# Meter and second expressed in eV

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**Abstract:** In space-matter model both matter and space have three spatial dimensions. Time is the result of the action-reaction of space and matter. The action-reaction motions of space and matter must be synchronized. The synchronization of these motions needs algorithms of both sides; matter and space must have algorithms. Space cannot be defined without matter. Space is what matter uses as space. Matter is what can exist as matter in the given space. The relation of space and matter cannot be created if the amount of information of space and matter cannot maintain the relationship of space and matter.

In space-matter model solely through the use of space waves, we can express spatial distance, time and energy. It is possible to express all these phenomena in eVolt, so meters can be converted into seconds or into kgs and vice versa. Saying this, we must realize that there is a surprising gateway between space and matter.

**Keywords:** space-matter theory, wave of time, wave of space, time, space, matter, time and spatial distance expresses by energy, algorithm of space and matter, information of space and matter, gateway between space and matter

## 1. SPACE-TIME CONTINUUM BY EINSTEIN

In modern physics, every frame of reference is equivalent according to Einstein's space-time model of the special and general theory of relativity[1, 2, 3, 4 5, 6, 7]. The special relativity introduced many definitions, like time dilation, length contraction, and mass–energy equivalence expressed as $E=mc^2$, where $c$ is the speed of light in a vacuum, $E$ is the energy and $m$ is the mass. $c$ is a universal speed limit, and (therefore) exists the relativity of simultaneity.

Einstein's general relativity theory gave a more complex system of gravity than Newton's Law of Gravity[8]. The general theory of relativity is a geometric theory of gravity, where gravity is the curvature of space-time generated by mass (energy). The curvature of space-time is an action-reaction phenomenon of energy and space.

Both the velocity of matter and the velocity of non-matter (space) have their speed limit. They cannot be faster than $c$ and the models of relativity themselves don't use a higher speed than $c$.

Space-time has three spatial dimensions and one time dimension, so space-time is a four-dimensional model according to Einstein. In later theories built on space-time, for example in superstring theories, there are different space-times according to their dimensions. See for example the popular 9+1 model, where space-time can have 9 spatial dimensions and 1 time dimension[9]. The modern models of physics needs space and time that are independent dimensions. But what is space and what is time? Theoretically they aren't matter but "something else"; in our reality both originate in matter. Why? Because of their measuring.

# 2. SPACE-TIME MODEL VS. SPACE-MATTER MODEL

## 2.1. Time and space

What is time? Today's physicists claim that time is what we measure as time.
What does the phrase "what we measure" mean? Just energy and mass are measurable. The physics' concept of measuring time is derived from two "bodies" acting upon each other, where the "bodies" can only be matter – for example, the Earth's rotation in relation to the Sun, the motion of a spring inside a wall clock, or atomic vibration powering an atomic clock. The essence is always the same. One matter moves in relation to another matter.

One second is defined as a changing character of the caesium 133 atom[10] we can measure. One second has its start and has its end we measure. The main element of time is the change. If there is no change, there is no time. We measure changes of matter measuring time.

Can we measure space? Measuring space, we measure matter. The meter is the length of the path travelled by light in a vacuum during a given time interval[11]. We can measure neither time nor space at all. We measure only matter. Do we measure all matter? No. Heisenberg's Uncertainty Principle gives us a limit we can measure[12]. From now on I refer to matter as 'measurable matter'. I suppose in the following, there is nothing else—just space and measurable matter. This is very likely not true since even Heisenberg's Principle doesn't mean, that there is "nothing" below the measurable limit, it means only that we cannot measure.

### 2.2. Action-reaction of space and matter

We know from quantum mechanics that particles of matter are in constant vibration. It is a physical impossibility for matter to come into contact with space without its vibrations having an effect. Based on the Casimir Effect[13] and other physical phenomena like gravity waves[14, 15], we can state that space exists in waves and vibrations.

