Exploration

Derivation of Natural Constants with a New Formula: Part I

Halit Eroglu*

Abstract

In this series of articles, the theory of a new formula is presented with which it is possible to derive fundamental constants of nature. This theory is a further development of Max Planck's approach to the quantized values. It elegantly combines different phenomena of the microcosm and macrocosm in a plausible explanation. With the new formula the following fundamental constants and significant physical parameters were derived: speed of light, elementary charge, electron mass, gravitational constant, fine structure constant, acceleration of gravity, classical electron radius, proton mass, quantized mass and several modified Planck-units. No original Planck units and their numerical values were used in this article. However, in honor of Max Planck, I have named after him the new quantized sizes. The Planck mass, the Planck length, etc. should therefore not to be confused with the original Planck units.

Part I contains the following: Prologue; 1. Toward a Theory of everything; & 2. the modified Planck-Units.

Key Words: natural constants, new formula, microcosm, macrocosm, speed of light, elementary charge, electron mass, gravitational constant, fine structure constant, proton mass, Planck.

Prologue

The fascinating thing about the universe is its space with the immense micro- and macrocosm size. Not only in the macrocosm between planets, solar systems and galaxies, but also in the microcosm in the atoms and its components is the "empty space" is the decisive element. Therefore, one must first of all understand the "empty" space of which it mainly consists in order to be able to understand the universe as a whole.

It is known that the "empty" space in fact is not empty but contains virtual particles, ominous dark matter and dark energy.

- However, what are the empty space and thus the entire universe?
- What is energy, mass, charge? What do they consist of?
- Why is the speed of light constant?
- Is it possible to derive the constants of nature?
- Does a Theory of everything exist?

* Correspondence: Halit Eroglu, Independent Researcher, Frankfurt, Germany. E-Mail: info@hc10.eu

Inter alia, we will have a look on these questions and solve some other mysteries of the universe. Thereby, new questions and new mysteries will arise, but we will see that the universe, made up of space, time and energy is made up in an unprecedented form.

The new world model is a theory, which currently is in development, some of the results and the "Theory of Everything" hereby is published. In this article, I am handling the key aspects of the new model of the world. Based on equations derived from fundamental physical constants of nature that play a central role in physics, I will demonstrate that it is possible to explain the entire universe with a brief "new formula". With the aid of the new formula, we also will experience how time works and how the three-dimensional space is created.

Many smart people have tried for a long time to derive all physical properties of the universe from a single formula. However so far, all attempts have failed. It seems that the reason for this failure was the imperfection of the existing theories. Viewing the universe from a different perspective and leaving the assigned paths of the previous theories, we at least reach a world model with a new formula. With this article it is demonstrated how to explain the recent recognitions in physics also from another perspective. Accordingly, modern physics is completed and enhanced.

Also some problems with previous theories will be highlighted in this article:

- **Newton** believed that it was gravity, which holds together the universe. Even today many people believe in this but no one is able to explain what actually causes gravity. Thanks to the new formula we are able to solve the mystery of gravity and based on the derived gravitational constant we will be able to learn how it works.

- **Einstein** could not exactly explain space and time although his famous theories were based on it. He summarized these as “Space-time” and assumed that the space bended itself. With the new formula we now can reveal the great secrets of space and time.

- **Planck** discovered the quantum of action and accordingly laid the foundation for quantum physics. However, his quantized quantities don’t include the gravitational constant, as we shall see in the appropriate section.

1. Toward a Theory of Everything

In this chapter we will discuss the basis of the new world model. Based on the structure of the quantized space and the new formula, in later Chapters we will gradually explore some features of the new model of the world.

For a better understanding, I will therefore refer to the following sections. The topics build on each other, and only after discussing some principles, we will be able to deal with more details in the later sections.

1.1. The Ether

The idea of an omnipresent ether as carrier of light, and thus of any electromagnetic wave comes from Aristotle and was later taken up by Newton. Since Newton, the space has been viewed as a "container" in which all physical processes take place. Even if it was not provable, Newton was convinced that there is a substance that permeates the entire universe and connects it with each other. He called this invisible substance "ether" and described it as a living, spiritual element.

Also, James Clerk Maxwell, the founder of the electromagnetic theory believed in ether, calling it *"a material substance that is more subtle than the visible body, and which exists in those areas of space, which appear to be empty."*

The notion of space, however, has changed dramatically in the continued development of physics and at least was challenged by Einstein. Since then, formal properties of mathematical spaces are used for its physical description.

As a seemingly disused physical concept, the ether hardly is treated by a scientific theory today. Although it is still discussed today if it is possible to quantize the space, however even in this matter the space considered as a mathematical or geometric object.

