Science Journal of Physics
ISSN: 2276-6367
http://www.sjpub.org

Published By
Science Journal Publication
International Open Access Publisher

Research Article **Volume 2013, Article ID sjp-154, 16 Pages, 2013. doi: 10.7237/sjp/154**

Derivation of the Relativistic Laws of Force and Their Consequences

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Accepted 29 November, 2013

Abstract - The relativistic laws of force as shown in FIG 1 are used to derive both the Teleronki model and the spherical-hyperbolic symmetry which later leads to a general field theory. On the basis of these new laws of force it is possible to rule out an infinitely large force right from the start.

Keywords: Relativistic Laws of Force, Spherical-hyperbolic Symmetry, Teleronki

1. Introduction

Departing from conventional theories which are mainly itemized by *J.Bublath* [1] (see also Wikipedia) we gain new insights by practicing the black-box method (test tube). A large collection of examples proves the connection to reality of that newly gained knowledge (see table 3).

With the aid of fundamental particles it is proved that for the first time it becomes possible to precisely calculate the mass, thanks to this totally new approach. Especially the standard model is being criticized because stable atomic nuclei are not possible according to this model.

In this short paper we naturally cannot discuss or even solve *all* problems in physics. The big bang model is also criticized and alternatives are suggested.

In the field of atomic physics, we develop - based on the Teleronki-Model - the shell models of protons and neutrons which lead to a new perception of bond relations (mass defect) within the atomic nucleus. [2] illustrates a prototype of this essay.

The Planck mass model was developed on the basis of *M. Planck's* question: "How big does the mass have to be that compensates an elementary electric charge's action of force?". The thus calculated mass has a magnitude of 10^{-9} kg, which is, considering the electron's mass (10^{-30} kg) unimaginably huge. It therefore has to consist of smaller particles (so-called X-particles). Due to this great mass which is experimentally not verifiable people have developed so-called super-symmetries as was decided on a congress.

However, these super symmetries can also not be verified by experiment. If they really exist, it should soon be possible to verify them on the converted, big accelerators. Also based on the Planck mass model is the big bang theory which is currently the generally accepted theory. According to this theory the proton is unstable, a fact which should be provable by experiment. However, this instability has hitherto not been proved for the range stated. So far, all attempts to split the electron into smaller parts have failed. The electron is therefore the smallest massive fundamental particle.

For this reason, the author allows himself to ask another question, namely: "How big must the coefficient *G* be to render electron mass and elementary electric charge compatible? (similar to the fine-structure constant)", or in other words: "How can you calculate the electron's specific charge?" This approach leads up to new, surprising results. Throughout this work, the author attached great importance to correspondence between calculations and experimental findings (see table 3). The most important conclusion of this paper is the separation of the stable periodic table of the chemical elements from the unstable, artificially constructed fundamental particles.

2 Presentation of the Physical Base Items as Universal Fundamental Natural Constants

2.1 Given Equations

The basic thesis of this paper is that acceleration, just as the speed of light, has an upper limit

and that there is a close connection between acceleration and mass defect. Newton, in his physics, starts from the quantity of movement. This is a concept which is alien to everyday language and is thus at first not particularly intelligible. Inertial systems are here not the issue as there is no difference between inertial and gravitational mass. Here, the following generally intelligible theorem shall apply:

When reaching any kind of maximum velocity the acceleration has to equal zero.

From this sentence the whole book will be derived. The velocity of light is a constant and as we know, the constant's differential is zero. Another *increase* of velocity is not possible. Therewith, the acceleration needs to have a *finite* maximum between the origin of ordinates and the velocity of speed. Actually, velocity and acceleration are vectors with a value and a direction. However, in this case *all* vectors have the same direction (cosΦ=1), so it is possible to calculate with the values only which, regarding acceleration, become zero at the speed of light and in the point of origin. It is therefore presupposed that mechanic work (energy) can be brought into relation to the energy-mass equivalent of the special theory of relativity (SRT). It shall be given:

$$m_0 a_{max} x_0 = m_0 c^2 = F_0 x_0 = E_0$$

(Equation: 2.1.1)

m_0 : fundamental mass or original mass; $a_{\max}$: maximum acceleration; x_0 : limit of length; F_0 : limit of force; E_0 : limit of energy. In equation (2.1.1), acceleration, too, is limited for the first time. Such limitation is not possible in classical physics and does neither occur in SRT nor in the general theory of relativity (GRT). In quantum theory, acceleration is also not limited. Limiting acceleration according to equation (2.1.1) immediately implies that path x also has to be limited. Thus, there is no punctiform fundamental mass. According to the findings so far, equation (2.1.1) should be: $m_0 \cdot \infty \cdot 0 = m_0 \cdot c^2$. This vagueness will here be removed. Further shall be given:

$$E_0 = \frac{e^2}{4\pi\varepsilon_0 m_0} = a_0 G_N \frac{m_0^2}{x_0} = m_0 c^2 = \frac{a(\sqrt{\hbar c})^2}{2\pi\lambda_0} = G_s \frac{e_s^2}{x_0}$$

(Equation: 2.1.2)

Any quantities with the index 0 are unknown *constants*, which have to be found. Known are e = 1.60217646·10–^{19} C - elementary electric charge, e$_0$ = 8.854187817·10–^{12} Fm–^{1} - electric field constant, c = 2.99792458·10^8 ms–^{1} - speed of light in vacuum, G_N = 6.67310·10–^{11} m^{3}kg–^{1}s-^{2} Newton's gravitation constant, a = 0.00729735254 - fine structure constant, = 4.45695557·10–^{13} CF–^{1}/^{2}m^1/^{2} - charge of the strong interaction in electrostatic units, h = 6.62606876·10–^{34} Js - Planck's constant, l - wave length in m (here is $l_0 = x_0$). More in sections 6 and 7. All experimental values were taken from [3]. By trial and error, the factor a_0 was determined as a_0 = (100{c})^4 = 8.07760871·10^{41}, whereby {c} is the numerical value of the speed of light. The factor 100, which will not be explained, does also appear later on when calculating the fine structure constant (see equation (6.1.1)). Now, the following fact was found by trial and error:

{G_N}·(100{c}) = 6.67310·10–^{11}(100·2.99792458·10^8) = 2.00054 » 2

(Equation: 2.1.3)

Here, {G_N} = 6.67310·10–^{11} is the numerical value of Newton's gravitation constant. One is immediately able to state a slightly corrected numerical value of the gravitation constant:

$$\{G_N\} = \frac{2}{100\,\{c\}} = 6.67128190 \cdot 10^{-11}$$

(Equation: 2.1.4)

$$G_e = a_0 G_N = 2(100\{c\})^{-1}(100\{c\})^4 m^3 kg^{-1} s^{-2} = 2(100\{c\})^3 m^3 kg^{-1} s^{-2} = 5.38880048 \cdot 10^{31} m^3 kg^{-1}$$

In addition, we can join the a_0 and G_N constants to G_e, G_e then being the electromagnetic gravitation constant

(Equation: 2.1.5)

2.2 Definition of Fundamental Mass or Original Mass

According to equations (2.1.2) and (2.1.5):

$$m_0 = \frac{1}{\sqrt{2}}\sqrt{\frac{1}{(100\{c\})^3}} \cdot \frac{e}{\sqrt{[G]\sqrt{4\pi\varepsilon_0}}} = \frac{1}{\sqrt{2}}(100\{c\})^{-3/2} \cdot \frac{e}{\sqrt{[G]\sqrt{4\pi\varepsilon_0}}}$$

= 2.06911676·10–^{30} kg .