### 2.3. Viewpoint of space

Einstein's special theory of relativity describes how the mass of an object increases with its velocity relative to the observer. The increasing velocity of mass decreases the spatial distance. When an object is at rest, and both the object and the observer are in the same inertial frame of reference, the object has a 'rest mass' ($m_0$). The rest mass is the smallest value of mass in the given inertial frame of reference which is connected with the longest spatial distance $s_0$. The observer is always matter and the object is always matter.

What if the observer is space itself? Can we describe a model of a moving mass from the viewpoint of waving space? Yes, we can[16].

If an observer "made out of space" was able to measure the wavelengths of space wave $\lambda$, it would find the shortest wavelengths ($\lambda_0$), if the mass is at rest, that is, the mass does not move in space, $v_0 = 0$. From the viewpoint of space, the 'rest mass' is possible, since the vibration of the space wave is much faster than the vibration of mass. See later.

If the mass moves in space $v_1 > v_0$, the wavelength of space wave is longer ($\lambda_1 > \lambda_0$). Knowing $\lambda_0$ and $\lambda_1$, we know when the mass moves in space. The space waves also show if the mass accelerates. If $\lambda_{i+1} \neq \lambda_i$ and $i = 0, 1, 2...$, then the acceleration of mass $a \neq 0$. $i$ represents time. If $\lambda_{i+2} = \lambda_{i+1}$, then $a = 0$, that is the object continues to move at a constant velocity from the viewpoint of space. Newton's First Law of Motion can be given as $\lambda_{i+1} = \lambda_i$.

Since space is always given, we can use it as a general observer. Space always has a common framework with every mass. Saying this, space is an absolute entity behind the relativity.

It sound like an old aether model, doesn't it? No, it doesn't.

### 2.4. No aether, but space waves

Aether theories propose the existence of a substantial medium, the so-called aether. Aether is a space-filling substance, and a transmission medium for the propagation of gravity forces (and even the electromagnetic force) according to physicists at the end of the 19th and the beginning of the 20th century. The works of Lorentz[17] represent the theory.

In the aether model, time is a "local time" that connects systems at rest and in motion in the aether.

In my model, there is no aether. The space waves and the changes in wavelengths of space waves represent the re/actions that the re/actions of matter cause. And there is no "local time". The definition of time makes a big difference between the space-time model and the aether model. In my model, there is neither "local time", nor space-time.

In the next chapter I'll show we can use a new aspect holding the results of the space-time model.

The new model is the space-matter model.

## 3. SPACE-MATTER MODEL: SPATIAL DISTANCES AS SPACE WAVES

### 3.1. Wavelength and spatial distance

If the mass of the object is at rest relative to the (non-space) observer, then the given spatial distances of the object and of the (non-space) observer can be given as the sums of the wavelengths of space waves: $s_{observer} = \sum_{1}^{n} \lambda_{observer}$ and $s_{object} = \sum_{1}^{n} \lambda_{object}$,

where

$$s_{observer} = s_{object} = \sum_{1}^{n} \lambda_{observer} = \sum_{1}^{n} \lambda_{object} . \tag{1}$$

If the object moves relative to the observer $v_{object} > 0$, then the observer will realize

$$s_{observer} > s_{object} . \tag{2}$$

Equation (2) shows the values we calculate using the theory of special relativity. But behind the curtain is Eq. (3).

$$\sum_{1}^{n} \lambda_{observer} < \sum_{1}^{n} \lambda_{object} . \quad (3)$$

That is,

$$\sum_{1}^{n} \lambda_{observer} = \sum_{1}^{p} \lambda_{object} , \quad (4)$$

where n>p. The same *s* spatial distance can be made out of $n \times \lambda_{observer}$ and out of $p \times \lambda_{object}$. The observer's wavelength of space wave doesn't change, but the object's wavelength of space wave does, $\lambda_{observer} < \lambda_{object}$. In other words, the spatial distance $s_{observer}$ is built out of more waves of space than the $s_{object}$. The object will travel the *s* spatial distance using its own space waves, that is, the spatial distance for the object is really shorter, now *p* pieces long instead of *n*.

