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# Time reversal and the matter originated from the Nothing

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**ABSTRACT**
In the view of several speculations reveals the question if a reversal in time is possible and could be formulated mathematically exact. Moreover, it stands the reason why matter can not be originated from the nothing, in contrast to the Big Bang Theory, BBT offering a comprehensive explanation for a broad range of observed phenomena, including the abundance of light elements, the cosmic microwave background, CMB, radiation, and large-scale structure in quantum electrodynamics, QED. A problem, however is the inflationary period. This theory reveals of both, exactly described here. The time will reverse as described in this actual paper as well as matter will be originated from the Nothing. This will reveal the Gravitoelectrodynamics, the unification of the relativistic atomic quantum theory and the theory of gravity. This is coined `The Theory of the Nothing for Everything´.

PACS NUMBERS:

03.30.+p special relativity
03.50.-z classical field theory
11.30.Er charge conjugation, parity, time reversal, and other discrete symmetries
45.20.-d formalism in classical mechanics

**Key words:** time reversal, charge conjugation, gravity, classical mechanics, relativity

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## I. INTRODUCTION

It is a long-cherished wish of mankind to reverse the course of time in order to make what has happened undone.

In the view of several speculations (*e. g.*, [1]) reveals the question if a reversal in time is possible or could be formulated mathematically exact [2, 3]. Moreover, it stands the reason why *m* can not be originated from the nothing in contrast to the Big Bang Theory, BBT offering a comprehensive explanation for a broad range of observed phenomena, including the abundance of light elements, the cosmic microwave background, CMB, radiation, and large-scale structure; the latter is due to electrodynamics and, especially, electrostatics. A problem however is the inflationary period [4-7].

The current theory reveals of both, exactly described here. The time will reverse as described in the theory as well as the *m* originated from the Nothing.

It has been recently demonstrated [9] time oscillates with

$$v_{T,B} \approx c \pm 8\ 067.66\ 285\ \mathrm{m/s} \tag{1}$$

leading to the shortest time interval [9] (suggested already before from Cordula 1987, personal communication)

$$\tau = 3.81\ 212\ 49\ 466\ 289 \cdot 10^{-44}\ \mathrm{s}, \tag{2}$$

indicating the quantization of time $\tau$. This follows directly from a former theory [9]

$$\mathrm{v} = \frac{(2h\varepsilon_0 c/q^2)}{\sqrt{1+(2h\varepsilon_0 c/q^2)^2}} \cdot c \tag{3}$$

and becomes obvious time oscillates in according to their two speeds eq. (1). Consequently, the time interval $\boldsymbol{\tau}$ would not form a constant. From incorporating the gravitation constant *G* [10, 11 that problem can be overcome to stabilize the time interval $\Delta t_{\min}$ generally

$$\Delta t_{\min} = \boldsymbol{\tau} \longrightarrow \boldsymbol{\tau} \triangleq 3.81\ 212\ 49\ 466\ 289 \cdot 10^{-44}\ \mathrm{s} \tag{4}$$

and showing the quantization of time via eq. (1) to be used.

Certainly, such a theory must be compatible with Hubble-Lemaître law (*e.g.*, [12]) – the observation the farther away galaxies are, the faster Big Bang, BBT, at around 13.8 billion years ago, which is thus considered the age of the they are moving away from Earth. In extrapolating this cosmic expansion backwards in time using the known laws of physics; those theories describes a high density state preceded by a singularity in which space and time lose meaning (*e.g.* [13]). There is no evidence of any phenomena prior to the singularity. Detailed measurements of the expansion rate of the universe place the universe. The universe describes a cosmological solution of the equations of the general theory of relativity, ART and seems the universe also violates Mach's principle in the form originally envisaged from Einstein for the ART. However, it was shown in 1949 a particle can reverse in time, *e. g.*, “coming” from the past [14].

In the view considering a finite instead of infinite universe, [15, 16] constructed a variant in 1962 without time travel into the past, but which still violates Mach's principle.

It is consequently due to the oscillation of light, or an electromagnet wave, EM (here considered in *uni sono*) [9]. That is to mark stabilisation to demonstrate the character of the amalgamation between electrophysics in $\alpha \longrightarrow \alpha^2$, *i. e.* quantum mechanics, QM and general relativity, GR. Therefore, it has to involve the influence of gravitation with *G*, incorporated in a wise strict for stabilization, assimilating the combination. Hence, the result can be trucked to a real and stabile time reversal. Though, both topics look very different, they are linked. Therefore, this study falls into two parts. This is very important for the theory proposed because then a space opens up between two worlds, and the two energies on either side cannot extinguish each other in this space. The difference in energy is trapped between these two “plates” to a certain extent there is energy from which new matter is originated..Albeit space and time cannot be teared apart – it is for no reason called "space.time.", nevertheless, there is still the possibility of being able to separate them in this proposition, regardless.

This present work is a kind of mixture of electrodynamics and gravitation and forms, in a way, the counterpart or almost a complete opposite of the QED. The full length of the manuscript is required for a complete and thorough understanding.