(Equation: 2.2.1)

The coefficient preceding e has the mathematical structure of a typical normalizing factor (exponent 3/2) as it occurs in statistic physics (partition function σ) and in quantum mechanics (wave function ψ). Needs only to be clarifying what $^1/\sqrt{2}$ is. Trial and error has shown that it may be useful to start from a wave equation. We therefore take the simplest equation of a stationary wave and thus obtain the simplest form of a wave differential equation (Schroedinger equation)

$$y'' + y = 0$$

(Equation: 2.2.2)

With the solutions:

$$y = C_1 \cos x + C_2 \cos x$$

(Equation: 2.2.3)

From the spectrum of solutions the following is selected:

$$\cos\frac{\pi}{4} = \sin\frac{\pi}{4} = \frac{\sqrt{2}}{2} = \frac{1}{\sqrt{2}}$$

(Equation: 2.2.4)

This is the relation of the cathetus to the hypothenuse in a unit triangle $^1/\sqrt{2}$. Thus, is also a normalizing coefficient. Thus, mass and charge are normalized to one another. Now we are able to state the rest mass of the fundamental mass or original mass we are looking for:

$$m_0 = \frac{e}{\sqrt{G_\varepsilon}} \cdot \frac{1}{\sqrt{4\pi\varepsilon_0}} = 2.06911676 \cdot 10^{-30} kg$$

(Equation: 2.2.5)

2.3 Physical Base Quantities

We still have to determine x_0 , $a_{\max}$ and t_0 as well as F_0 and E_0. From equation (2.1.2) we obtain

$$G_\varepsilon \frac{m_0^2}{x_0} = m_0 c^2$$

How to Cite this Article: Roland Meissner "Derivation of the Relativistic Laws of Force and Their Consequences", Science Journal of Physics, Volume 2013, Article ID sjp-154, 16 Pages, 2013. doi: 10.7237/sjp/154

(Equation: 2.3.1)

$$x_0 = G_\varepsilon \frac{m_0}{c^2} = 1.24061120 \cdot 10^{-15} m$$

And therefore

(Equation: 2.3.2)

By application of $c = x_0 / t_0$ we obtain for t_0

$$t_0 = \frac{x_0}{c} = 4.13823352 \cdot 10^{-24} s$$

(Equation: 2.3.3)

We further obtain for the maximum acceleration

$$a_{max} = \frac{c}{t_0} = 7.24445183 \cdot 10^{31} ms^{-2}$$

(Equation: 2.3.4)

Thus, for the force it follows

$$F_0 = m_0 a_{max} = 1.49896229 \cdot 10^2 N$$

(Equation: 2.3.5)

As well as for energy

$$E_0 = F_0 x_0 = 1.85962940 \cdot 10^{-13} J$$

(Equation: 2.3.6)

Therewith, all sought-after physical base quantities have been determined (see table 3). Mass m_0 can also be denoted as reduced Planck mass. We get to the Planck mass model (see [4]) if we substitute G_N for G_e in equation (2.2.5). However, the base quantities a_{max}, F_0 and E_0 are not calculated there.

2.4 New Description of Physical Quantities

In principle *any* physical quantity (phG) can be described as follows:

phG = $phG_0 \cdot f(X, Y, Z, T, M)$,

(Equation: 2.4.1)

whereby $X = x/x_0$, $Y = y/y_0$, $Z = z/z_0$, $T = t/t_0$ and $M = m/m_0$. In this manner, it is possible to separate physics (units of measurements) and mathematics (pure numbers).

2.5 The Unit-less Differential in Physics

The differential can now be described without units as follows:

$$dx = x_0 dx \frac{x}{x_0}$$

(Equation: 2.5.1)

Since any physical base quantity (phG_0) can now be described by the two universal fundamental natural constants e_0 and c, these base quantities are *universal* fundamental natural constants, too.

2.6 The New Dimension of Mass and Charge

It is generally known that there is no difference between inertial and gravitational mass. Thus it follows that the gravitational constant, which is defined as follows

$$G_N = \frac{F_0^{inert}}{F_0^{grav}}$$

(Equation: 2.6.1)

does not require units.
If, for inertia force, we put

$$F_0^{inert} = m_0 a_{max}$$

(Equation: 2.6.2)

and for gravitation force

$$F_0^{grav} = \frac{m_0^2}{x_0^2}$$

(Equation: 2.6.3)

We obtain

$$G_N = \frac{F_0^{inert}}{F_0^{grav}} = m_0 a_{max} \cdot \frac{x_0^2}{m_0^2} = \frac{a_{max}}{m_0} x_0^2$$

(Equation: 2.6.4)

If G_N does not have a unit, then m_0 must have the following units

$$[m] = \frac{m^3}{s^2} \quad respectively \quad \dim m_0 = \frac{L^3}{T^2}$$

(Equation: 2.6.5)

Hence it follows that mass has no independent physical unit. It shall be noted that the 3rd of Kepler's laws has the same dimension. Now it is possible to define:

Mass is the product of space and angular acceleration.

Or generally spoken:

Mass is a special manifestation of space and time.

Thus, mass is some space-time vortex, which can be condensed or vaporised. Since, according to equation (2.2.1), mass and charge are normalised to one another, charge e_0 (in electrostatic units) has in case of a unit-less gravitation constant the same unit as mass

dim e_0 = dim m_0 = $L^3 \cdot T^{-2}$.

(Equation: 2.6.6)

Thus, charge is also some space-time vortex, which however cannot be condensed. Since a conversion factor does not appear in equation (2.6.4), we can continue to denote mass in kg if we keep in mind that this unit of measurement is not independent. The dimension given above for mass and charge does also apply to the charge of the strong and weak interaction in electrostatic units.

2.7 The Universal Law of Force

We now have two independent units of measurements, [x_0] and [t_0], which are determined by two fundamental universal natural constants (e and c). If we put G_e = 1 in equation (2.3.5), we can support a universal system of measurement wherein the law of force is as follows:

The fourth power of the speed of light is equal to the force which maximally accelerates a fundamental mass.

If velocity is variable (see equation (2.3.5)), we obtain the force

$$F = F_0 \frac{v^4}{c^4} = \frac{v^4}{G_E}$$

(Equation: 2.7.1)

which transforms (annihilates) mass into energy. For the currently accepted Planck mass model we then obtain

$$F_{PM} = F_0 \frac{v^4}{c^4} = \frac{v^4}{G_N}$$

(Equation: 2.7.2)

This force is limited by the speed of light.

2.8 Current, Voltage and Density in New Measurement Units

According to section 2.6 we now get

$$\dim F = \dim ma = \frac{L^3}{T^2} \cdot \frac{L}{T^2} = \dim \frac{m^2}{x^2} = \dim \frac{e^2}{x^2} \cdot \frac{1}{4\pi\varepsilon_0} = \frac{L^6}{T^4} \cdot \frac{1}{L^2} = \frac{L^4}{T^4} = \dim v^4$$

(Equation: 2.8.1)

For the dimension of the current we get

$$\dim I = \dim \frac{e}{t\sqrt{4\pi\varepsilon_0}} = \frac{L^3}{T^2} \cdot \frac{1}{T} = \frac{L^3}{T^3} = \dim v^3$$

(Equation: 2.8.2)

and for the potential or the voltage

$$\dim U = \dim \frac{e}{r\sqrt{4\pi\varepsilon_0}} = \frac{L^3}{T^2} \cdot \frac{1}{L} = \frac{L^2}{T^2} = \dim v^2$$

(Equation: 2.8.3)

Hence, for conductance $G = I/U$, it follows

$$\dim G = \frac{\dim I}{\dim U} = \frac{\frac{L^3}{T^3}}{\frac{L^2}{T^2}} = \frac{L}{T} = \dim v$$

(Equation: 2.8.4)

resulting a sequence of decreasing powers of velocity. Density then has the dimension

$$\dim \rho = \frac{m}{r^3} = \frac{L^3}{T^2} \cdot \frac{1}{L^3} = \frac{1}{T^2}$$

(Equation: 2.8.5)

This is the dimension of angular acceleration α (dimα). In case of a spherical gyroscope, on whose surface the speed of light must not be exceeded, density increases with angular acceleration.

3 Verbal Description of a Fundamental Process

(motion of two 3-dimensional spherical gyroscopes)

Now, a fundamental process shall be described in the form of a thought experiment. Given are two fundamental masses in 3-dimensional motion (spherical gyroscope). They are only different in that one is rotating clockwise, the other counter-clockwise. On the surface, speed of light is reached. Basic condition for any kind of motion is hereby that speed of light is aspired by all surface points and in all directions. This is however not possible for the poles of the rotation axis in a spherical gyroscope, thus rendering the rotating motion unstable. For also getting the poles of the rotation axis to reach the speed of light, the spherical gyroscope tends to go into translation. However, in case of translation, other points of the surface would have to exceed the speed of light, which is also not possible. The translation causes a deceleration of the rotation and, in the end, returns to rotation. On the basis of the rotation's instability, an acceleration occurs that shall be directed unto the common centre of both of the masses. When the fundamental masses touch translation shall reach the speed of light and shall transform into a rotating motion of the particles around each other. Since such motion is always plain not all of the surface points will reach the speed of light. In order to make this happen, translation has to start at the speed of light in direction of the z-axis; the fundamental particles motion on spirals along the z-axis. Since this is also unstable, the fundamental masses move apart. Once their distance has reached its starting position translation is decelerated, thereby re-establishing rotation. The motion can start anew.