The $\lambda_{observer} < \lambda_{object}$ is a real phenomenon, not the viewpoint of the observer. Behind the relativistic length contraction is a real difference of wavelengths of observer and object.

### 3.2. Calculation of the change of wavelength of space wave

The calculation is based on the Lorentz-transformation of the special theory of relativity. The known formula of the length contraction is this:

$$s' = s(1 - \frac{v^2}{c^2}) , \quad (5)$$

where *v* is the velocity of the object with mass. So the change of wavelength of every space wave is

$$\lambda' = \frac{\lambda}{1 - \frac{v^2}{c^2}} , \quad (6)$$

Of course, the model can be more precise using Newton's Law of Gravity that makes different lengths of wavelengths of space waves. The differences of wavelengths of space waves depend on the distance between space wave and mass. In this study I use the two-dimensional cosine model, because it is more simple.

If the wavelengths of space waves are given in a three-dimensional model, where they depend on the distance between mass and space wave, this leads us to a new form of the general theory of relativity, where the metric tensor doesn't describe the curvature of space, but the wavelengths of space waves. This new model is the space-matter model.

# 4. SPACE-MATTER MODEL: TIME AS SPACE WAVES

The space-matter model is a surprising model, where space has three spatial dimensions and time has no dimension. In the space-matter model, time comes into existence when mass and space meet. Also, whenever mass and space meet, the result is time. Time is the action-reaction phenomenon (or mutual effect) of matter and space, and appears as space waves.

What does this imply? If we have matter and space, we have time. Time is not the fourth dimension. It is a phenomenon. It is a spatial wave, a series of signals with properties. It has characteristics like speed, frequency and action that can be calculated[18].

On the other hand, space has time, too, since the actions of matter can be used as time impulses in the case of space. The question of time of space is very complex; I shan't go into details here.

## 4.1. Time as spatial wave

Can time have waves? In some models, time may have waves, cp. references[19, 20, 21]. If time does exist, and it is not just our human production, it must have effects on matter and the matter must have effects on time. Knowing the theory of relativity, this statement is not new. But there is something missing. The theory of relativity doesn’t describe the reactions of space caused by actions of the vibration of particles (matter).

If there is matter in space, there is a (set of) waving spatial signals, that cannot be "switched off". Space waves always exist when matter exists. Every wave has its "effect" on matter. The "effect" has its start and end. So, we can produce one second using (a set of) space waves. We can describe time as waves of space caused by matter, where the space wave has its effect on matter. Saying this, space and matter produce time; time is not an independent phenomenon.

According to modern physics, only mass changes the space waves via causing gravity. Accepting this, our time is the action-reaction of mass and space that exists as space waves. This is not the only space wave, that is, not the only time, just our time. In other words, everything creates space waves, that is, everything creates time. We use in our life (and models) the time of mass, but "non-mass" objects may use different space waves as time.

**4.2. Time wave and time unit**

The matter-space vibrations, from the point of view of matter, can vacillate between strong and weak. It oscillates. The change is periodic, and one period is one unit of time. This unit of time has two parts:

a) the hit, when space acts upon matter most strongly; and
b) the period between hits, when the force of space acts less strongly upon matter.

FIG.1 shows the *naive* model of the hits of space on matter.

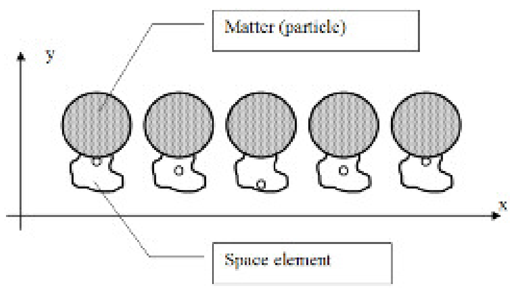


FIG. 1. Time impulses as hits of space on matter. Two-dimensional model, x and y are spatial distances, not proportional. The white shape illustrates an element (a range) of space. The grey box illustrates a particle of matter. Note the space element is a phenomenon with structure. The elementary particle of matter has also structure.