## THEORY

In space-time nothing is at rest. This theory can not relate solely to time reversal, since gravity must be taken into account. It is therefore not possible to separate the two topics mentioned. Hence, it is called space-time, since space is not simply separable from time. It is important to follow the electromagnetic wave, EM and the light beam both are treated in unison – the same way and in same meaning.

The two themes are coupled, since the emergence of *m* originated from nothing is explained from a time reversal. Of course, a complete discussion can only take place if all the variables important here are disclosed in their form. Therefore, there are several sections to describe this phenomenon.

A light beam passes through the shortest time period [9] according to the Lagrangian extremal principle [17, 18] when covering any path *s*. Those statements are valid for any material, any mass *m* – positive +, negative, zero 0 − and any property of space *S* and applies to all materials and every track in an interaction distance *d* in *s*. The distance *d* results from the Pythagoras.

The requirements are given by the designations. These serve to distinguish between ***el***: electric, ***gr***: gravity, and the vectors

$$\vec{X} = \begin{bmatrix} +ict \\ +X \\ +Y \\ +Z \end{bmatrix} \quad \text{and} \quad -\vec{X} = \begin{bmatrix} -ict \\ -X \\ -Y \\ -Z \end{bmatrix} . \tag{5}$$

If required for distinction the variables and constants would be provided with upper posed indices, each.

## 1 Preliminary remarks

First, the attention looks to the determination of the fundamental constants. According to the above, this route can be closed according to time or time interval, respectively. It is valid for forward and backward running time, and for an *m* of any value as (positive) matter, (negative) anti-matter, or 0 (zero), respectively, like

$$\begin{array}{lrl} & E = & -(i\hbar c\boldsymbol{\alpha}\nabla - \beta m_0 c^2)\,\psi(\boldsymbol{r},t) \\ + & E = & +(i\hbar c\boldsymbol{\alpha}\nabla - \beta m_0 c^2)\,\psi(\boldsymbol{r},t) \\ \hline & 2E = & 0 \qquad \psi(\boldsymbol{r},t) \end{array} \tag{6}$$

[9, 10, 12]. This means two particles or respective bodies, anti-matter and matter, disappear to nothing (zero) without any radiation ("no big crash"). The result of

$$2E = 0 \cdot \psi(\boldsymbol{r},t) \tag{7}$$

can be split into the two states, negative and positive, leaving the pair [16]

$$E^- = -(i\hbar c\boldsymbol{\alpha}\nabla - \beta m_0 c^2)\,\psi(\boldsymbol{r},t) \tag{8}$$

$$E^+ = +(i\hbar c\boldsymbol{\alpha}\nabla - \beta m_0 c^2)\,\psi(\boldsymbol{r},t) \tag{9}$$

to justify a reverse to formula (3). Though, the spin of the electron with

$$s = \frac{1}{2} \rightarrow \pm\frac{1}{2} m_s , \tag{10}$$

first suggested from Kudar [19] in 1926 and mathematically exact confirmed in the theory of Dirac [16, 20, 21]. This statement will reveal a dimension of order 11 in both spaces – the 10 dimensions already demonstrated recently via [9-11] twice a dimension 5 according to the Klein-Gordon-Fock, KDF formulation. Here, 5 dimensions are positive, whereas the "other side" demonstrates a negative behavior with also 5 dimensions [9-11]. That gives 10 dimensions, and in addition the gravitation spin 2 results in a total of the 11 dimensions. It is very important to mention there is a gap between the two "worlds", which is why a clear dimension of order 11 must be incorporated. It is significant here the two interacting beams (Fig. 1) are not exactly parallel to one another, rather "bent" from a small angle $\vartheta$. (Figs. 2, 3). The above formulas will yield the possibility to explain how time can be reversed and, in addition, show any *m* originated from the nothing in the whole universe and everywhere. However, following a former theory [9]

$$\mathrm{v} = \frac{(2h\varepsilon_0 c/q^2)}{\sqrt{1 + (2h\varepsilon_0 c/q^2)^2}} \cdot c \tag{11}$$

it becomes obvious time oscillates in according to their two speeds eq. (1). Consequently, the time interval $\boldsymbol{T}$ would not form a constant and will oscillate. In consideration of the angle between v and *c*

$$\chi \equiv \frac{\mathrm{v}_{T,B}}{c} \approx 20\,69\,108\,26\,589\,23\,995 \cdot 10^{-6} , \tag{12}$$

this correlation originates the numerical values

$$\sin\vartheta \approx 0\ 39\ 603\ 41\ 032\ 40\ 402\cdot 10^{-6}$$

→

$$\vartheta \approx 0\ 10\ 803\ 07\ 851\ 63\ 676\cdot 10^{-6\,\circ} \quad . \qquad (13)$$

This angle shows two tracks exist in the interaction of two bodies and these are not exactly parallel to each other. It affects the distance *D* and the path *s* and also the time *t*. Consequently, the Heisenberg's uncertainty – based on the canonic conjugate relations – will not be minimal, but will show an – albeit tiny (Fig.6) – gap caused from the above angle $\vartheta(\mathrm{v_B}/\mathrm{v_T}, c)$.