4 Application of the Base Quantities

4.1 Nature of the Mass Defect

According to SRT, mass becomes infinitely big when reaching the speed of light, whereas in annihilation, when electron and positron motion towards each other in free fall, and where the speed of light is also reached, mass disappears. This paradox shall here be solved by showing that mass disappears in free fall as well as in rotation, when *maximum acceleration* is reached. A variable physical quantity is defined as follows. It shall be true that (see equation Gl. 2.4.1)

$$A = \frac{a}{a_{max}}$$

(Equation: 4.1.1)

whereby a shall be an acceleration which can change in the range $0 \leq a \leq a_{max}$. It shall be presupposed that mass disappears when maximum acceleration is reached (mass defect). A dynamic mass M (annihilated mass) shall be defined as follows:

$$M = m_0 \frac{\frac{a}{a_{max}}}{\sqrt{1-\frac{v^2}{c^2}}}$$

(Equation: 4.1.2)

This mass shall now be introduced as term into the SRT mass relation. Thus we obtain

$$m = \frac{m_0 - M}{\sqrt{1-\frac{v^2}{c^2}}} = \frac{m_0 - m_0\frac{a}{a_{max}}}{\sqrt{1-\frac{v^2}{c^2}}} = m_0 \frac{1-\frac{a}{a_{max}}}{\sqrt{1-\frac{v^2}{c^2}}}$$

(Equation: 4.1.3)

As we can easily see, the mass m becomes infinitely big at constant acceleration a=const<∞ , which is normal. However, when acceleration reaches its maximum, the mass *disappears*, as has been observed in annihilation of electron and positron. If, at the same time, $a = a_{max}$ and $v = c$, we obtain an indeterminacy which can be resolved if we put und (see equation (2.1.1)):

$$m = m_0 \frac{1-\frac{a}{a_{max}}}{\sqrt{1-\frac{a}{a_{max}}}} = m_0 \sqrt{1-\frac{a}{a_{max}}}$$

(Equation: 4.1.4)

relation $v^2 = x_0 a$ is a condition (free fall) for the disappearance of the rest mass in annihilation of electron and positron under consideration of SRT (mass defect). If we now bring equation (4.1.4) into the relation for Newton's 1st Law we get

$$F = m_0 a \sqrt{1-\frac{a}{a_{max}}} = m_0 a_{max} \frac{a}{a_{max}} \sqrt{1-\frac{a}{a_{max}}} = F_0 \frac{a}{a_{max}} \sqrt{1-\frac{a}{a_{max}}}$$

(Equation: 4.1.5)

It is true for any rest mass m

$$F = F_0 \frac{ma}{m_0 a_{max}} \sqrt{1-\frac{a}{a_{max}}} = ma\sqrt{1-\frac{a}{a_{max}}}$$

(Equation: 4.1.5a)

For *effective* acceleration then applies:

$$a_{eff} = a\sqrt{1-\frac{a}{a_{max}}}$$

(Equation: 4.1.5b)

From the diagram in Chart 1 (p. 14) we can distinguish that effective acceleration has a finite maximum, which was to be proven.

This is the formulation of the Law of Force for the fundamental process described in section 3. It is immediately perceivable that, when maximum acceleration is reached, the force effect in direction of this acceleration is disappearing.

The maximum acceleration a_{max} is calculated for the speed of light as maximum speed. There are, however, other kinds of maximum speed that are considerably smaller than the speed of light. When you put your car to the limit you also get a maximum speed and this for every gear you are driving in. The tortoise too has a maximum speed and so forth. An individual a_{max} can be assigned to any such maximum speed.

In *Kamke* [5], we can find the following differential equation

$$y^2 y'' = 1$$

(Equation: 4.1.6)

for free fall (central force) and

$$y'' = y^2$$

(Equation: 4.1.7)

for rotation. We can now put

$$y'' = \frac{a}{a_{max}} \quad and \quad y = \frac{x}{x_0}$$

(Equation: 4.1.8)

for the central force as well as

$$y'' = \frac{a}{a_{max}} \quad and \quad y = \frac{x}{x_0}$$

(Equation: 4.1.9)

for the rotation. We then obtain the relation of force for free fall

$$F_{frF} = F_0 \frac{x_0^2}{x^2}\sqrt{1-\frac{x_0^2}{x^2}}$$

(Equation: 4.1.10)

and the relation of force for rotation

$$F_{Rot} = F_0 \frac{x^2}{x_0^2}\sqrt{1-\frac{x^2}{x_0^2}}$$

(Equation: 4.1.11)

These interdependencies are shown in FIG 1.

4.2 The Spherical-hyperbolic Symmetry (Transformation)

On first glance, the two force formulae seem to be asymmetrical since they have two entirely different domains of definition ($0 \le x \le x_0$ and $x_0 \le x \le \infty$). However, if we take the unit-less number x/x_0, respectively x_0/x, the domains of definition are symmetrical. It is, for instance, true that

$x/x_0 = 0{,}25 = x_0/x = 1/4$.

(Equation: 4.2.1)

In principle we are able to assign to any even scale between 0 and 1 a reciprocal scale. This type of symmetry, called spherical-hyperbolic, is treated thoroughly by *F. Klein* [6].

According to this symmetry, the centre of the sphere is the *mirror image* of the total set of the infinitely distanced points and vice versa: the total set of the infinitely distanced points is the mirror image of the sphere's centre. We now can formulate the following theorem:

The circle is an imaginary hyperbola, and the hyperbola is an imaginary circle.

This theorem is easily proved. Given is the equation of the circle

$$y^2 + x^2 = 1$$

(Equation: 4.2.2)

and the associated hyperbola

$$y^2 - x^2 = 1$$

(Equation: 4.2.3)

If we now put $1 = -i^2$ ($i = (-1)^{1/2}$: imaginary unit) and $-1 = +i^2$, we get for the hyperbola

$$y^2 - (ix)^2 = 1$$

(Equation: 4.2.4)

and for the circle

$$y^2 + (ix)^2 = 1$$

(Equation: 4.2.5)

This corresponds to a rotation of 90° ($\pi/2$) in the Gaussian plain, which was to be shown. This correlation is shown in **FIG. 1** (p. 70); there circle and hyperbola are compressed. This type of symmetry is also applicable to differential equations. Given are the symmetrical differential equations of the II. order

$$y'' \pm y = 0$$

(Equation: 4.2.6)

With the solutions

$$y+= C_1e^{ix} + C_2e^{-ix}$$

(wave function, quantum mechanics)
(Equation: 4.2.7)

And

$$y-= C_1e^{x} + C_2e^{-x}$$

(exponential function, thermodynamics)
(Equation: 4.2.8)

Both solutions can be transformed into one another by a rotation of 90° ($\pi/2$) in the Gaussian plain. The differential equations of the IV. order are also symmetrical in the same sense as above, e.g.

$$y^{(4)} \pm y = 0$$

(differential equation of the oscillating rod)
(Equation: 4.2.9)

With the solutions

$$F_{frF} = F_0 \frac{x_0^2}{x^2}\sqrt{1-\frac{x_0^2}{x^2}}$$

(Equation: 4.2.10)

And

$$y-= C_1 e^{ix} + C_2 e^{-ix} + C_3 e^{x} + C_4 e^{-x}$$

(Equation: 4.2.11)

Here both solutions are transformed into one another by a rotation in the Gaussian plain of 45° ($\pi/4$). By application of EULER's formulae