It was failed to prove ether around the turn of the century, and also in several later experiments. Albert Einstein could then solve the difficulty by banishing ether from his equations and replaced it by the speed of light as a universal constant. Thus, the failure of attempts to prove the ether gave Einstein the impetus to develop the theory of relativity.

In one of his speeches, Einstein summarized the former idea of the ether, and he expressed his views in detail about this issue:
" *Recapitulating: we may say that according to the general theory of relativity space is endowed with physical qualities; in this sense, therefore, there exists ether. According to the general theory of relativity space without ether is unthinkable; for in such space there not only would be no propagation of light, but also no possibility of existence for standards of measuring rods and clocks, nor therefore any space-time intervals in the physical sense. But this ether may not be thought of as endowed with the quality characteristic of ponderable media, as consisting of parts which may be tracked through time. The idea of motion may not be applied to it."*

When talking about the subject of ether it is often asserted that Einstein would have abolished it. But how one can see in his speech, he did not abolish the ether, but he has redefined it according to his theory. So, he has modernized the ether concept during that period.

It is interesting to experience what considerations are hidden behind the fact that at the beginning of the last century the debate in relation to ether was brought to an end. Not just because the fact that it is not provable, but also because there was no theory with which one could equally explain the physical phenomena in the micro and macrocosm explain using the properties of the space. In his speech, Einstein also called attention to the following fact:

"Of course it would be a great advance if we could succeed in comprehending the gravitational field and the electromagnetic field together as one unified conformation. Then for the first time the epoch of theoretical physics founded by Faraday and Maxwell would reach a satisfactory conclusion. The contrast between ether and matter would fade away, and, through the general theory of relativity, the whole of physics would become a complete system of thought, like geometry, kinematics, and the theory of gravitation."

The above quoted speech of Einstein is very interesting for the subject of this article. In this speech, we get to know the real reasons why the former idea of "material" ether, was abandoned in a justified way.

(Link to Einstein's speech: http://www-history.mcs.st-andrews.ac.uk/Extras/Einstein_ether.html)

Why can the ether not be measured?

Since last century, the ether hypothesis is considered dead. In later experiments it also was not possible to prove the ether. In the many discussions on ether at the beginning of the last century and even later, no one seems to have considered that the one thing they were looking for was simply too small to be detected in experiments.

Apparently ether is considered as an element, which is large enough to be proven. However already at the beginning of the last century Max Planck -after the discovery of the quantum of action-, has derived the units, which were named after him and has defined a tiny quantized quantity of the space as a Planck length $l_P = 1{,}616199 \cdot 10^{-35} m$. Latest after this recognition, the researchers should have actually been aware that it is not possible to measure physical effects at these small scales.

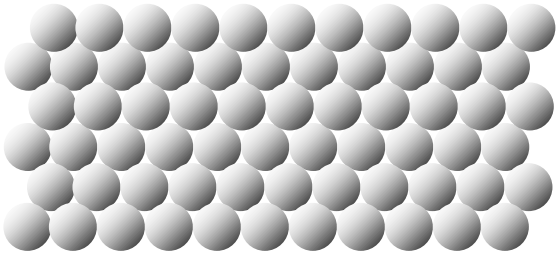
For centuries, the ether was defined with different, sometimes even bizarre theories. However, the new world model is not based on the old ideas of space and the ether, so I will not use that term.

In the following chapters we will see that the "empty" space has a structure, which previously was unknown. Even if the properties of the "empty" space cannot be detected directly, there is enough evidence for the existence of a "*substance that permeates the entire universe and connects it with each other*" as Newton had described.

1.2. The structure of the quantized space

As with any scientific model, also with the new world model we try to describe the reality with basic elements. In the presented world model, the universe consists of simple components. However, this should not obscure the complexity of reality. An analog clock also consists of simple components, such as of gears, screws, etc. Only the interaction of these basic components according to a specific system brings the clock running. In the universe it is the interactions of the individual components that make the "clockwork" universe running.

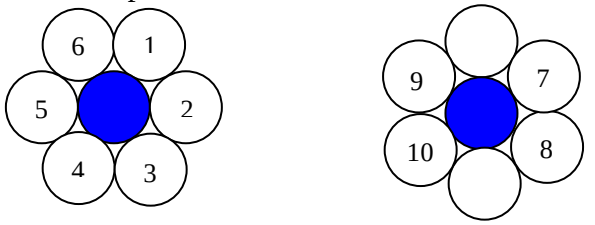
In the new world model, the complete space in the universe, so the vacuum in its smallest dimension consists of unified, densely interconnected spheres with a strictly periodic structure which I have referred to as "space balls" in this article.
Figure: In new Model vacuum filled with space balls



The sphere as a geometric body generally has special properties and for the given volume has the smallest surface area of all possible body. This property is very important in the quantization of the space. Therefore, the new world model is based on these quantized space balls and not on other geometric shapes such as cubes or pyramids.