From incorporating the gravitation constant *G* [11] the obvious problem can be overcome to stabilize the time interval $\Delta t_{\min}$ generally

$$\Delta t_{\min} = \boldsymbol{\tau} \longrightarrow \boldsymbol{\tau} \triangleq 38.12\ 124\ 94\ 662\ 89\cdot 10^{-45}\mathrm{s} \qquad (14)$$

showing the quantization of time via eq. (1) to be used and coined a Temptron, a constant proposed before (Cordula, personal communication 1987). The related *m* is the graviton $\mu_{\tau} = M$, here determined from gravitation, follows immediately from

$$E = mc^2 \equiv h\nu \equiv \frac{h}{\Delta t_{\min}\cdot c^2} \equiv \frac{h}{\boldsymbol{\tau}\cdot c^2}$$

→

$$m = \frac{E}{c^2} \equiv \frac{h}{\Delta t\cdot c^2} \longrightarrow \mu_{\tau}, \mu_g$$

↔

$$\vec{m}\cdot c = \frac{h\nu}{c^2} \equiv \frac{h}{\vec{\lambda}} \equiv \vec{p}_{\boldsymbol{i}}$$

→

$$\mu_g \triangleq 0.\,19\ 339\ 60\ 010\ 38\ 087\cdot 10^{-6}\mathrm{kg} \quad \text{from } \boldsymbol{\tau} \quad . \qquad (15)$$

From here, it becomes clear space and time will be consequently quantisized in $\boldsymbol{\tau}$, the smallest unit of time, just leading to emphasize the origin of any *m* in the whole universe. The constant to stabilize the oscillation between the two light speeds must generally be incorporated and is grounded in the gravitational constant *G* [11] as

$$G \triangleq 66.74\ 083\ 1\cdot 10^{-12}\ \frac{\mathrm{m}^3}{\mathrm{kg}\cdot \mathrm{s}^2} \qquad (16)$$

to avoid oscillation in time [10, 11] as in a EW,

$$\vec{X}_0 = i\,\vec{\omega}\,t \quad . \qquad (17)$$

This oscillation $\omega$ is demonstrated rectangular or respective perpendicular to a seemingly propagation speed of light *c* in the electromagnetic wave, EM and this is important to note.
There is a clear difference between the interaction electrodynamics and gravitation, α ↔ G,

$$\alpha(x) \square G(z) \qquad \text{electrostatic / pure gravity} \quad ,$$
$$\alpha(x) \square G(z, \boldsymbol{\vartheta}) \qquad \text{electrostatic / exact gravity} \quad \text{(see below)} \quad ;$$

it is later evident in the ensemble from Maxwell [22]. The angle $\boldsymbol{\vartheta}$ is not very decisive for the transition between the transition positive to negative interval, nor for the formation of the matter from the nothing; it is evident admittedly the constant *G* actually oscillates as shown in eq. (13) and gives rise to the expression

$$G(\boldsymbol{\vartheta}) = G(1 \pm \sin\vartheta) \quad .$$

The above pure EM oscillation entailed from $v_{T,B} \approx c \pm 8\,067.66\,285\ \mathrm{m/s}$ has to be characterically stabilized, which can only be achieved via the *G*; otherwise the electromagnetic gravitation-wave, EGW would maintain oscillate between the two light speeds eq. (10). This would not be confirmable with the actual theory proposed here, since then a true and consequent time reversal can and would not be possible, otherwise.

Now, the character of the *m* has to be demonstrated. Following the de Broglie´s relativistic wave generalisation [23] the equations

$$E = mc^2 \equiv h\nu,\ mc^2 \longrightarrow = h\nu \quad ,$$

$$mc = \frac{h\nu}{c^2} \equiv \frac{h}{\lambda} \equiv p \quad ,$$

$$m = \frac{h\nu}{c^2} = \frac{h}{c^2} \cdot \frac{1}{t} \tag{18}$$

can load to the smallest $m_g$ and brings

$$m_{\min} \equiv \frac{h}{c^2} \cdot \frac{1}{t} \equiv \frac{h}{c^2} \cdot \frac{1}{\boldsymbol{\tau}} = \mu_g \tag{19}$$

compare the real numerical value for gravitation .

$$M = \mu_{gr} \triangleq 11.59\,090\,90\,909\,09 \cdot 10^{+60}\,\mathrm{kg} \quad , \tag{20}$$

coined a Graviton. In case of electrodynamics, ED it is

$$E = mc^2 \equiv h\nu \equiv \frac{h}{\Delta t_{\min} \cdot c^2} \equiv \frac{h}{\boldsymbol{\tau} \cdot c^2} \quad ,$$

$\rightarrow$

$$m = \frac{E}{c^2} \equiv \frac{h}{\Delta t \cdot c^2} \longrightarrow \mu_\tau \quad ,$$

$\rightarrow$

$$\mu_{\boldsymbol{\tau}} \triangleq 0.19\,339\,60\,010\,38\,087 \cdot 10^{-6}\,\mathrm{kg} \quad \text{from } \boldsymbol{\tau} \tag{21}$$

in attention of $\boldsymbol{\tau}$ from former investigation [11].