$e^{ix} = \cos x + i \cdot \sin x$

(Equation: 4.2.12)

and

$e^{x} = \cosh x + \sinh x$

(Equation: 4.2.13)

we get to the cyclic and hyperbolic functions stated in *Kamke* [5]. The whole Gaussian plain is comprised by the following differential equations:

$$y'' - py = 0$$

(Equation: 4.2.14)

With

$$p = \rho^2(\cos\varphi + i\sin\varphi)^2$$

(Equation: 4.2.15)

And

$$y = C_1[\cosh(\rho\cos\varphi)\cos(\rho\sin\varphi) + \sinh(\rho cos\varphi)\cos(\rho sin\varphi)] +$$

$$C_2[\cosh(\rho\cos\varphi)\sin(\rho\sin\varphi) + \sinh(\rho cos\varphi)\sin(\rho sin\varphi)]$$ (Equation: 4.2.16)

$$\rho = 0$$

(Equation: 4.2.17)

$$y = C_1 \cdot x + C_2$$

(Equation: 4.2.18)

$$\varphi = 0, \pi$$

(Equation: 4.2.19)

$$y = C_1 \cos hx + C_2 \sin hx$$

(Equation: 4.2.20)

$$\varphi = \frac{\pi}{2}, \frac{3}{2}\pi$$

(Equation: 4.2.21)

$$y = C_1 \cos x + C_2 \sin x$$

(Equation: 4.2.22)

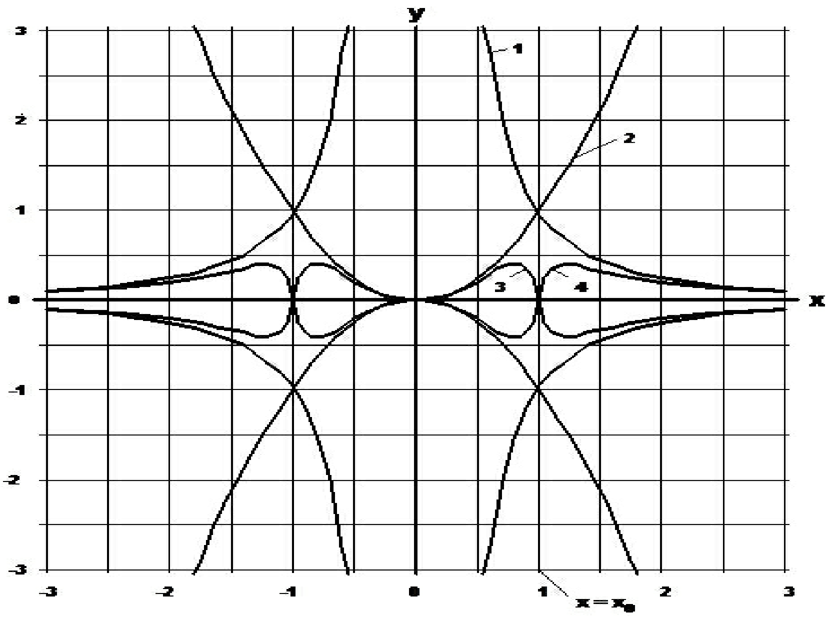

FIG 1. Graph of the functions (4.1.10) and (4.1.11) in the vicinity of the point $x = x_0$Functions:

$$1: y = \pm\frac{1}{x^2} \quad 1: y = \pm\frac{1}{x^2} \quad 3: y = \pm x^2\sqrt{1 - x^2}; 4: y = \pm\frac{1}{x^2}\sqrt{1 - \frac{1}{x^2}}$$

as well as

$$y^{(4)} - py = 0$$

(Equation: 4.2.23)

With

$$p = \rho^4(\cos\varphi + i\sin\varphi)^2(\cos\varphi - i\sin\varphi)^2$$

(Equation: 4.2.24)

And

$$y = C_1\cosh\rho(\cos\varphi)\cos\rho(\sin\varphi) + C_2\cosh\rho(\cos\varphi)\sin\rho + (\sin\varphi) +$$

$$C_3\sinh\rho(\cos\rho)\cos\rho(\sin\varphi) + C_4\sinh\rho(\cos\varphi)\sin\rho(\sin\varphi)$$

(Equation: 4.2.25)

$$\rho = 0$$

(Equation: 4.2.26)

$$y = C_1x^3 + C_2x^2 + C_3x + C_4$$

(Equation: 4.2.27)

$\varphi = 0,\ \pi/2,\ \pi,\ 3\pi/2$

(Equation: 4.2.28)

$$y = C_1\cosh\rho x + C_2\sinh\rho x + C_3\cos\rho x + C_4\sin\rho x$$

(Equation: 4.2.29)

These differential equations with their solutions are not listed in *Kamke* [5]. They present the elemental-mathematical base structure for the sought after Theory of Everything, because *all* numbers are covered. (q.v. section 2).

The differential equation of fourth order is being covered so properly because in equations (2.3.5), (2.3.6) and (2.8.1) velocity appears to the 4th power. Apparently there exists a deficiency in theoretical Physics which does not cover this differential equation although there would be an approach in the String Theory (one can treat the string like an oscillating rod). Moreover, the differential equation of an oscillating spherical shell also exists, a differential equation of third order. I was not able to find the differential equation of an oscillating spherical membrane. It does exist, though, and should be easy to derive So there are other differential equations apart from the Schrödinger equation which one can describe oscillations and waves with.

On the base of this symmetry every rest mass (spherical gyro) must have a finite, distinct from zero volume expansion, irrespective of whether this volume expansion can be found or not. Because of the partly annihilation, the border area on the surface of the spherical gyro will however be less massive than the center. The calculations made up till this point of the paper are also possible in the Plank Mass Model. You achieve the same diagram as shown in chart 1 because the variable x_0 is independent from its numerical value. x_0 must only not be zero or infinite ($0 < x_0 < \infty$).

Now the elementar mass m_0 will be asymmetrically divided into the electron mass m_e and the so called Teleronki mass m_t. As shown furtheron, these two masses let themselves be fit into the Periodic Table of Elements which is not possible with the Plank Mass.

4.3 Energy and Mass Relations

By integrating equations (4.1.10) and (4.1.11) we get for the energy

$$E_{frF} = \frac{1}{2}E_o\frac{x_0}{x}\left(\sqrt{1-\frac{x_0^2}{x^2}} + \arcsin\frac{x^0}{x}\right)$$

(Equation: 4.3.1)

And

$$E_{Rot} = -\frac{1}{8}E_0\frac{x}{x_0}\left[\left(\frac{2x^2}{x_0^2}-1\right)\sqrt{1-\frac{x^2}{x_0^2}} + \arcsin\frac{x}{x_0}\right]$$

(Equation: 4.3.2)

whereby, according to equation (2.1.1) it is that $E_0 = F_0x_0 = m_0a_{max}x_0 = m_0c^2$. Since arcsin x is a periodic function, we take here the principal value (Arcsin x). In the point $x = x_0$ we get

$$E_{frF} = \frac{\pi}{4}E_0$$

(Equation: 4.3.3)

And

$$E_{rot} = \frac{\pi}{16}E_0$$

(Equation: 4.3.4)

Whereas in point $x = x_0$ the force effects of F_{rot} and F_{frF} are equal and disappear, E_{rot} and E_{frF} reach different extreme values and in their sum make up the energy of the elementary system in point $x = x_0$.

$$\sum E = E_{frF} + E_{rot} = \frac{\pi}{4}E_0 + \frac{\pi}{16}E_0 = \frac{3\pi}{16}m_0c^2$$

(Equation: 4.3.5)

This is the rotational energy of a three-dimensional spherical gyroscope as described in section 3. For the annihilated mass or dynamic mass m_d we then get

$$m_B = \frac{\sum E}{c^2} = \frac{3\pi}{16} m_0$$

(Equation: 4.3.6)

The rest mass of the rotation axis shall be taken into account. If we consider that the poles of the rotation axis are singular points and are moved merely by the other two directions of rotation we can now find the following correction term (*cor. t*)

$$KT = \frac{\sum E}{3c^2} \cdot \frac{P_n}{\omega}\left(1 - \frac{\sum E}{3c^2} \cdot \frac{P_n}{\omega} \cdot A_n\right)$$

(Equation: 4.3.7)