In three-dimensional space, each space ball is directly connected to 10 adjacent spheres. For uniform structure with the same diameter and the same gravitation between the space balls, there is an interaction with the factor 10 between the space ball in the center and its adjacent spheres.

Figure: Interaction between the space balls



Two-dimensional view in a plane

View from above

The space balls are magnetic monopoles, and they pull each other. All physical phenomena are the consequences of this primal magnetism in the space balls. As we are going to see, the charge, mass, and thus the basic components of matter, atoms, stars, etc. arise from interactions between these space balls.

For the present, this principle can describe as follows:

Magnetism > Charge > Mass > Particles > Atoms > Stars

I.e. the magnetism causes charges, and these generate mass, which then form particles that accumulate in atoms and thus produce all macroscopic bodies and celestial objects in the universe.

1.3. The New formula

Many physical phenomena can be explained with the fundamental natural constants of speed of light and the reduced Planck's quantum of action. In the new world model the following context constitutes the base of each physical event in the universe, and it can therefore be defined as a "new formula".

The New formula: $$\hbar \cdot c = \sqrt{10} \cdot 10^{-26} \qquad (1\text{-}1)$$

Speed of light with c=299.792.458 m/s

Reduced Planck constant with $\hbar = \frac{h}{2\pi}$.

The reduced Planck quantum of action has been modified by transforming the new formula with:

$$\hbar = \frac{\sqrt{10}}{c} \cdot 10^{-26} = 1{,}0548222864\ 7939 \cdot 10^{-34}$$

Planck's quantum of action is determined experimentally, and physical measurements are always associated with measurement errors. Even the most accurate measurement can not provide a precise value. The determination of Planck's quantum of action depends on many factors, so with the above reduced formula of the Planck constant was modified. The absolute deviation from the CODATA value is minimal and amounts: $0{,}0002505611\ 4310492 \cdot 10^{-34}$.

The new formula has the dimension of energy times length and thereby constitutes a universal relationship between energy content and length scale. It describes the amount of energy con-

tained in the space balls and here, the quantized length amounts as modified Planck length $l_P = 10^{-26} m$. The dimension of the new formula with the general units eV in nuclear physics is:

$$\frac{\hbar \cdot c}{e} = \frac{\sqrt{10}}{e} \cdot l_P \Rightarrow \text{ 197, 39208802178700 MeVfm}$$

Despite to the above modified **ħ**, the modified value from the next Chapter was used for the elementary charge e.

The new formula $\hbar \cdot c = \sqrt{10} \cdot 10^{-26}$ means that the space balls with the diameter of l_P contain a certain amount of energy $\sqrt{10}$. The interaction between the space balls is done with the time factor contained in the speed of light and the smallest action ħ.

The constant speed of light is used as the time factor in the pulse transmission and therefore, also the quantized action ħ is constant. When asked which of the two existed at first (Hen-egg problem), we can say with certainty that the time factor, which is measured from the speed of light is given, and that ħ is directly dependent. In the Chapter "derivation of the speed of light," we will continue to discuss the phenomenon of the time factor.

The attraction in the space balls in the form of energy with $\sqrt{10}$ and the universal time factor with the speed of light, are the only basic elements with which the universe is built. The modified Planck quantum of action as the smallest effect also plays a big role, but this quantity directly depends on the speed of light and therefore can be derived from it.

With the "new formula" it is possible to make a clear and unambiguous description of the phenomena observed in nature. The simple formula also allows predictions about new phenomena.

The new formula is harmless and any concerns that zealous scientists could use it to play "God" with it and turn the world upside down, are unfounded. The left side of the new formula contains natural constants that have long been known for a long time and are used daily in nuclear physics. My discovery relates to the right side of the formula, and it explains to what the fundamental constants of nature, the speed of light and the Planck constant can be attributed to.

According to the new world model, space and time is quantized in the universe. In addition to the elementary magnitudes such as the Planck mass, the Planck charge etc., also some fundamental constants of nature, and even the speed of light can be derived with the new formula. We also will gain new insights on the nature of time and the three-dimensionality of space.

1.4. The Secrets of the universe

In physics, there are some natural laws, but many scientific theories. There are also rather interpretations, opinions and hypotheses on which these theories are based on.

