So\_Erd := \frac{Gx4Pi \cdot m\_So}{4 \cdot \pi \cdot r\_SoEr^2} \cdot m\_Erd = 3.545 \times 10^{22} N$$

6.1.2 The decomposition of the composite gravitational constant into factors

Gravity is mysterious in that the underlying mechanism is not clear. The reason for this is that the gravitational constant is composed of two factors, which makes the detailed mechanism invisible. The analysis of the units provides insight into the solution approach. The units of the gravitational constant show that the gravitational constant can be broken down into an acceleration **m/s²** and a factor of area per mass **m²**/kg or into pressure **Pa** and the factor of area per mass (m²/kg)² squared.

$$SIUnitsOf(Gx4Pi) = 1 \frac{m^3}{s^2 \cdot kg} \qquad SIUnitsOf\left(\frac{m}{s^2} \cdot \frac{m^2}{kg}\right) = 1 \frac{m^3}{s^2 \cdot kg} \qquad SIUnitsOf\left[Pa \cdot \left(\frac{m^2}{kg}\right)^2\right] = 1 \frac{m^3}{s^2 \cdot kg}$$

6.1.3 Equating the gravitational formula with the pressure model

By equating the conventional formula for gravitation with a formula with a pressure model**,** the factor **K_Gx** for the conversion of mass to surface area can be derived if the pressure **P0** is known:

$$Gx4Pi \cdot \frac{m\_So}{4\pi \cdot r\_SoEr^2} \cdot m\_Erd = P0 \cdot \frac{(m\_So \cdot K\_Gx)}{4\pi \cdot r\_SoEr^2} \cdot (m\_Erd \cdot K\_Gx) \qquad K\_Gx := \sqrt{\frac{Gx4Pi}{P0}} = 1.241 \times 10^{-12} \frac{m^2}{kg}$$

6.1.4 Equating the gravitational formula with the acceleration model

By equating the conventional formula for gravitation with an acceleration model, the acceleration property of space **a_0** can be calculated if the factor **K_Gx is** known.

$$Gx4Pi \cdot \frac{m\_So}{4\pi \cdot r\_SoEr^2} \cdot m\_Erd = a\_0 \cdot \frac{m\_So}{4\pi \cdot r\_SoEr^2} \cdot (m\_Erd \cdot K\_Gx) \qquad a\_0 := \frac{Gx4Pi}{K\_Gx} = 675.887 \frac{m}{s^2}$$

6.1.5 The factors of the gravitational constant

The multiplication of the two factors **K_Gx** and **a_0** results in the natural gravitational constant, or the gravitational constant can be broken down into two factors:

$$Gx4Pi := a\_0 \cdot K\_Gx = 8.387 \times 10^{-10} \frac{m^3}{kg \cdot s^2} \qquad K\_Gx := \frac{Gx4Pi}{a\_0} = 1.241 \times 10^{-12} \frac{m^2}{kg} \qquad a\_0 := \frac{Gx4Pi}{K\_Gx} = 675.887 \frac{m}{s^2}$$

This confirms the derivation by revealing the previously hidden properties of the gravitational constant. Second, this insight makes it possible to trace the mysterious cause of gravity back to a natural cause.

7 Final consideration

This means a revival of the age-old concept of the ether in space. This is in no way an argument against the theory of relativity. The theory of relativity is and remains an ingenious theory that, as such, does not a priori condition space as empty (see the following quote from Albert Einstein). With this new, currently still very unpopular view, we are in good company with the statements of scientists from past centuries.

Sir Isaac Newton: *"That gravity should be endogenous, inherent & essential to matter, so that a body can act on another body over a distance through a vacuum without mediation by anything else, that its effect & force would be transmitted directly from one to the other, is to me so great an absurdity that in my opinion no man who can competently consider philosophical matters could ever fall for such a thing."*

- James Clerk Maxwell: *"Whatever difficulties we may have in forming a consistent conception of the nature of the ether: There can be no doubt that interplanetary and interstellar space is not empty, but that both are filled with a material substance which is certainly the most extensive and probably the most uniform matter of which we know."*

- Heinrich Hertz: *"Take electricity out of the world and light disappears; take the light-bearing ether out of the world and the electric and magnetic forces can no longer transcend space."*

- Dr. Albert Einstein: "*However, closer reflection teaches us that this denial of the ether is not necessarily demanded by the special principle of relativity. According to the general theory of relativity, space is endowed with physical qualities; thus, in this sense, an aether exists. According to the general theory of relativity, a space without ether is unthinkable; for in such a space there would not only be no propagation of light but also no possibility of the existence of scales and clocks, and thus also no spatiotemporal distances in the sense of physics".*

7.1 Positioning

In particular, no new theory was invented for this work. Based on the fundamentals of physics, old definitions were questioned and reorganized. From this, fundamental natural relationships could be recognized. A new perspective emerges from the real understanding of field constants. This leads to a functional explanation for gravitation, the basis of mass, mass inertia including relativistic mass, kinetic energy and the forces of electrostatics. All these processes are based on a common cause. This results in the long-sought unification of the fundamental forces. However, not in the form of a complicated formula but rather in the form of a common cause. As a whole, this is in no way an attack on Dr. Albert Einstein's ingenious theory of relativity. It only shows the natural background behind all the correct theories.

This is the work of an engineer, an amateur physicist who enjoys finding simple and natural solutions instead of complicated theories but who has difficulty carefully "finishing".

Further old and new, not systematically organized, finished and unfinished, correct and incorrect solutions and models, on these or other topics, also on the basis of mathematically supported philosophical considerations for real and natural physics, can be found under:

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

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

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

Galileo Galilei said approximately four hundred years ago:

"All truths are easy to understand,

as soon as they are discovered; the important thing is to discover them!"

Thailand, Sisaket, February 25, 2024, Walter Ruh