P_n: number of poles ($P_n = 2$); ω: solid angle (surface of the unit-sphere; $\omega = 4\pi$); A_n: number of rotation axes ($A_n = 2$) When we set in the given quantities we get

$$KT = \frac{\pi}{16} \cdot \frac{2}{4\pi}\left(1 - 2 \cdot \frac{\pi}{16} \cdot \frac{2}{4\pi}\right) m_0 = \frac{15}{512} m_0 = 0.06061866551 m_0$$

(Equation: 4.3.8)

and for the dynamic mass m_B

$$m_B = m_0\left(\frac{3\pi}{16} - \frac{15}{512}\right) = 0.55975174 m_0 = 1.15819171 \cdot 10^{-30} kg$$

(Equation: 4.3.9)

The rest mass m_r follows as the difference to the total mass m_0, from

$$m_R = m_0\left(1 - \frac{3\pi}{16} + \frac{15}{512}\right) = 0.44024826 m_0 = 0.910925053 \cdot 10^{-30} kg$$

(Equation: 4.3.10)

A comparison of m_r with the table of fundamental particles [7] will show that the calculated value, within the scope of the experimental error, matches the experimental value of the electron's rest mass m_e (m_e(exp) = $0.91093819 \cdot 10^{-30}$ kg). That's why we can put $mr \equiv m_e$. The value m_d is thus the annihilated part of m_0. Although we do not find a value for m_d in the table of fundamental particles we however can calculate a comparative value from the experimental data. This is

$$m_B(\text{exp}) = 0{,}5(m_n - m_p) = 1{,}1527 \cdot 10^{-30} \text{ kg} .$$

(Equation: 4.3.11)

Here is m_n – rest mass of the neutron and m_p - rest mass of the proton (see table 3). Thus the experimental value for m_0 is

$$m_0(\text{exp}) = 0{,}5[m_n(\text{exp}) - m_p(\text{exp})] + m_e(\text{exp}) = 2{,}0637 \cdot 10^{-30} \text{ kg}$$

(Equation: 4.3.12)

If we condense the dynamic mass m_B and annihilate m_e, we obtain a new particle with a rest mass $m_d = m_t = 1.15819171 \cdot 10^{-30}$ kg. m_t is what we call the rest mass of the *teleronci*. The word is inferred from the word „electron" by moving the *t* and *c* to the outskirts of the word and then affixing an *i*. Analogous the word „positron" becomes *iposronti*. Since the mass m_t is in close proximity to the maximum of force in accordance to (4.1.10) and (4.1.11), teleronci and iposronti obviously form very strongly bound dipoles which are called *teleronci-dipoles*. The binding energy of these dipoles is two electron masses. The quanta of this interaction can also be called a kind of gluons. The mass m_0 is *asymmetrically* divided by the masses m_t and m_e.

4.4 The Shell Models of Protons and Neutrons

The fundamental particle masses known hitherto are *not* contained in neutrons and protons in whole numbers. The test with the newly calculated fundamental masses m_0 and m_t results in

$$\frac{m_n}{m_0} = \frac{1674.9286 \cdot 10^{-30} kg}{2{,}06911788 \cdot 10^{-30} kg} = 809.48625$$

(Equation: 4.4.1)

$$\frac{m_p}{m_0} = \frac{1672.6231 \cdot 10^{-30} kg}{2{,}06911788 \cdot 10^{-30} kg} = 808.37467$$

(Equation: 4.4.2)

$$\frac{m_n}{m_t} = \frac{1674.9286 \cdot 10^{-30} kg}{1.1580788 \cdot 10^{-30} kg} = 1446.1571$$

(Equation: 4.4.3)

$$\frac{m_p}{m_t} = \frac{1672.6231 \cdot 10^{-30} kg}{1.1580788 \cdot 10^{-30} kg} = 1444.1664$$

(Equation: 4.4.4)

Equations (4.4.1) and (4.4.2) have a difference of $\Delta_1 = 1.111585$, and (4.4.3) and (4.4.4) have a difference of $\Delta_2 = 1.99068 \approx 2$. The first calculation can be discarded. From the second there follow the natural numbers 1446 and 1444. An analysis of these numbers reveals that $1444 = 2^2 \cdot 39^2$ is a square number. Due to the difference of 2 we can now assume that proton and neutron are made up of *teleronci*-dipoles. The proton therefore consists of 722 and the neutron of 723 dipoles. For 722, we can write the following empirical formula

$$S_n = \sum_{n=1}^{n=19}[n^2(n-1)^2] = 722$$

(Equation: 4.4.5)

The Periodic Table of Elements is built according to the formula

$$S_n = \sum_{n=1}^{n=19} 2n^2$$

(Equation: 4.4.5a)

There is, as can be seen, a certain similarity between these two formulae. If we now suppose such a shell structure in reference to the proton, then, according to equation (4.4.5), the 19th shell has $2\cdot(19^2 - 18^2) = 74$ teleronci-dipoles. In case of the neutron, there is an additional pole on the 20th shell. If we now take the experimental value of the teleronci according to equation (4.3.11) as denominator, we get

$$\frac{m_n}{m_{t(exp)}} = \frac{1674.9286\cdot 10^{-30}\,kg}{1.15275\cdot 10^{-30}\,kg} = 1452.9851$$

(Equation: 4.4.6)

And

$$\frac{m_p}{m_{t(exp)}} = \frac{1672.6231\cdot 10^{-30}\,kg}{1.15275\cdot 10^{-30}\,kg} = 1450.9851$$

(Equation: 4.4.7)

These are also natural numbers, with the values 1453 and 1451. However, we cannot do anything with these numbers. The theory developed here is obviously so exact that it can help to prove *systematic errors* in *precision measurements*. Now we want to state the relations of a neutron respectively a proton to an electron. From equations (4.3.9), (4.3.10), (4.4.3) and (4.4.4) we obtain:

$$\frac{m_n}{m_e} = \frac{m_n}{m_t}\cdot\frac{m_t}{m_e} = 1446\cdot\frac{\frac{5\pi}{16}-\frac{15}{512}}{1-\frac{5\pi}{16}+\frac{15}{512}} = 1838.5105$$

(Equation: 4.4.8)

The experimental value is: 1838.6836 (see table 3). Likewise

$$\frac{m_p}{m_e} = \frac{m_p}{m_t}\cdot\frac{m_t}{m_e} = 1444\cdot\frac{\frac{5\pi}{16}-\frac{15}{512}}{1-\frac{5\pi}{16}+\frac{15}{512}} = 1835.9676$$

(Equation: 4.4.9)

The experimental value is: 1836.1526 (see table 3). We can now also calculate the specific charge of an electron. From equations (4.3.10) and (2.2.5) we get

$$\frac{e}{m_e} = \frac{e\sqrt{4\pi\varepsilon_0}}{m_0\left(1-\frac{5\pi}{16}+\frac{15}{512}\right)} = \sqrt{G_e}\,\frac{\sqrt{4\pi\varepsilon_0}}{1-\frac{5\pi}{16}+\frac{15}{512}} = 1.75884554\cdot 10^{11}\,C\,kg^{-1}$$

(Equation: 4.4.10)

The experimental value is $e/m_e(\exp) = 1.75882017\cdot 10^{11}$ Ckg^{-1} (see table 3). We see here that the coupling constant $\sqrt{G_e}$ has the physical meaning of a specific charge.