If we leave aside the theories and the various opinions and interpretations as "man's work", then only the laws of nature will remain. The empirically confirmed and universally valid laws of nature do explain the relationships and interrelationships of physical phenomena. However, there is a problem: they contain partially natural constants that only can be determined by measurement. While describing the processes of nature, one will encounter physical constants, whose values can be measured, but so far no one knows what they are to be attributed to.

The secrets of the universe are thus hidden in the constants of nature. Consequently, many well-known physicists had the desire to derive the number of fundamental constants from a single constant.

There are over a hundred fundamental constants, but only about two dozen of them are elementary, and the rest can be derived from them. After the discovery of the new formula I have therefore derived the basic constants of nature, because it is possible to explain the entire universe with them. The derived constants of nature have been selected after careful consideration, and as we shall see later, even these fundamental constants of nature are based on a single number, namely the elementary constant.

Einstein also was dissatisfied with the constants of nature, and he has described it as follows:
"... I cannot compellingly think of any reasonable and consistent theory that explicitly contains one number, which could also have been chosen as another number by the whim of the Creator, where the world qualitatively would have been represented in a different way in its laws. "

For Einstein, the most elementary constants of nature such as the speed of light, gravitational constant and the Planck quantum of action were not really fundamental, because their value still depends on "conventional" units. Only if it could be succeed to create one quantity from several constants that is a pure numerical value without unit of measurement, then a universal constant would exist according to Einstein's view. However the numerical value of this universal, absolute constant should be determined by the logical basis of the physical theory.

The number $\sqrt{10}$ in the new formula is the universal elementary constant, and we will gradually learn their special characteristics in the following chapters.

The below listed nature constants and some important physical quantities have been derived with the new formula. As we are going to see, all fundamental constants in physics can be attributed to a single number $\sqrt{10}$ as the elementary constant.

$$E=\sqrt{10}\left\{\begin{array}{l} c \\ \hbar \\ \\ l_P \\ \\ t_P \end{array}\right.\left\{\begin{array}{l} e \\ m_e \\ \\ Q_P \\ \\ m_P \end{array}\right.\left\{\begin{array}{l} G \\ m_{\mathrm{Pr}ot} \\ \alpha \\ \\ kr_e \\ \\ g \end{array}\right.$$

$c =$ Speed of light
$\hbar =$ Reduced Planck quantum
$l_P =$ Planck length
$t_P =$ Planck time
$e =$ Elementary charge
$m_e =$ Electron mass
$Q_P =$ Quantized charge
$m_P =$ Quantized mass
$G =$ gravitationnel constant
$m_{\mathrm{P}rot} =$ proton mass
$\alpha =$ Fine structure constant
$kr_e =$ Classical electron radius
$g =$ Acceleration of gravity

2. The modified Planck-Units

Starting with the Planck length $l_p = 10^{-26} m$**,** the enormous dimensions in the microcosm provide ample space for particles, charges and photons. These elements, in fact are already formed in the smallest plane in the Planck sphere. Therefore, the microcosm is like an ocean of microscopic particles and radiation.

In the macroscopic length scale in the laboratory we only can study large concentrations of these elements. In experiments, indeed, we observe the existence of tiny particles or radiation seemingly to arise out of nowhere and disappear again. Therefore we call them virtual particles or vacuum fluctuations. However, also these particles are already large collections of quantum objects, which we will discuss in the following chapters.

(Note: In the following sections, equations are derived to make certain connections clear. Here, the Planck length wasn't used in order to ensure clarity. The multiplication by the number one in the Planck length has no effect on the numerical values. During the comparison of equations derived with CODATA values, however, the Planck length is included in the extension with the orders of ten.)

2.1. The quantized magnetism

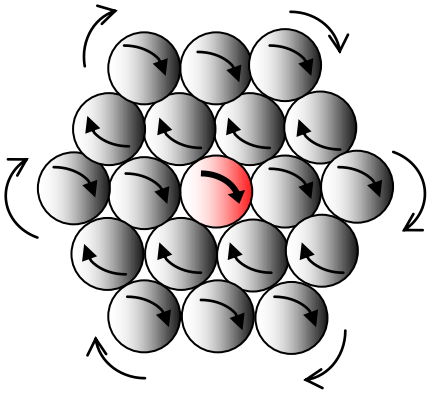
Magnetism is usually a hidden power. According to the new world model, it forms the elemental force in the universe, and therefore the entire universe is built up electromagnetically.

The magnetic monopoles in the space balls form the origin of electromagnetism. Thus, the electrodynamics observed by us has its origin in the quantized magnetism. Magnetism is therefore not a side effect of electrodynamics, but it produces the electromagnetic interactions. Magnetic fields are not generated by the time-varying electric fields out of nothing. The effects of the elemental magnetism become apparent from the charge transport.