For further discussion certain introduction and comments are necessary related to gravitation and are composed to electrodynamics. Similar to the Maxwell's equations [22] can, in respect of the electrical field $\vec{E}$ and the magnetic field $\vec{H}$, the symbols $\boldsymbol{\eta}$ and $\boldsymbol{\xi}$ are introduced and treated to compare the gravitation field in the GW with electrodynamics for the amalgamation of electrodynamics, ED and gravitation for the GW. The results are directly comparable to both "curl equations" of the ED in

$$\vec{\nabla} \times \vec{E} = -\vec{H} \longrightarrow \nabla \times \vec{\eta} = -\vec{\xi}$$
$$\vec{\nabla} \times \vec{H} = +\vec{E} \longrightarrow \nabla \times \vec{\xi} = +\vec{\eta} \quad . \tag{22}$$

In analogy to ED it can be imagined a form of a "gravitation-tube" (Fig.4). It is obviously surrounded from "rings" perpendicular to the gravitation current produced by the field and the flux $\varphi_g$ running between the two interacting $m_{gr}$ analogously to $\vec{H} \,\square\, \vec{E}$ . This argument shows the enormous influence of gravitation interaction compare [10] to assimilate an EW with a GW. The consequence is the running current $\vec{I}_{gr}$ between the two $m_g$ in form of a gravitation wave $\omega_g$, which follows the identity

$$\vec{\nabla} \times \vec{\nabla} = \text{grad}(\text{div}) - \vec{\nabla}^2 \text{, with } \text{curl curl} \equiv (\vec{\nabla} \times)(\vec{\nabla} \times), \quad (23)$$

just suggested and explained before. It is is now clear to explain an exact analogy to compare the classical electrodynamics from Maxwell with $\vec{H}$ and $\vec{E}$ to the here expressed formulae in gravitation for the associate vectors $\vec{\xi}$ and $\vec{\eta}$ in Greek symbols for strict distinguish from the ED. However, a wave considered in the KGF is running forth and back. That means there must be an additional influence to the EW from the side", say the *G* to stabilize a one-way direction in propagation of the GW applying to classical electrodynamics. As long as it is a question of pure electrodynamics the arising questions can be resolved via the special theory of relativity, SR, since this is inherently Lorentz invariant. However, if *m* occurs this inevitably draws a description of the general theory of relativity, GR.

The origin and evaluation of the whole universe as well as matter *m* results directly in accordance to the above eqs. (6, 9) from the Nothing explained via a reverse of eg. (5) guiding the eqs. (7, 8). Consequently. a clear and stabile time difference $\pm\Delta t$ will be incorporated via the very strong influence of *G*, compare eq. (15) with $\mu_g$. This constant allows maintenance in the oscillation of time to maintain behave $\tau$ a constant. Sincerely, in the current theory the time interval $\Delta t$, measured in absolute amount, must become a constant. Hence, the oscillation in *G* must be incorporated to compensate the nature in oscillation of a free EW to allow a real and stabile $\Delta t$ in contrast to a separation into plus (+) and minus (−), $\pm\Delta t$. This argument reads to achieve

$$+\Delta t \longrightarrow -\Delta t \ , \quad \text{not} \quad \pm\Delta t \longrightarrow \mp\Delta t \quad (24)$$

and will demonstrate a real time reversal.

In this context however, it must be mentioned the "time vector-component", $\pm X^0 = i c t$ is perpendicular to the position vectors *x*, *y*, *z*, and the gravitation, *i.e.*, G. This means a comparison in time reversal relates to the 3-dimensional space vectors , the ED and in the gravity will be affected. In addition, there is a direct connection to the gravitational current $I_g$ and the flux $\varphi_g$ from the moving graviton, since these are coupled with time. In a time reversal, however, all of these components will be exactly mirrored and therefore swap the positive sign (+) for a negative (−). The absolute value in complete amount, however will not change. In plain language and descriptively, this means if the time is reversed the distance *s* and the distance *D* will also appear reversed for the moving particles *m*. When considering gravitation, one GW moves forward and the other backwards; the reason for this is the coupling between time and the space-time vectors, *i.e*., giving space-time. Consequently, there is an interaction between the two GWs, which is stronger and more effective compared to interactions in electrodynamics, which is very pronounced and clearly outweighs the pure electrodynamic interactions. Then, it becomes obvious two massive particles - one moving forward while the other is moving in opposite direction - will attract each other via gravity, even if they are not electrically charged (Fig.1).