5 The Mass Defect in the Atomic Nucleus

After we have clarified the inner relations of the fundamental particles of the Periodic Table we can now go on to discuss the inner relations of an atomic nucleus. The most important occurrence in the atomic nucleus is the mass defect. It can be explained from the shell model of protons and neutrons if we take into account the teleronci's excess rest mass in relation to the electron. **Chart 2** shows the mass defect of the elements of the Periodic Table in dependence to the equivalent atomic number. The experimental data (points) have been calculated according to the atomic mass table for selected isotopes [3]. We can see that this mass defect aligns on the borderline

$$\Delta m = N_A\cdot Z\cdot 2(m_t - m_e)\cdot 2(19^2 - 18^2) \qquad = 2{,}20383022\cdot 10^{-2}\cdot Z$$

(Equation: 5.1)

(Δm: mass defect; $N_A = 6.0221367\cdot 10^{23}$ mol^{-1}: Avogadro constant; Z: equivalent atomic number; m_t and m_e according to (4.3.9) and (4.3.10), and $19^2 - 18^2$ according to equation (4.4.5)). If we assume the shell model of protons and neutrons, there are then 74 teleronci-dipoles on the 19th shell of the proton and the neutron, their negative charges pointing to the outside. The proton's charge is above this shell, not in the centre. Due to this charge, the neutrons can now react attracted and are brought so close to the proton (approximately 10^{-15} m), that the outer teleroncis can get into contact to one another and thus can exchange pions. Now the repulsive effect of the dipoles makes itself felt by causing an acceleration of the rotational movement of 10^{31} m·s^{-2}. At this acceleration, the teleronci pairs loose their excess mass in relation to the electron. By overlapping, proton and neutron are bound to one another. The released energy appears as kinetic energy of the entire system.This obviously is the main component of the mass defect

If we spread the mass defect onto all nuclei, we get a curved line instead of a straight one. The proportionality to the equivalent atomic number indicates however that the mass defect occurs essentially between one proton and one neutron. If Z = 1, equation (5.1) states the mass defect of the linkage of a proton and a neutron in the middle of an infinitely long proton-neutron chain. Due to their excess teleronci-dipole, neutrons can also react with one another with a mass defect under a creation of a teleronci-quadrupole. Outside of the nucleus, the neutron is unstable. This obviously originates from the teleronci-dipole of the 20th shell pointing with its positive side to the centre. At decay, the electron is hurled outwards whereas the positron moves inwards and is annihilated by rotation on the 20th shell (mirroring at the circle, according to [6], spherical-hyperbolic symmetry). The teleronci-dipole is rotated by approximately 90° by the electrostatic field of the protons in the nucleus. At a rotation of 180°, positrons are released. In case of other angles, the electron or the positron respectively carry only part of the energy. The other energy part is released as a neutrino.

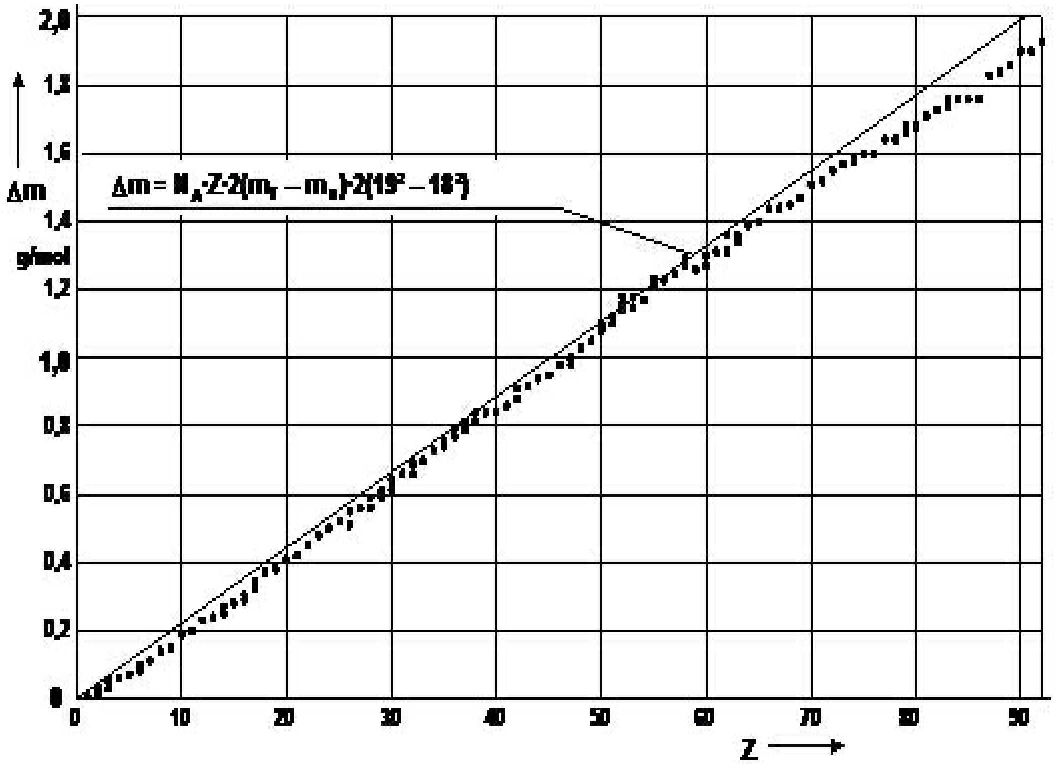

Chart 2. Dependence of the mass defect (Δm) on the equivalent atomic number (Z) ($m_T = m_t$)

The teleronci can obviously be fitted into the structure model expressed by the Periodic Table of Elements, thus making this system complete since it now consists of two fundamental particles, electron and teleronci. *Artificially created* fundamental particles are based on another structure model, as will be shown further on.

6 The Mass Spectrum of Fundamental Particles

6.1 On the History of Fundamental Particles

Already the ancient Greeks believed that there were elements. In 1803, *Dalton* was the first to experimentally prove the existence of atoms. However, the fundamental particles' actual history begins with the discovery of the electron through *Thomson* in 1897. Shortly later, the hydrogen nucleus was identified as a proton and, on this basis, the BOHR atomic model was developed in 1913. Discovery of the neutron, thus making the atom a complete entity, followed in 1932. Other particles were discovered in cosmic radiation (myon, pion and others). Of particular importance was the discovery of the first antiparticle in cosmic radiation, the positron, by *Anderson* in 1932, which confirmed DIRAC's theory on the vacuum. The development of large and very effective accelerators brought on the discovery of many more new fundamental particles (approximately 200).

6.2 The Standard Model of Fundamental Particles

The sheer number of fundamental particles made it necessary to bring them into a system. However, any attempts to classify the particles into a system similar to the Periodic Table of Elements have failed. In 1963 *M. Gell-Mann* and *G. Zweig* developed the quark model. Quarks are smallest particles with refracted charge. These particles became an essential part of the standard model. It contains 6 leptons: electron (e), myon (μ) and tauon (τ) with their antineutrinos and 6 quarks: up(u), down(d), strange(s), charm(c), bottom(b) und top(t).

The hadrons, such as baryons and mesons, are represented in different quark combinations, e.g. baryons consist of 3 and mesons of 2 quarks. Details on quark combinations can be obtained from the relevant literature (physical charts, textbooks, also inorganic chemistry textbooks). People have tried, but failed, to split mesons into their component parts. Experiments going in this direction have ceased. This indivisibility is been called quark-confinement and has been based on a force proportionate to r^{-1}. Although this force disappears in infinity, its potential (~ln$r$) becomes infinitely big. This potential is called funnel potential. The quarks' confinement means that their mass cannot be determined by mass spectrometer. All we have are scientifically based estimates regarding their mass. This however has the disadvantage that the mass spectrum of fundamental particles can be calculated only imprecisely.

What is noticeable is the structure's primitivity. According to the quark model, mesons are linear (rod-shaped) entities. The three quarks in the baryons can only be arranged in a plane triangle, far off spherical symmetry. If one, for instance, would like to achieve spherical symmetry in proton or neutron, then the quarks would have to be strongly deformed. What force is doing this?

These problems have led the author to look for another structural model of fundamental particles.