The cause of electrodynamics is the magnetism, and it brings out the charges as an effect. Until today, this fact has been interpreted in reverse order. Although physics calculations do not change by this order, we are able to better understand the universe from a different perspective and thus gain many new insights.

So far, no magnetic monopoles have been observed. As gravitation in the space balls, the magnetic monopoles show no physical events without external influence, which one could be observed. Physical events emerge from the interactions of dipoles, which are formed by external influences. Therefore, it is not possible to directly observe magnetic monopoles.

According to the following illustrations we see how the polarity from magnetic monopoles is produced in the space balls.



When the ball rotates in the center, it brings the neighboring balls to rotate as well with its gravitation force. The ball in the center, shown in the figure is able to rotate in any direction in the

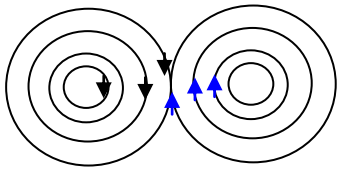
three dimensional space and the directions of rotation of the adjacent balls are dependent on this due to the prevailing gravity.

In the figure, the ball rotates in the center to the right, and therefore, all the balls also rotate to the right. If the direction of rotation is defined as polarity, then the rotation to the right side corresponds e.g. to the positive polarity. This globular cluster in the figure can only interact with other globular clusters with the same polarity, and with opposite polarity they would push each other away.

In the classical description of the polarity, it is assumed the attraction of opposite polarities. To date, however, the question remains, why there is different polarity in nature and what the mutual attraction can be attributed to. Without knowing the cause of the polarity, this classical approach leads to an incorrect interpretation. Many physical phenomena are interpreted without knowledge of their underlying principles. But nature does not depend on our human logic and our interpretations.

With increasing distance from the center, the rotation energy of the globular clusters decreases. The different polarity becomes interesting at the intersection between two globular clusters, as can be seen in the figure below.

Figure: Two globular clusters with different polarity.



At the intersection points there is interaction with the attractive force between the balls on the one hand and on the other hand, repulsion is seen due to different polarity.

The macroscopic magnetism is the consequence of different polarities of the sub-atomic particles. In addition to the magnetic polarity, there is also a polarity of charge. The relationship between magnetism and charge will be discussed in the following chapter.

The quantized magnetism in space balls has the value of $\sqrt{10}$, and with this elemental power other quantized sizes can be derived.

2.2. The quantized charge

Each space ball exerts an attraction in the form of magnetism on the neighboring space balls. Through external factors, for example by pulse power, the space balls can be brought into rotation, and as we saw in the last Chapter causes the polarity.

The charge of the electron is defined as elementary charge. The electron only carries half the charge in an atom and the other half of the charge s carried by the proton. The correlation between the elementary charge e and the quantized charge Q_P can formulate as follows:

$$Q_P = 2e \tag{2-1}$$

$$\Rightarrow \qquad e = \frac{Q_P}{2} \tag{2-2}$$

And this corresponds to the following relationship:

$$e = \frac{\sqrt{10}}{\pi^2} \cdot \frac{1}{2} \tag{2-3}$$

For the quantized charge of a space ball, we get:

$$Q_p = \frac{\sqrt{10}}{\pi^2} \cdot l_P \tag{2-4}$$

And this is equivalent to:

$$Q_P = \frac{\hbar \cdot c}{\pi^2} \tag{2-5}$$

The charge of an electron as an elementary charge, according to CODATA is:

$e = 1{,}602176565 \cdot 10^{-19}$ C .

With the above equation (2-5) we obtain the value for the elementary charge with

$e = 1{,}6020285776\ 69910 \cdot 10^{-19} C$.

The deviation from the CODATA value is $0{,}0001479873\ 30086531 \cdot 10^{-19} C$.

In the measurement of the electron elementary charge in the small length scales of up to 10^{-19}, several factors have to be considered. In addition to the influence of the geomagnetic field, the local acceleration and the gravity, the influences of the measuring apparatus on the test object must also be considered.

The primary magnetism in the space balls with disturbance produced by external influences creates charges. Pictorially this can be thought as a dynamo. Every movement of the dynamo causes magnetic interaction with its environment. A rotating space ball makes adjacent balls rotate with its magnetic field and thereby power is spent. This power transmission and energy transfer between the space balls is called Q_P as quantized charge.

In actual fact, magnetism is transmitted in form of magnetic force. In our macroscopic dimension it is possible to move charges with magnetism and the electric current from the wall outlet is due to this principle. Moving charges in turn cause magnetism. Therefore, it is seen that charges are the transport of magnetism.