The FIG.1. illustrates the different states of vibration of one space element (space particle) pictured as a small, white ball. The vibration can be given as a cosine function, where a) equals the positive amplitude of the cosine function. The first and the last space element show this state. Every other value of the function is b). That is, time is created by space and matter. In my cosine-model a pulse of time exists, if $\cos(x) = 1$. The time impulse is followed by a lack of time pulse, when $\cos(x) < 1$.

**4.3. Space waves vs. time waves**

Every non-space object produces space wave. Light, too. According to modern physics light has no time. This is not possible according to the space-matter model, but now I accept this axiom. A time wave is a wave of space produced by mass and "sensed" by mass. A time wave is the result of a space action followed by matter's reaction and vice versa. Our time wave is a set of space waves, where the set contains one or more waves of space, where the amplitude is given as $\cos(x) = 1$. Every non-space object generates space waves, so there can be many unknown space waves with many different amplitudes. In our lives (and in our models), we use the time of mass, but a "non-mass" object will use different time waves.

### 4.4. Lajtner-burgers

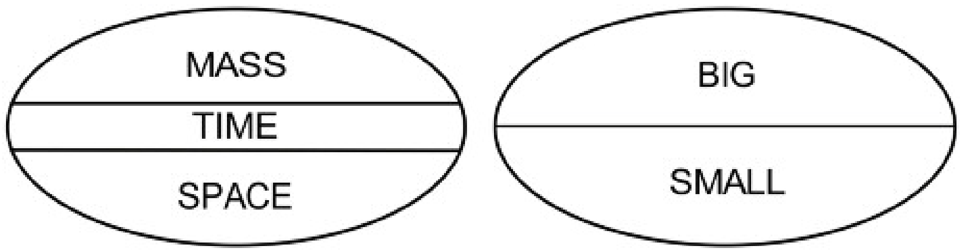


FIG. 2. Space-matter model displayed as Lajtner-burgers.

FIG.2. shows there is no way to put together space and mass without time coming into being. Time is the result of the action-reaction of space and mass. The wavelength of the space wave gives us the spatial distance; the frequency of space waves give us time - if mass is in space. The second illustration of Fig.4. shows the same in a more complex approach. Here space appears as *space and time* for matter (SMALL), and matter appears as *matter and time* for space (BIG).

### 4.5. Time's new definition

Using BIG and SMALL we can give a new definition of time. Time combines our three spatial dimensions and the three spatial dimensions of space. Are they not the same? Three spatial dimensions are three spatial dimensions, aren't they? In mathematics yes. In physics, no. The *actions* of their buildings elements are at different scales. And the actions cannot change their given dimensions.

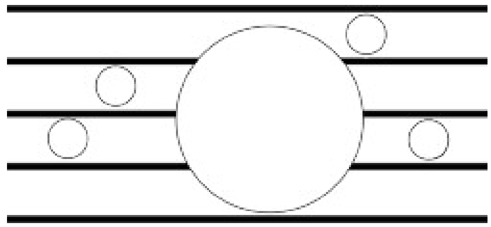

FIG. 3. There are two different three-dimensional spatial dimensions depending on the actions of the objects (model, not proportional).

FIG. 3. shows there is an essential difference in the scale (of actions) of space and matter (SMALL and BIG). Both exist in three-dimensional space, but matter is fundamentally incapable of entering the 3-D world of space. Similarly, space is unable to exploit the opportunities of the matter's 3-D world. The picture above illustrates how space cannot span two bars, while matter cannot fit between them.

From the above statements, a new definition of time emerges. Time is the meeting of "bodies" that exist in two three-dimensional spaces that have different scales. Or in other terms: time comes into being if two different three-dimensional spaces meet.

Our time merges three different things: the three-dimensional spatial world of space, our three-dimensional spatial world of matter, and their actions and reactions. In our normal life we cannot sense the three spatial dimensions of space, therefore we can figure with one time dimension. This *dimension* is *our* action/reaction.