6.3 Calculation of the Fine Structure Constant

In order to lateron calculate the fundamental mass m_h, which is the main component of artificially produced fundamental particles, it is necessary to determine the fine structure constant. The fine structure constant a is defined as follows [see equation (2.1.2)]:

$$\frac{1}{\alpha} = \frac{2hc\varepsilon_0}{e^2}$$

(Equation: 6.3.1)

For calculation of the fine structure constant it has been found by trial and error that we can get the correct result when we proceed from the differential equation of the spherical wave (wave-formed potenial):

$$y'' + \frac{2}{x}y' + y = 0$$

(Equation: 6.3.2)

(The differential equation for the potential in the *Debye-Hückel* theory with k as screening radius, which is symmetrical to equation (6.1.2), takes the form:

$$y'' + \frac{2}{x}y' - \kappa^{-2}y = 0$$

(Equation: 6.3.2a)

Its general solution is:

$$y = A\frac{\cos(x+\alpha)}{x}$$

A: Amplitude; a : distortion of phase).
(Equation: 6.3.3)

Given the boundary conditions $A = 1$, $\alpha = 0$ and $\tan x = 1$, we get

$$y = \frac{2\sqrt{2}}{\pi}$$

(Equation: 6.3.4)

This is the relation of hypothenuse (chord) to the circular arc in the unit triangle / unit circle. If we put equation (6.1.4) as some sort of normalising constant into (6.1.1), we get

$$\frac{2hc\varepsilon_0}{e^2}\cdot\left(\frac{2\sqrt{2}}{\pi}\right)^3 = \frac{1}{\alpha}\left(\frac{2\sqrt{2}}{\pi}\right)^3 = 100.004606$$

(Equation: 6.3.5)

Table 1. Calculated and experimentally determined masses of selected fundamental particle			
	Mass of the fundamental particles		
	Calculation approaches according to equation (6.2.1)	Calculated values in MeV/c^2	Experimental values according to [7] in MeV/c^2
μ^- Myon	$m_{\mu-} = 3m_h + 3m_0$	105.654694	105.658387
π^o Pi Zero	$m_{\pi o} = 4m_h - m_0$	135.06948	134.9739
π^+ Pi Plus	$m_{\pi+} = 4m_h + 3m_0$	139.71224	139.5675
K^+ Ka Plus	$m_{K+} = 14m_h + 15m_0$	494.216	493.646
K^o Ka Zero	$m_{Ko} = 14m_h + 18m_0$	497.698	497.671
η^o Eta Zero	$m_{\eta o} = 14m_h + 62m_0$	548.77	548.8
τ^- Tau Minus	$m_{\tau-} = 49m_h + 99m_0$	1783.73	1784.1 (+2.7/–3.6)

This is within the scope of the experimental error of h and e the natural number 100 (factor 100 did already occur in calculating the gravitation constant, see equation (2.2.1).
Therefore

$$\frac{1}{\alpha} = 100\cdot\left(\frac{\pi}{2\sqrt{2}}\right)^3 = 137.0296781$$ (Equation: 6.3.6)

The experimental value is a–^{1} = 137.0359998 (see table 3). From here we can define a new fundamental mass (m_h : small *Planck* mass):

$$m_h = \sqrt{\frac{hc}{G_g}} = \frac{e}{\sqrt{2\varepsilon_0}}\cdot\frac{10}{\sqrt{G_g}}\left(\frac{\pi}{2\sqrt{2}}\right)^{3/2} = 60.71311110\cdot 10^{-30}kg = 34.0575417MeV$$

The exponent 3/2 occurs here as in equation (2.2.1).

(Equation: 6.3.7)

6.4 Analysis of the Mass Spectrum of Selected Fundamental Particles

When analyzing the mass spectrum we will start from the premise that the masses of the artificially created fundamental particles m_{fp} consist of the following

$m_{ET} = k\cdot m_h + l\cdot m_0$, (Equation: 6.4.1) whereby k and l are integers. m_0 is the carrier of the elementary electric charge (positive or negative) whereas m_h is electrically neutral. The results of the analysis are presented in **tab. 1**

6.5 On the Structure of Fundamental Particles

The values presented in table 1 show a fairly good correspondence of calculation and experiment. The composition of the fundamental particles provides us with a basis from which we can draw certain inferences regarding their structure. Thus, the myon is a plain triangle. The neutral pion is obviously a tetrahedron with a hole. Since m_0 does not occur, it decays into quanta. The charged pion is a tetrahedron, too. We see however, that it decays into a myon if we write

$m_{p+} = m_h + (3m_h + 3m_0) = m_h + m_{\mu+}$.

The formula of the charged kaon can also be broken down as follows

$m_{K+} = 6(2m_h + 2m_0) + (2m_h + 2m_0) + m_0$.

(Equation: 6.5.1)

Since the number 6 is occurring, it is obviously a space-centred octahedron with the charge in the middle. It can decay into 2 or 3 particles which are pre-formed here as well. The neutral kaon can occur in two structural modifications.

$m_{K0} = 4(4m_h + 5m_0) - (2m_h + 2m_0)$

(Equation: 6.5.2)

and

$m_{K0} = 6(4m_h + 3m_0) + 2m_h$.

(Equation: 6.5.3)

One is a tetrahedron with a deficit, as in a pion, the other is a space-centred octahedron (excess). The tetrahedron can only decay into two particles whereas the octahedron can decay into 2 or 3 particles. The eta particle is obviously structurally very similar to the kaons.

The tauon can be broken down as follows

$m_{t-} = 6(7m_h + 14m_0) + (7m_h + 14m_0) + m_0$,

(Equation: 6.5.4)

whereby the bracket can be broken down further

$(7m_h + 14m_0) = 6(m_h + 2m_0) + (m_h + 2m_0)$.

(Equation: 6.5.5)

Here we are obviously faced with a space-centered octahedron with the charge in its center, which is surrounded by six further space-centered but uncharged octahedrons. It is noticeable that in the myon and tauon (leptons), the structure leaves no deficits and excesses, which however is not the case for mesons. Now we also want to analyze the very massive bottom mesons. As Table 2 shows, in bottom mesons we find quite a number of combinations within the scope of the experimental error. Considering current experimental precision, a selection seems hardly possible. However, it is easily seen that, in case of a charged bottom meson, we have an odd number of m_0. For the neutral bottom meson, the number of m_0 is even.

Table 2. The bottom mesons (experimental values according to [7])

B±	B°
$m_{B\pm}$(exp) = 5277,6±1,4 MeV/c²	m_{Bo} (exp) = 5279,4±1,5 MeV/c²
$m_{B\pm} = 153m_h + 57m_0 = 5276.96$ MeV/c²	$m_{Bo} = 152m_h + 88m_0 = 5278.89$ MeV/c²
$= 150m_h + 145m_0 = 5276.93$ MeV/c²	$= 149m_h + 176m_0 = 5278.86$ MeV/c²
$= 147m_h + 233m_0 = 5276.90$ MeV/c²	$= 146m_h + 264m_0 = 5278.82$ MeV/c²
$= 144m_h + 321m_0 = 5276.87$ MeV/c²	$= 143m_h + 352m_0 = 5278.79$ MeV/c²
$= 141m_h + 409m_0 = 5276.84$ MeV/c²	$= 140m_h + 440m_0 = 5278.76$ MeV/c²
$= 138m_h + 497m_0 = 5276.80$ MeV/c²	$= 137m_h + 528m_0 = 5278.73$ MeV/c²
$= 135m_h + 585m_0 = 5276.77$ MeV/c²	$= 134m_h + 616m_0 = 5278.70$ MeV/c²

One can be persuaded that if we would analyze the other fundamental particles with the suggested method, they would also fit into the system above. Only the quarks will make an exception, i.e. we probably wouldn't be able to integrate them, since their masses cannot be determined experimentally and all we theoretically have access to are legitimate estimates (see [9]). The mass relations of the fundamental particles to the electron can be described by the following formula:

$$\frac{m_{L,M}}{m_0} = 66.649917 \cdot k + 2.271446 \cdot l$$

(Equation: 6.5.6)

whereby $m_{l,m}$ is the mass of the leptons, or mesons, and k and l are integers.

6.6 Calculation of Planck's Quantum Constant

From equation (6.3.7) we can also obtain a further coupling constant

$$G_h = \frac{G_e}{2\pi\left(\frac{\pi}{2\sqrt{2}}\right)^8} = 6.25889403 \cdot 10^{28} m^3 kg^{-1} s^{-2}$$

(Equation: 6.6.1)

then equation (6.3.7) can be written as follows

$$m_h = \frac{\sqrt{hc}}{\sqrt{G_e}} = \frac{1}{\sqrt{G_h}} \cdot \frac{e}{\sqrt{4\pi\varepsilon_0}}$$

(Equation: 6.6.2)

Since α is known from equation (6.1.6) we can calculate Planck's quantum constant from equation (6.1.1). We get

$$h = \frac{e^2}{2c\varepsilon_0} \cdot \left(\frac{\pi}{2\sqrt{2}}\right)^3 \cdot 100 = 6.62577030 \cdot 10^{-31} Js$$

(Equation: 6.6.3)

The experimental value is $h = 6.6260876 \cdot 10^{-34}$ Js. Thus it is shown that Planck's quantum constant is no independent fundamental natural constant. It is determined by the elementary electric charge, by the speed of light and by a number.