2.3. The quantized mass

According to the famous formula $E = m \cdot c^2$, the mass is equivalent to energy. And according to the new world model with the new formula $\hbar \cdot c = \sqrt{10} \cdot l_P$ is also a form of energy. If we equate these two equations and use the Planck mass as rest mass, we obtain:

$$E = m_P \cdot c^2 = \sqrt{10} = \frac{\hbar \cdot c}{l_P} \tag{2-6}$$

Obtained by reshaping the Planck mass m_P:

$$m_p = \frac{\hbar}{c \cdot l_P} \tag{2-7}$$

The Planck's rest mass has the value $m_p = \frac{\hbar}{c \cdot l_P} = 3{,}5185084158\ 4345 \cdot 10^{-17} kg$

The Planck's rest mass is thus the ratio between the smallest effect and the speed of light in the time factor. We will discuss this time factor later.

Using $\hbar = \frac{\sqrt{10}}{c}$ in the above equation, we obtain additionally:

$$m_p = \frac{\sqrt{10}}{c^2} \tag{2-8}$$

However, there are still the following relationships:

$$m_P = \frac{1}{c^2 \cdot \sqrt{10}} \tag{2-9}$$

$$m_P = \frac{\hbar^2}{\sqrt{10}} \tag{2-10}$$

$$\frac{1}{m_P} = \frac{c}{\hbar} = c^2 \cdot \sqrt{10} = \frac{\sqrt{10}}{\hbar^2} \tag{2-11}$$

The relationship with the quantized charge $Q_P = \frac{\hbar \cdot c}{\pi^2}$ and $m_P = \frac{\hbar}{c}$ is:

$$Q_P = \frac{m_P \cdot c^2}{\pi^2} \tag{2-12}$$

And then we obtain for the Planck mass the following:

$$m_P = \frac{Q_P \cdot \pi^2}{c^2} \tag{2-13}$$

The Planck mass in eV (m_{PeV}) corresponds to

$$m_{PeV} = 2 \cdot \pi^2 \tag{2-14}$$

Transforming the units from kilogram to energy eV, the following factor is used (left site):

$$\frac{c^2}{e} = \frac{2\pi^2}{m_P} \tag{2-15}$$

And this is equivalent with the following relation to Einstein's Formula:

$$2\pi^2 = \frac{m_P \cdot c^2}{e} = \frac{E_P}{e} = m_{PeV} \tag{2-16}$$

$$\Rightarrow \qquad E_P = \sqrt{10} = e \cdot 2\pi^2 \tag{2-17}$$

The relationship between the mass and the charge is of great importance for the structure of the universe. Many microscopic and macroscopic physical processes are founded upon the interaction of charge and mass.

One can imagine the quantized mass as follows: In case of failure of the magnetic attraction force by external factors the space balls rotate and they thereby use a force in order to move the adjacent space balls. We have described this power transmission in the previous section as "charge". The resistance of the space balls as a counter force to this movement is the force of inertia, and thus it is the mass of the space balls. The resistance of a body in relation to a change

in its rotational movement is generally referred to as the moment of inertia, and the mass of a rotating body is exactly the same moment of inertia.

The magnetic component of the kinetic energy is transmitted by charges and the inertia force is exerted against it with mass. All space balls are interconnected through magnetic attraction and a change in their state by rotation calls forth certain resistance, which appears in the form of mass as inertia.

Thus, each particle with mass also contains a charge and vice versa. Mass and charge can only exist together, and they form the basic properties of all particles. The impulse force that causes the disturbance of magnetism between the space balls and causes charges also produces mass as a counter force.

Mass and charge are the two sides of the same medal just as the speed of light and Planck's constant of action is interdependent and which represent two sides of the same medal. The reasons of physical processes are ħ and c, and thereby, the charge and mass is produced as an effect. The magnetism in the space balls generates charge through rotating, which in turn generates a force of inertia mass. This process takes place with the speed of light as time factor and the smallest effect with reduced Planck's quantum ħ.

2.4. The quantized energy

The energy can be defined from different aspects. According to Planck energy is the smallest effect with a given frequency: $E = h \cdot f$
And according to Einstein, energy and mass are equivalent: $E = m \cdot c^2$

According to the new world model we obtain for the quantized energy the value with:

$$E_P = \sqrt{10} \tag{2-18}$$

And it is equivalent to:

$$E_P = m_P \cdot c^2 = \sqrt{10} \tag{2-19}$$

Following relationship is obtained for the quantized energy with the charge power:

$$E_P = Q_P \cdot \pi^2 \tag{2-20}$$

The quantized energy consists of the attraction force in the space balls. It is noticeable on magnetism and thus holds together the whole universe. Therefore the quantized energy and the quantized magnetism are identical.