## 5. PITCH OF SPACE-MATTER MODEL

Matter causes waves in space. Solely through the use of space waves, we can express spatial distance, time and energy. Why? Because space waves have the shortest wavelength, the fastest speed, and the smallest energy expressed in our terms.

- Every spatial distance can be expressed using the wavelength of space waves.
  In our physics terms: This is the shortest unit of distance.
- Every unit of time can be expressed using the periodicity of space wave.
  In our physics terms: This is the shortest unit of time.

- Every amount of action (energy) can be expressed using the value of the action of space wave.

  In our physics terms: This is the smallest unit of energy.

See the calculated values using a simple two-dimensional cosine model as space wave in the next chapter.

# 6. CALCULATED VALUES IN SPACE-MATTER MODEL

## 6.1. How can we derive our time units from the space wave?

If we wish to express the time function of space waves in terms of physics' units of time, we may do so. If we take as our unit of time one second, the space waves show us how to divide that unit into the smallest possible parts of time. The time appears as the frequency of the space wave, or in other words, the action of the space wave. One second is as long as the space wave expresses $E_{\mathrm{sec}}$ energy. It is calculable according to the model of space-matter.

$$v_{TIME} / \lambda_{TIME} = f_{TIME} \ . \quad (7)$$

In Eq. (7) $\lambda_{TIME}$ is the Planck-length[22] and

$$v_{TIME} = \frac{\mathrm{c}^2{}_{\mathrm{meter}}}{\mathrm{t}_{\mathrm{Planck}}}, \quad (8)$$

where $\mathrm{t}_{\mathrm{Planck}}$ is the Planck time[23] and $\mathrm{c}^2{}_{\mathrm{meter}} = (2.997 \times 10^8)^2$ meters derived from $E = m \times c^2 = F \times \mathrm{c}^2{}_{\mathrm{meter}}$, where $\mathrm{c}^2{}_{\mathrm{meter}}$ is the distance around the mass, where mass and its modifications of wavelengths of space wave expressed as $F$ are one entity within one time unit, that is, without time. In a closed system, the total momentum is constant according to Newton's Second Law of Motion. Using this law in a wider context, the mass and the given portion of space build a closed system.

Using the values mentioned above, the speed of time wave (space wave) is $v_{TIME} = 1.667 \times 10^{60}$ meters/sec. The *c* speed limit of the matter is not valid in the case of space and time waves. These waves spread in the texture of space. The measurement of gravitational waves by LIGO doesn't change this statement. See later.

$f_{TIME} = 1.031 \times 10^{95}$ $(\sec^{-1})$, using a simple cosine function to calculate the frequency of the time wave. The frequency of the time wave cuts one second into $1.031 \times 10^{95}$ time-pieces. So, if we stress the *frequency of the space wave*, we are speaking about *time wave*.

$h_{TIME}$ can be calculated supposing a theoretical photon, where $\lambda_{photon} = \lambda_{TIME}$, and using the Planck law[24] as a pattern that light has adopted from the wave of time.

$$f_{photon} \times h = f_{TIME} \times h_{TIME} \tag{9}$$

$$\frac{c}{\lambda_{photon}} \times h = \frac{v_{TIME}}{\lambda_{TIME}} \times h_{TIME} \tag{10}$$

$$h_{TIME} = h \times \frac{c}{v_{TIME}} \tag{11}$$

So, seconds can be expressed as energy. $E_{\sec} = 1.956 \times 10^{9}$ Joules, that is, 1 second represents $E_{\sec}$ energy, according to the cosine model.

Time waves (space waves) are not any kind of matter, but it's "action", it's "energy" can be described with our physics units of matter. We have to be very careful with expressions like "action of time wave", "energy of time wave" etc., because action and energy etc. are the characteristics of matter. (To make the difference clearer, I suggest using *L*action (Low Action), *L*energy (Low Energy) etc. in the cases of time and space waves.)