7 The Potential of the Electromagnetic Wave and the Mass Equivalent of Potential Energy

7.1 The Potential of the Electromagnetic Wave

Equation (6.1.1) provides (see also equation (2.1.2))

$$\sqrt{hc} = \sqrt{\frac{1}{2\pi\alpha}} \cdot \frac{e}{\sqrt{4\pi\varepsilon_0}}$$

(Equation: 7.1.1)

Whence it follows that $\sqrt{hc}$ is a charge (in electrostatic units). It has the same sign as the elementary electric charge since the signs of elementary electric charge and root compensate each other. The $\sqrt{hc}$ expression is now called the charge of the electromagnetic wave, abbr. wave charge. The charge has the following potential:

$$P = \frac{\sqrt{hc}}{\lambda}$$

(Equation: 7.1.2)

whereby λ is the wave length of the electromagnetic wave. This is also a centrally directed potential as in electrostatics and gravitation. The electromagnetic wave has potential centres or wave charges in the spacing of λ. The potential energy is

$$E_{pot} = \frac{\left(\sqrt{hc}\right)^2}{\lambda}$$

(Equation: 7.1.3)

7.2 The Force of the Electromagnetic Wave

The force corresponding to the potential (equation (7.1.2)) then is

$$F = \frac{\left(\sqrt{hc}\right)^2}{\lambda^2}$$

(Equation: 7.2.1)

In literature, this force is called „strong force". We further get from(6.3.7):

$$G_e m_h^2 = hc$$

(Equation: 7.2.2)

Now mass and wave length shall be variable. We then get

$$G_e m^2 = \frac{hc}{\lambda}$$

(Equation: 7.2.3)

According to equation (2.3.3)

$$x_0 = \frac{e\sqrt{G_e}}{c^2\sqrt{4\pi\varepsilon_0}}$$

(Equation: 7.2.4)

And we get

$$c^2 \frac{\sqrt{G_e}\sqrt{4\pi\varepsilon_0}}{e} m^2 = hc$$

(Equation: 7.2.5)

According to equation (2.3.2)

$$\sqrt{G_e}\frac{\sqrt{4\pi\varepsilon_0}}{e} = \frac{1}{m_0}$$

(Equation: 7.2.6)

And we get

$$\frac{c^2}{m_0} m^2 = m_0 c^2 \left(\frac{m}{m_0}\right)^2 = E_0 \left(\frac{m}{m_0}\right)^2 = \frac{hc}{v} = hv$$

(Equation: 7.2.7)

7.3 The Mass Equivalent of the Potential Energy

The mass equivalent of the *potential energy* of the electromagnetic wave thus is

$$E_{pot} = hv = E_0 \left(\frac{m}{m_0}\right)^2$$

(Equation: 7.3.1)

If, in equation (7.2.5), we put $v = v_0 = t_0^{-1}$, we obtain $m = m_h$. According to this, Einstein's formula of energy-mass-equivalence is an equivalence of mass and *kinetic* energy in the sense of mechanics (difference in the exponent).

$$E_{kin} = mc^2 = E_0 \left(\frac{m}{m_0}\right)^1$$

(Equation: 7.3.2)

During the absorption of the electromagnetic wave by an electron it is slowed down with a delay of $-a_{max}$ and its potential energy is "condensed" to mass which is then transformed into kinetic energy according to equation (7.3.1) (absorbtion of the electromagnetic wave). During emission the process is reversed. When the absorbed mass is "vaporised", the electron is rocketed to a higher energy level (impulse). Thus, the electromagnetic wave itself does not necessarily have to have an impulse in the sense of mechanics. If we analyze the absorption process of an electromagnetic wave in this manner, it is no longer necessary to assign a kinematic impulse in the sense of mechanics to the wave although the *overall* appearance seems to match such a supposition.

8 Conclusions

These representations allow the following conclusions to be drawn:

1. It is shown, that by limiting acceleration laws of force are dramatically changed especially in the neighborhood of the origin of ordinates.
2. A coherence between acceleration and the becoming and disappearance of mass is made.
3. By introducing the constant a_0 in equation (2.1.2) an elemental mass m_0 can be defined which can be divided asymmetrically into the mass of the electron m_e and the teleronci mass m_t. Both of these masses fit into the Periodic Table of Elements.
4. It is shown that the number of dimensions in physics can be reduced from 3 (kgms) to 2 (ms).
5. It is further shown that, from the fundamental natural constants *c* and *e,* the other universal fundamental natural constants, such as G_N and a, can be calculated (see 3).
6. From the limitation of acceleration it follows that all massive fundamental particles must have a finite spatial extension.
7. Further calculations show that a structure more complicated than the structure of the quark model can be assigned to fundamental particles.
8. In contrast to the standard model, the number of basic fundamental particles is reduced from 12 to 4. Two of these particles, namely the electron ad the teleronci, provide the basis for the Periodic Table of Chemical Elements whereas the artificially created fundamental particles consist of the fundamental masses m_0 and m_h.
9. Whereas the teleronci can easily be integrated into the Periodic System of Elements, such classification is not possible with the Planck mass model and the quark model.
10. A truly fundamental particle is a three-dimensional spherical gyroscope, whose measurement (radius) is determined in that the speed of light may not be exceeded on its surface.

9 Summary Table

Table 3. Overview of the calculated basic quantities and their experimental values

basic physical quantity	Values		
quantity	**explanation and name**	**experimental**	**calculated**
c	vacuum speed of light	$2.99792458 \cdot 10^8 ms^{-1}$	0
e	elemetary charge	$1.60217646 \cdot 10^{-19} C$	0
G_N	Newton’s constant of gravitation	$6.67310 \cdot 10^{-11} Nm^2kg^{-2}$	$6.67128190 \cdot 10^{-11} m^3kg^{-2}s^{-2}$
m_e	rest mass of the electron	$0.91093819 \cdot 10^{-30} kg$	$0.910925053 \cdot 10^{-30} kg$
m_p	rest mass of the proton	$1672.6216 \cdot 10^{-30} kg$	$1672.4297 \cdot 10^{-30} kg$
m_n	rest mass of the neutron	$1674.9272 \cdot 10^{-30} kg$	$1674.7461 \cdot 10^{-30} kg$
m_t	rest mass of the teleronci	$1.1527 \cdot 10^{-30} kg$	$1.15819171 \cdot 10^{-30} kg$
m_n / m_e	quotient of neutron mass and electron mass	1838.6836	1838.5105
m_p / m_e	quotient of proton mass and electron mass	1836.1526	1835.9676
e/m_e	specific charge of the electron	$1.75882017 \cdot 10^{11} Ckg^{-1}$	$1.75884554 \cdot 10^{11} Ckg^{-1}$
1/a	fine structure constant	137.0359998	137.0296781
h	Planck’s quantum constant	$6.6260676 \cdot 10^{-34} Js$	$6.62577030 \cdot 10^{-34} Js$
G_e	electromagnetic constant of gravitation	0	$5.38880048 \cdot 10^{31} m^3kg^{-2}s^{-2}$
G_h		0	$6.25889403 \cdot 10^{28} m^3kg^{-2}s^{-2}$
m_0	reduced Planck mass	$2.06372 \cdot 10^{-30} kg$	$2.06911676 \cdot 10^{-30} kg$
m_h	small Planck mass	0	$60.7131110 \cdot 10^{-30} kg$
x_0	limit of length	0	$1.24061120 \cdot 10^{-15} m$
t_0	limit of time	0	$4.13823352 \cdot 10^{-24} s$
a_{max}	maximum acceleration	0	$7.24445483 \cdot 10^{31} ms^{-2}$
F_0	limit of force	0	$1.49896229 \cdot 10^2 N$
E_0	limit of energy	0	$1.85962940 \cdot 10^{-13} J$

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How to Cite this Article: Roland Meissner "Derivation of the Relativistic Laws of Force and Their Consequences", Science Journal of Physics, Volume 2013, Article ID sjp-154, 16 Pages, 2013. doi: 10.7237/sjp/154