2.5. The modified Planck-Units

After the discovery of the quantum of action and based on this smallest action element, the famous physicist Max Planck has tried to derive quantized magnitudes. All physical quantities should be derived with the so-called Planck units. However, these Planck units were not applied until today and they were almost forgotten. In fact, in terms of quantized values Planck was on the right track. However, research in the field of quantum physics only broke through a century ago its groundbreaking discovery.

The presented new world model is based on Max Planck's approaches to the quantized values. However, we cannot use the original Planck units, because they are based on gravitation as "primal force". Since Newton, gravity is regarded as a universal force that holds together the entire universe. As we will see later in the related Chapter, this is only half the story. As with the other fundamental forces also Gravitation is only a modification of magnetism as a primal force, and it shows its effect in larger dimensions and only from a certain particle density.

The gravity only shows its effects in the presence of particles, but the universe mainly consists of "empty" space and particles only create "side effects" of the many dynamic processes in the smallest scales in space. Therefore it is not possible to explain the entire universe with gravity, which describes the interaction of particles with each other. In the next chapters we will discuss this topic in more detail.

At the end of this chapter the previously discussed quantized variables with the corresponding formulas are listed. In honor of Max Planck I have named these as modified Planck units. The remaining physical units can be derived with these quantized sizes as base units. The quantized time has a special shape, and we therefore will discuss these in the 4th chapter after we have analyzed the nature of time.

Length:

$$l_P = 10^{-26} m$$

Mass:

$$m_p = \frac{\hbar}{c \cdot l_P} = 3{,}5185084158\ 4345 \cdot 10^{-17} kg$$

Charge:

$$Q_p = \frac{\sqrt{10}}{\pi^2} \cdot l_P = 3{,}2040571553\ 3983 \cdot 10^{-27} Coulomb$$

Energy:

$$E_P = \sqrt{10} = 3{,}1622776601\ 6838\ \ Joule$$

2.6. The units invariance of the new formula

According to international definition all physical units can be attributed to seven base units (meter, kilogram, second, ampere, kelvin, mole and candela.). All others are made up of these basic units.

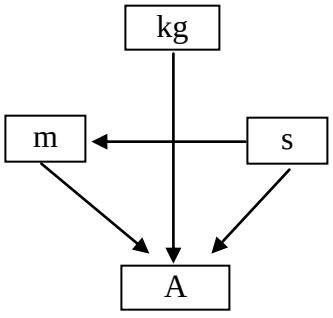
The base unit of mass, the kilogram, is an arbitrary determination, and for several years international committees are trying to perform a redefinition. It is intended to determine the units kilogram, ampere, kelvin and mole based on the fundamental constants. For example, should ampere be defined by the flow a certain amount of particles of the electron charge per unit time. And the unit of mass with the kilogram shall be defined on the natural constant "Planck's quantum of action".

The kilogram as the unit of mass is a "sub-unit" because it is based on arbitrary determination and not to fundamental constants. While the mass of a body irrespective of its location is always the same, the force of gravity acting on it depends on the acceleration of gravity. In international determination of the mass, however, the heaviness-property of the mass, i.e. the weight is determined. The mass of the "primary kilogram" is defined by the weight force and not the mass of the particles contained in it. The current goal is to determine the mass of the particle masses contained in the kilogram prototype (Avogadro project).

The new formula is not only the basis of the nature constants but also on the physical units. With the elementary constant $\sqrt{10}$ for the energy, besides the fundamental nature constants c and h also the modified Planck units can be derived.

The new formula is independent of our arbitrary definition of units. This topic I will illustrate with two examples, the meter and kilogram.

Let's look first at the dependence of the units themselves:



The meter, the kilogram and the second are included in the definition of the ampere.

The new formula with units:

$$\hbar \cdot c = \sqrt{10} \cdot 10^{-26}$$

$$[J \cdot s] \cdot \left[\frac{m}{s}\right] = [J] \cdot [m]$$

$$\left[\frac{kg \cdot m^2}{s^2} \cdot s\right] \cdot \left[\frac{m}{s}\right] = \left[\frac{kg \cdot m^3}{s^2}\right]$$

The new formula at first glance appears to be depend on our arbitrary definition of kilogram, meter and second. However, it must be remembered that the Planck constant quantum of action, meter and second are based on measurements in the quantum dimension. The masses of subatomic particles are not "weighted" but derived through energy measurements. In atomic physics, we therefore use the units of energy (eV), because physical units are interdependent and therefore can be converted one into another.