### 6.2. How can we derive our spatial distance from the space wave?

If we wish to express our terms of physics' units of distance using the characteristic of space wave made by mass, we may do so. If we take as our unit of spatial distance one meter, the space waves show us how to build that unit from the smallest possible spatial parts. The shortest spatial distance is given by the wavelength of the space wave. $1 \text{ meter} = k_{TIME} \times \lambda_{TIME}$, where $k$ is the wave number of space wave (time wave). Using waves that have energy, we can give one meter as energy, too.

### 6.3. Meter, kg and second expressed in eVolt

Using the action of time waves (space waves), we can express mass, energy, time and spatial distance in the same dimensions, for example in eVolt.

First see the well-known value[25]:

$1\ kg$ represents $5.61 \times 10^{35}\ eV$ (12)

Now let's see the new results using the cosine model:

$1\ meter$ represents $7.32 \cdot 10^{-33}\ eV$, (13

$1\ second$ represents $1.22 \cdot 10^{28}\ eV$. (14)

There is one more surprising conclusion: time, spatial distance and energy can be given in meters and in seconds, too. For example:

$1\ second$ represents $1.66 \times 10^{60}\ meters$. (15)

The values come from the cosine model. If the model is more accurate (for example it is a three-dimensional model accepting the changing values of gravitational force), the above mentioned values will change, but the principle remains the same.

The above written is surprising, but it has old roots. There must be a way to convert – for example – spatial distance into mass and mass into spatial distance, since the special theory of relativity shows the connection of mass and spatial distance using:

$$s' \cdot m' = s \cdot \sqrt{1-\frac{v^2}{c^2}} \cdot m \cdot \frac{1}{\sqrt{1-\frac{v^2}{c^2}}} = s \cdot m = \text{constant}_{\text{s m}} \quad (16)$$

The transformation of kg into meter was meaningless, but we can now express both in eV.

### 6.4. New constant

If time waves are derived from space waves there arises a strange phenomenon—the time and the distance are the two sides of the same medal from the viewpoint of mass.

$$f_{space\ wave} = f_{time\ wave} \quad \text{and} \quad \lambda_{time\ wave} = \lambda_{space\ wave} \quad (17)$$

If a mass generates growing wavelengths of space, the frequency of the space wave decreases, that is, the time unit for the mass grows in the same portion. Mass always needs the same time expressed as $f_{time\ wave}$ to travel the one $\lambda_{space\ wave}$. Mass can travel never faster, never more slowly in space from its own viewpoint. According to a Hungarian proverb: "It is not possible to jump over its own shadow", that is, "The leopard cannot change his spots". This is displayed in the Eq. (18) by $v_{sm}$ . Accelerating motion appears in a non-space inertia frame of reference according to the mass, but it doesn't appear in the framework of waving space according to the mass.

$$v_{sm} = c \tag{18}$$

Eq. (18) comes from the space-matter model combined with the special theory of relativity. *c* is true, because of Eq. (19).

An observer can realize the acceleration of mass in space, if the observer is able to measure the changing wavelengths of space waves around the mass. The mass itself isn't able, since its time depend on its space waves. Eq. (18) doesn't mean at all that the velocity of an object cannot be higher than *c* according to an observer. Eq. (18) characterizes how objects "can see their shadows" in the waving space.

Eq. (18) also shows that mass particles cannot be motionless in space, that is, particles (matter) must vibrate, and they always have time.

### 6.5. Different spaces vs. wormholes

In Eq. (18) we can see the same phenomenon in mass-space relation, what we know about the relation between mass and light. The speed of light is independent of the *v* velocity of the mass, it is always *c*, according to the given mass. Mass and light follow the same rule, but their spaces are different. Mass travels in space, light travels on the space wave generated by mass. This highlights the reason of the gravitational red shift of light. Light's frequency level (*FL*) is constant in the case of the given photon:

$$FL = const = f_{light} / f_{time\ wave} \tag{19}$$

Mass and light have different spaces, that is, there *are* different spaces. Objects opt for what is space for them. Mass and light (and other hypothetical or real particles) use different spaces, where the wavelengths of space waves are different. The different wavelengths of space waves result that there are spaces, where $v_{limit}>>c$, where $v_{limit}$ is a velocity measured by mass. These spaces can be seen as wormholes. What is a wormhole in the space-time model? A wormhole[26] or an Einstein–Rosen bridge[27] is a hypothetical "bridge" connecting two sheets of space-time.