A connection then is formed from this in relation to the emergence of the mass *m* from the Nothing. The reason, figuratively speaking, is the streams also flow back in $+I_{gr} \rightarrow -I_{gr}$, which means that the said equation eg. (3) is reverse into egs. (5, 6) will be effected, which the 3-dimensional vectors $\vec{H}$, $\vec{E}$ [22] the ED and in the gravitation with $\vec{\xi}$ and $\vec{\eta}$ and could affect. As already mentioned, a time reversal $+\Delta t \longrightarrow -\Delta t$ entails a mirroring of all the variables mentioned so far, with the exception of the temperature *T*, which does not become negative: $+T(+\Delta t) \longrightarrow +T(-\Delta t)\,!$ . This characteristic is disclosed and explained below. However, there is a direct connection to the gravitational current $I_{\text{gr}}$ and the Graviton $M = \mu_{gr}$ as coupled to time. In time reversal the addition all of these components will be ideally mirrored and therefore swap the positive sign (+) for a negative (−); the absolute amount, however, will not change. A connection is then formed from this in relation to the emergence of the mass *m* from the Nothing. The reason, figuratively speaking, is the streams also flow back meaning the said equation eg. (3) will be reversed into egs. (5, 6) be effected. Since the angle $\vartheta$ eq. (10), although appearing tiny, must be taken into account, the two "worlds" are not exactly congruent to each other or respectively congruent as shown in positive space ,

$$S^{+} = \begin{bmatrix} +i\,X_0 \\ +\sin\vartheta\cdot X_1 \\ +\sin\vartheta\cdot X_2 \\ +\sin\vartheta\cdot X_3 \end{bmatrix} \equiv \begin{bmatrix} +ict \\ +X \\ +Y \\ +Z \end{bmatrix} \quad \text{positive space-time}$$

$$S^{-} = \begin{bmatrix} -i\,X_0 \\ -\sin\vartheta\cdot X_1 \\ -\sin\vartheta\cdot X_2 \\ -\sin\vartheta\cdot X_3 \end{bmatrix} \equiv \begin{bmatrix} -ict \\ -X \\ -Y \\ -Z \end{bmatrix} \quad \text{negative space-time} \quad . \qquad (25)$$

The current vector results from the inclusion of the electron spin and shows a 5-dimensional space-time vector as given below. In semi-relativistic representation of wave mechanics, *i. e.*, quantum mechanics from Schroedinger [24-26] based on

$$E_{\text{Sch}} = \frac{1}{2}\cdot mv^2 \equiv \frac{p^2}{2m} \quad , \qquad (26)$$

and this is sufficient. When considering the real state in relativistic wave mechanics according to [27] with

$$E_{\text{Dir}} = mc^2 \qquad (27)$$

the electron spin *s* must be included showing

$$\vec{r}_{\text{Dir}} = \vec{r}_{\boldsymbol{i}} \times \vec{r}_{s}, \;\; \text{with} \;\; \boldsymbol{i} = 1,2,3,4 \longrightarrow m_s = \pm\frac{1}{2} \;\; \text{at} \;\; H_{Z-\,\text{external}} \quad . \qquad (28)$$

This serves the 5-vector

$$S^{+} = \begin{bmatrix} +iX_0 \\ +\sin\vartheta\cdot X_1 \\ +\sin\vartheta\cdot X_2 \\ +\sin\vartheta\cdot X_3 \\ +s \end{bmatrix} \equiv \begin{bmatrix} +ict \\ +X \\ +Y \\ +Y \\ +W \end{bmatrix} \quad . \qquad (29)$$

Consequently, the vectors of the electrodynamics and also of gravitation will be based on it and further, albeit in a small way, will be influenced. This *S* transforms completely and in full at a time transition in all components from positive to negative.

In a time transition, these vectors would not be exactly parallel to each other due to the $\boldsymbol{\vartheta}$ (see above). Nevertheless, the time reversal is possible according to eq. (10) from one speed to another in numerical values

$$\mathrm{v_B} \;=\; 0.99\;997\;30\;178\;4 \cdot c \qquad \text{and} \qquad \mathrm{v_T} \;=\; 1.00\;002\;69\;821\;5 \cdot c \tag{30}$$

so soon the tremendous effect of *G* eq. (11) is taken into account and then plays the decisive role. There is, of course, a small distance in the transition from a time-space / space-time

$S^{+}_{r,t} \;\rightarrow\; S^{-}_{r,t}$ in the other time a prerequisite. Since otherwise the effect of gravitation decreases decisively with the distance *D* between the two bodies (objects) and consequently increasingly disappears in the distance *D*. Therefore, a space-time current flows between the two objects under consideration

$$I_t \;\rightarrow\; I_{\tau,\,\mu_g} \;\leftrightarrow\; I_{\tau,\,\vec{r}} \quad . \tag{31}$$

It is crucial in the further discussion [28, 29] to incorporate the constants

$$\alpha \;=\; \frac{e^2}{4\pi\varepsilon_0 \hbar c} \quad , \tag{32}$$

with numerical values

$$\alpha \;=\; 7.29\;735\;25\;69\;(24)\cdot 10^{-3} \;\text{ or }\; \alpha^{-1} \;=\; 137.03\;599\;90\;74\;(44)\cdot 10^{-3} \;,$$
$$\mu_{\boldsymbol{\tau}} \;\triangleq\; 0.\;19\;339\;60\;010\;38\;087 \cdot 10^{-6}\,\mathrm{kg} \quad \text{from } \boldsymbol{\tau} \tag{33}$$