The base unit for energy is joules and can also be converted into the following units:

$$\text{Joule} = \text{N} \cdot \text{m} = \text{W} \cdot \text{s} = \frac{\text{kg} \cdot \text{m}^2}{\text{s}^2}$$

Example of changing the meter

If for example the definition of the meter changes, then so does the Joule because it also contains the meter. Thus for the speed of light and reduced Planck's quantum of energy we also would get a different value, but still the basis of the new formula with $\sqrt{10}$ would not change.

The reduced Planck's quantum of action, with the new formula directly dependent on the determination of the speed of light with the following equation:

$$\hbar = \frac{\sqrt{10}}{c} \cdot 10^{-26}$$

Example of change of the kilogram

Since for the arbitrary decision of the elementary kilogram there is no defined unique physical property of the mass. The mass is converted in atomic physics on the principle of equivalence of mass and energy through the following formula:

$$E = m \cdot c^2 \Rightarrow m = \frac{E}{c^2} \qquad (2\text{-}21)$$

As the smallest unit of energy applies the elementary charge and it is calculated the mass of the kilogram in eV to the following:

$$\text{Mass (in kg)} = \frac{\text{Mass (in eV)} \cdot e}{c^2} \tag{2-22}$$

$$\text{Mass (in eV)} = \frac{\text{Mass(in kg)} \cdot c^2}{e} \tag{2-23}$$

Masses in eV of the particles, electrons and protons derived in the next Chapters are based on the conversion formula in atomic physics.

The electron volt (eV) is defined as follows:

$$1\,\text{eV} = 1{,}602176565\ \cdot 10^{-19}\ \text{Joule} \rightarrow \frac{\text{kg} \cdot \text{m}^2}{\text{s}^2}$$

$$1\,\frac{\text{eV}}{\text{c}^2} = 1{,}7824971867\ 4393 \cdot 10^{-36}\ \text{kg}$$

"An electron volt is the amount of energy to which the kinetic energy of an electron is increased as it passes through an acceleration voltage of 1 volt."

The Ampere is defined as follows:

"1 ampere is the power of the time-constant electric current which- in a vacuum between two parallel, infinitely long, straight conductors with negligible circular cross-section and the distance of 1 m between these conductors would cause a force of $2 \cdot 10^{-7}$ *Newton's per meter of length."*

One ampere represents a flow of 1 coulomb per second through the cross section:

$$Ampere = \frac{Coulomb}{Second}$$

"A coulomb is defined as the electric charge, which is transported in one second by the cross section of a wire, in which an electric current of the strength of one ampere flows."

The Volt as a derived unit is defined as follows:

$$1\,\text{Volt} = \frac{J}{C} = \frac{N \cdot m}{A \cdot s} = \frac{kg \cdot m^2}{A \cdot s^3}$$

As it can be seen in these units, they do depend on each other and the change of the meter or the kilogram also leads to the change of electrical quantities such as ampere or volt.

If the definition of the kilogram is changed, which is indeed planned for the future, then the ampere changes because it contains kg. This would, however, also change the value of the electron volt (eV). The following relationships namely depend on the reduced Planck's constant and the mass of the quantized electron charge:

$$\hbar = \frac{m_{PeV} \cdot e}{c} \tag{2-24}$$

$$\Rightarrow \qquad m_{PeV} = \frac{\hbar \cdot c}{e} \tag{2-25}$$

($m_{PeV} =$ Planck mass in eV)

The discrepancy at the Planck mass

Here, I would like to point to a discrepancy: the Planck mass is greater than the mass of subatomic particles. The quantized units are the smallest physical units, but the original Planck mass and also the Planck mass modified with the new formula is greater by several powers of ten.

For comparison with the powers of ten with kg:
Original Planck mass: 10^{-8}
Modified Planck mass: 10^{-17}
Electron mass: 10^{-31}
Proton mass: 10^{-27}

(Note:
This discrepancy does not affect the numerical values but only affects the powers of ten. I have not yet figured out the reason for this discrepancy. Perhaps something is wrong with the above mentioned conversion between kg and eV. I suppose it's up to the definition of the electric charge (Coulomb) and the electric current (Ampere). The factor in the strength of 10^{-7} in the definition of ampere seems to lead to a discrepancy in the transformation of the mass in kg. In atomic physics, the unit eV is used for the mass and therefore the experiments and the theoretical calculations are correct. But when compared to the quantized, smallest mass, i.e. the Planck mass, this difference appears. Nevertheless, in the next section, I have derived the masses of subatomic particles in kg, because in this way the property of matter with gravity and inertia can be better analyzed than by conversion to energy units.)

(Continued in Part II)