There is no wormhole in the space-matter model, but different spaces. The different spaces seem to make the spatial distances shorter, because the wavelengths of space waves are longer here. From the viewpoint of masses, the following seems to be true: $v_{limit}>>c$.

### 6.6. Synchronization of space wave and matter vibration

You can see that the waving of space is faster than the vibration of matter. $f_{space-wave} > f_{matter-vibration}$. These motions must be synchronized. The synchronization of these motions needs algorithms of both sides. Matter and space must have algorithms. Saying this, there are structures of matter built from smaller bricks than themselves. In other words, the elementary particle of matter we know cannot be the last building bricks of the matter. These smaller bricks (or their twins) are in space, too, that is, both space and matter have structures.

### 6.7. The hidden and common information of space and matter

These structures hold information. The information of matter is not independent from the information of space[28]. Matter uses an object (mass, energy or space) as space which has the amount of information that matter as matter needs[29]. In different spaces matter appears in different forms. If matter changes the (normal) space, it changes its form as matter, it will be e.g. fast wave. If this fast wave reenters the (normal) space, its "original" form returns. So the energy and the form of matter can be changed while its algorithm remains unchanged. In poetic words: in different spaces mass changes its "body", but not its "soul". Using this poetic picture we may say, spaces are able to create the body of matter from matter's soul. In expressions of physics: matter can uses such objects as space which is able to conserve the main algorithm(s) of the given matter.

So, if we see once more FIG.2. from this point of view, we may say, spaces and matters have more faces. (Cp. the Lajtner-submarine in Ref. 30.) Both the BIG and the SMALL can be used as space, and I think, both can be seen as matter, too. Space and matter are categories where given amounts of information exists. Time comes into being if two different three spatial dimensional information packages meet.

## 7. WHAT IS MATTER, WHAT IS SPACE?

Space is what matter uses as space. Matter is that space allows to exist as matter in the given space. There are spaces that matter cannot use as space, and there are matters that cannot exists in given spaces. There are many spaces and many forms even of one given matter. For example, the particle we know as electron can exist in a different space as fast wave. The different space can be an object that we know as matter.

### 7.1. Density of space and matter

I show here two values that corroborate the above-mentioned. We know that the nuclear density of a proton is $a \times 10^{53}\ V/m^3$, where $1 \le a < 10$. (The radius of the proton is discussed[30]. The discussion may influence the calculation, but not the conclusion.)

If we suppose that space is built from little space cubes whose size can be given as $\lambda^3{}_{space}\ (m^3)$, and knowing the energy of space wave at any distance, and knowing $\lambda_{space}\ (m)$, we can calculate the density of space. It is $b \times 10^{72}\ eV/m^3$, where $1 \le b < 10$, using our model with cosine functions. We can conclude that the density of the proton is nineteen orders of magnitude beyond the density of space. If the density of an object is smaller than the density of space, this object can act as space from a viewpoint of a third object, and can act as matter from a viewpoint of another object. The tunneling works this way. The barrier is made out of matter, but electrons and photons use it as space.

"Space" or "matter"? The answer depends on they role in the given system. Our space can be also defined as matter with very high density. Saying this, the space-time theory and the commonly accepted pictures of space and matter cannot interpret these all relationships, we need the space-matter theory that describes these all.