(the current paper) and the very strong influence of gravity eq. (15)

$$m_{\min} \;\equiv\; \frac{h}{c^2}\cdot\frac{1}{t} \;\equiv\; \frac{h}{c^2}\cdot\frac{1}{\boldsymbol{\tau}} \;=\; \mu_g \quad , \tag{34}$$

with real numerical value for the gravitation, coined the Graviton – in the outside of the chamber, where the plates pressed together with the enormous effect of the free and undisturbed waves outside them. This is necessary a .

$$M \;=\; \mu_{gr} \;\triangleq\; 11.59\;090\;90\;909\;09 \cdot 10^{+60}\,\mathrm{kg} \tag{35}$$

to include. This ensures the angle $\vartheta_g$ caused from gravity exceeds the electrodynamic effect eq. (16) to a certain extent “killed”. The result is obvious, since then the two time vectors $+\vec{X}_0,\,-\vec{X}_0$ become almost exactly parallel – simile the Heisenberg´s uncertainty, where the canonically conjugate vector values are compared. Hence, an exact transition

$$\Delta t^{+},\,\Delta d^{+},\quad \Delta t^{-}\Delta r^{-} \quad \text{transition} \quad +\Delta t \;\rightarrow\; -\Delta t \tag{36}$$

discloses. Due to the inclusion of gravitation in eg. (15) this is possible since the influence of the electrostatic component $\mu_{\boldsymbol{\tau}}$ in eq. (21) is vanishingly small. The comparison reveals this in the numerical value

$$\frac{\mu_{\boldsymbol{\tau}}}{\mu_{gr}} \;\triangleq\; 16.68\;514\;51\;875\;998 \cdot 10^{-57} \tag{37}$$

and shows the tremendous effect of gravity. As a result, the time vectors $\vec{X}_0$ , just like those for the space *S* in $X_1,\,X_2,\,X_3$ , can be openly compared with one another initially allowing deviation to be neglected. Now, the distance $D_g$ between the two interacting bodies remains. This is calculated using the Heisenberg's uncertainty as

$$\vec{p}_i \cdot \vec{d}_i \;\geq\; \frac{\hbar}{2}, \quad i = 1,2,3,4 \qquad , \qquad (38)$$

and in special Greece letters accentuated for gravitation analogous to electrodynamics, ED to be compared and merged with gravitation. That is in analogy to be compared or respective merged with gravitation

$$\vec{\pi}_i \cdot \vec{\delta}_i \;\geq\; \frac{\hbar}{2}, \quad i = 1,2,3,4$$

$$\vec{\pi}_i \cdot \vec{\delta}_i \;\equiv\; (\vec{\mu}_i \cdot c) \cdot \vec{\delta}_i \;\geq\; \frac{\hbar}{2}, \quad i = 1,2,3,4 \qquad (39)$$

from the Graviton $\mu_{gr}$ eq. (24). This happens over

$D_g \longrightarrow 2\sigma \equiv \delta$ (analog to $2R = D$) – the $\delta$ not to confuse with the Dirac´s $\delta$-function – and leads to

$$\vec{\pi}_i \cdot \vec{\delta}_i \;\geq\; \frac{\hbar}{2}, \quad i = 1,2,3,4$$

$$\rightarrow \quad \vec{\pi}_i \cdot \vec{\delta}_i \;\equiv\; (\vec{\mu}_i \cdot c) \cdot \vec{\delta}_i \;\geq\; \frac{\hbar}{2}, \quad i = 1,2,3,4 \qquad . \qquad (37)$$

This is in accordance to the quabla-operator $\vec{\Box}$ in the 4-space. The value results from

$$\vec{\pi}_i \cdot \vec{\delta}_i \;\geq\; \frac{\hbar}{2}, \quad i = 1,2,3,4$$

$$\rightarrow \quad \vec{\pi}_i \cdot \vec{\delta}_i \;\equiv\; (\vec{\mu}_i \cdot c) \cdot \vec{\delta}_i \;\geq\; \frac{\hbar}{2}, \quad i = 1,2,3,4$$

$$\rightarrow \quad \delta_i \;\geq\; \frac{\hbar}{2\mu_g \cdot c} \qquad , \qquad (38)$$

giving the numerical value for minimal gravitation distance interaction in

$$\delta_i \;\triangleq\; 4.22\,091\,45\,332\,185\,46 \cdot 10^{-94}\,\text{m} \qquad , \qquad (39)$$

where a time reversal occurs. Here, the electrodynamic oscillation $\text{v}_{el}$, $\omega_{el}$ does not come into consideration, since + and − exactly cancel each other out. In contrast to this, the quantum mechanics, QM which is coupled with the electrodynamics, ED - and the statement

$$\psi(\vec{r}, t) \;=\; \pm A \cdot e^{(\vec{k}\vec{r} - \omega t)}$$

$$\rightarrow \quad I_{el} \;\equiv\; \|\psi(\vec{r}, t)\|^2 \;=\; +A^2 \cdot e^{[2 \cdot (\vec{k}\vec{r} - \omega t)]} \qquad (40)$$

is certainly correct – but would contradict the demand for a stable time transfer $+\Delta t \longrightarrow -\Delta t$.

In case of the influence of *G*, however, not as a result of the present theory, since the gravitation current $+\vec{I}_g$ is now oriented and directed. It must be taken into account, though this current spreads with *c*, its form is encased from a, figuratively speaking, screw in analogy to the electrodynamics, ED (as mentioned above). As a result, this current looks like an amplitude modulation in the EM. It is important to mention the momentum *p* oscillations with the above frequency $\omega_{el}$ caused by the electrostatic interaction. Hence, the gravitational constant *G* does not turn out to be a true constant, but really has to be included as slightly oscillating according to

$$G(\omega,\, t) \;=\; A \cdot e^{(\vec{k}\,\vec{r} \,-\, \omega t)} \cdot \| G \| \qquad (41)$$

meaning an electromagnetic, EM effect as a kind of slight disturbance. It is therefore, though this is very tiny in comparison to the influence of gravitation $\omega\tau \;=\; E_{grav}$ and should be written

$$E \;=\; \omega_{el} \cdot t + \omega_{grav} \cdot \tau_{grav} \;=\; E_{el} + E_{grav} \;. \qquad (42)$$

## 1 Contemplation of the energy

Since a reference to the transition over the light barrier – here considered as the time barrier – is required the energies for this plan must be considered, first, to enable and reveal such a transfer $+\Delta\boldsymbol{t} \longrightarrow -\Delta\boldsymbol{t}$ from one time to another. Here, two forms of energy to consider, which require a connection between mechanics and electrodynamics in accordance to the theory of gravitoelectrodynamics, GED to connect gravitation with electrodynamics [10]. These are the energy deriving from the electrostatics between two objects at a distance *D* = 2*R* appearing electrically in unit charge *e* is generally

$$E_{\mathrm{el}}(r) \;=\; \frac{1}{4\pi\varepsilon_0} \cdot \frac{q_1 \cdot q_2}{r} \;\equiv\; +\frac{e \cdot e}{(4\pi\varepsilon_0)\,D} \qquad (43)$$

and the compared indicates

$$E_{\mathrm{mec}} \;=\; mc^2 \quad \text{and} \quad E_{\mathrm{el}}(r) \;=\; \frac{e \cdot e}{(4\pi\varepsilon_0)\,D} \;. \qquad (44)$$

The necessary constants for this project have already been explained above, thus a description is possible connecting gravitation with electrodynamics leading into a gravitoelectrodynamics, GED; both forms of energy together are necessary for the above-mentioned required stability during the time transition. It is explicit with

$$\delta_{\boldsymbol{i}} \;\triangleq\; 0.42\;209\;14\;5\;533\;218\;546 \cdot 10^{-93}\,\mathrm{m} \;,$$
$$\mu_{gr} \;\triangleq\; 11.59\;090\;90\;909\;09 \cdot 10^{+60}\,\mathrm{kg} \;,$$
$$e^2 \;\triangleq\; 25.\,66\;972\;19\;676\;59\;3 \cdot 10^{-39}\,\mathrm{C}^2 \qquad (45)$$

resulting into the real values

$$E_{\mathrm{el}}(r) \;=\; \frac{e \cdot e}{(4\pi\varepsilon_0)\,2 \cdot \delta_{\boldsymbol{i}}} \;\triangleq\; 0.12\;018\;82\;926\;19\;228\;6 \cdot 10^{+103}\;\mathrm{J_{el}} \;, \qquad (46)$$

$$E_{\mathrm{mec}} \;=\; \mu_{\mathrm{gr}} \cdot c^2 \;\triangleq\; 1.04\;173\;89\;571\;72\;212\;2 \cdot 10^{-75}\;\mathrm{J_{mec}} \;. \qquad (47)$$

A comparison

$$\frac{E_{\mathrm{el}}}{E_{\mathrm{mec}}} \;\triangleq\; 1.15\;372\;75\;417\;39\;231 \cdot 10^{+177} \qquad (48)$$

shows the tremendous effect of gravity compared to the electrostatic attraction of two *m*, but only at the very short and tiny distance $\delta_i$, while compared to gravitation, the electrostatic describes a long ranging effect. With increasing distance *D*, the effect of gravity is increasingly lost. This shows the enormous difference between gravitation and electrostatic. In considering the oscillation

$$E_{el} = \frac{h}{\tau} \equiv h \cdot \nu_{el} \quad . \tag{49}$$

makes clear transition requires the interaction or respective involvement of both forms of energy in accordance with

$$E_{mec} = E_{el}$$

→

$$\mu_{gr} \cdot c^2 = h \cdot \nu_{el} \quad . \tag{50}$$

Further, it is directly from eq. (43)