## List of References

[1] Einstein A (1905) Zur Elektrodynamik bewegter Körper. Annalen der Physik 17, 891-921.
[2] Einstein A (1907) Relativitätsprinzip und die aus demselben gezogenen Folgerungen- Jahrbuch der Radioaktivitaet, 4, 411-462.
[3] Einstein A (1907) Die vom Relativätsprinzip geforderte Trägheit der Energie Annalen der Physik 23. 371-384.
[4] Einstein A (1914) Formale Grundlage der allgemeinen Relativitätstheorie. Preussische Akademie der Wissenschaften, Sitzungsberichte, 1030-1085.
[5] Einstein A (1915) Zur allgemeinen Relativitätstheorie. Preussische Akademie der Wissenschaften, Sitzungsberichte, 778-786, 799-801.
[6] Einstein A. (1915) Feldgleichungen der Gravitation. Preussische Akademie der Wissenschaften, Sitzungsberichte, 844-877.

[7] Einstein A. (1916) Grundlage der allgemeinen Relativitätstheorie. Annalen der Physik. 49, 769-822.
[8] Newton I (1687) *Philosophiae Naturalis Principia Mathematica.*
[9] Nishimura J, Tsuchiya A, Kim S-W (2012) Expanding (3+1)-Dimensional Universe from a Lorentzian Matrix Model for Superstring Theory in (9+1) Dimensions. PhysRevLett.108.011601
[10] SI Brochure, The International System of Units (SI) http://www.bipm.org/en/publications/si-brochure/second.html (2014).
[11] SI Brochure, The International System of Units (SI) http://www.bipm.org/en/publications/si-brochure/metre.html (2014).
[12] W. Heisenberg W (1927) Über den anschaulichen Inhalt der quantentheoretischen Kinematik und Mechanik. Zeitschrift für Physik 43 (3) 172-198.
[13] Casimir H B G, Polder D (1948) The Influence of Retardation on the London-van der Waals Forces. Phys. Rev. 73, 360.
[14] Weisberg J M, Taylor J H, Fowler L-A, (1981) Gravitational waves from an orbiting pulsar Scientific American 245: 74-82.
[15] https://www.ligo.caltech.edu/system/media_files/binaries/302/original/detection-press-release.pdf (2016).
[16] Lajtner T (2015) *Ez minden?* http://mek.oszk.hu/13600/13685/
[17] Lorentz H A (1904) , Electromagnetic Phenomena in a System Moving with any Velocity Smaller than that of Light Proceedings of the Royal Netherlands Academy of Arts and Sciences 6: 809-831.
[18] Lajtner T (2014) What is time? http://philica.com/display_article.php?article_id=444 (2014).
[19] Kozyrev N A (1967) Possibility of experimental study of properties of time http://www.univer.omsk.su/omsk/Sci/Kozyrev/paper1a.txt
[20] Kozyrev N A (1991) Selected Works (Leningrad State University).
[21] Chubykalo A, Espinoza A (2014) The Mathematical Justification of a Possible Wave Nature of the Time Flow of Kozyrev International Journal of Physics and Astronomy, Vol. 2. 9-20.
[22] Planck length http://physics.nist.gov/cgi-bin/cuu/Value?plkl|search_for=planck+lenth
[23] Planck time http://physics.nist.gov/cgi-bin/cuu/Value?plkt|search_for=Planck+time
[24] Planck M (1901) Über das Gesetz der Energieverteilung im Normalspectrum. Annalen der Physik 4: 553-563.
[25] http://physics.nist.gov/cgi-bin/cuu/Convert?exp=0&num=1&From=kg&To=ev&Action=Convert+value+and+show+factor
[26] Morris S M, Thorne K S, Yurtsever U, (1988) Wormholes, Time Machines, and the Weak Energy Condition Phys Rev Letters 61 (13). 1446-1449.
[27] Einstein A and Rosen N (1935) The particle problem in the general theory of relativity. Phys. Rev. 48, 73-77.
[28] Lajtner T (2016) Speeds of mass and light in different spaces depend on the volume of information that the given space contains (Draft) http://vixra.org/abs/1701.0289?ref=9189575
[29] Lajtner T (2016) Thought Force Moves Real Objects—Energy Amplifier by Nature http://vixra.org/abs/1610.0373
[30] Bonesini M (2016) The proton radius puzzle https://arxiv.org/abs/1612.07684