$$E_{el}(r, \omega) = \left[e^{(\vec{k} \cdot \vec{r} - \omega \cdot t)}\right] h \cdot v_{el} \equiv \left[e^{(\vec{k} \cdot \vec{r} - \omega \cdot t)}\right] \hbar \cdot \omega_{el} \tag{51}$$

and $\omega_{el} \longrightarrow \text{follows from } h\,v$. This denotes a superimposition of the gravitational flow. In electrodynamics it corresponds to a frequency modulation as energy-determined; how (*h* ν) gives an oscillation with respect to an amplitude modulation would not change the energy. The resistance in a transition from subluminal to superluminal state will not end the absolute amount of ***ω***, but this jump over this barrier requires enormous energy, which was shown. The interaction between the two gravitational streams is still determined from the electrostatics. It must be mentioned the transition via ***τ*** behaves a similar way to the distance

$$\Delta \tau \equiv +\tau - (-\tau) = +2\tau, \quad \Delta \delta \equiv +\delta_i - (-\delta_i) = +2\delta_i \tag{52}$$

justified from crossing the light barrier [9]. This statement must be taken into account in the calculation, otherwise the frequency of the transition can not be determined precisely. The resistance in a transition from subluminal to superluminal state will not end the absolute amount of ***ω***, but this jump over this barrier requires enormous energy, which was shown. The interaction between the two gravitational streams is still determined from electrostatics,

$$E(+t, -t) = E_{mec} + E_{el} \quad , \; \|\omega\| \; \text{constant} \quad ,$$
$$-E(+t, -t) = -E_{mec} + (-E_{el}) \quad , \; \|\omega\| \; \text{constant} \quad , \tag{53}$$

since the interaction acts perpendicularly or respective orthogonally. Further, it is directly from eq. (47)

$$E_{el}(r, \omega) = \left[e^{i(\vec{k} \cdot \vec{r} - \omega \cdot t)}\right] h \cdot v_{el} \equiv \left[e^{i(\vec{k} \cdot \vec{r} - \omega \cdot t)}\right] \hbar \cdot \omega_{el} \tag{54}$$

and $\omega_{el} \longrightarrow \text{follows from } h\,v$ and denotes superimposition of the gravitational flow. In electrodynamics this corresponds to a frequency modulation, which is energy-determined; how (*h* ν) gives an oscillation with respect to an amplitude modulation would not change the energy.

It must be mentioned the transition via ***τ*** behaves a similar way to the distance from

$$\Delta \tau \equiv +\tau - (-\tau) = +2\tau, \quad \Delta \delta \equiv +\delta_i - (-\delta_i) = +2\delta_i \tag{55}$$

justified from crossing the light barrier (**[9]** Gerlitz 2022). This statement must be taken into account in calculation, otherwise the frequency of the transition can not be determined precisely. An energy of $E_g$ is required to bring a real particle or respective body over the time barrier crossing regardless of the oscillating $E_{el}$ . The required values for the $E_{trans}(\delta, \boldsymbol{\tau})$ are found for the distance $\boldsymbol{\delta}$ and the transfer process will happen exactly in a time interval of $\boldsymbol{\tau}$. It must be included here that alpha is a constant [28, 29].

## 2 Temperature in time reversal

As already briefly mentioned above, what is briefly presented here applies to a time reversal

$$+T(+\Delta t) \longrightarrow +T(-\Delta t) \quad ! \quad , \qquad (5$$

with the condition there is no change in the state of aggregation, the following applies to the heat supplied to or given off from a body. The consideration is based on the Heat Capacity $Q$, and the specific heat capacity describes the state of the ideal gas with regard to the state variables with $m$ mass, $\zeta$ specific heat capacity, $\Delta T$ temperature change, and amount of substance or number of particles $n$ or mass $m$. It can be represented in various forms being equivalent to one another, with all of these forms describing the state of the system under consideration in the same way and unambiguously

$$Q = m \cdot \zeta \cdot R_m \cdot \Delta T \quad , \quad \zeta = \frac{\partial Q}{\partial T} \quad . \qquad (57)$$

However, it is obvious the including $m$ changes sign when comparing subluminarity to superluminarity from + to −, and this entails a change in the sign of $Q$ !

It is necessary for the heating process to be quasi-static, *i.e.*, very slow, so irreversible phenomena do not play a significant role during the process. More precisely it is the equilibrium heat capacity. From this follows indirectly the Thermal Equation of State or respective \`General Gas Equation´

$$p \cdot V = n \cdot R_m \cdot T \quad \longrightarrow \quad T = \frac{p \cdot V}{n \cdot R_m} \equiv \frac{(-p) \cdot (-V)}{n \cdot R_m} \qquad (58)$$

to describe the state of the ideal gas in relation to the state variables volume $V$, temperature $T$, amount of substance respective $n$, and mass $m$. It can be represented in various forms equivalent to one another with all these forms describing the state of the system under consideration the same way and unambiguously [30]. The Clapeyron equation can be specified for different phase boundaries and leads to the above equation

When heat is applied to a body, its temperature generally increases. When a body gives off heat its temperature will decrease. The number of degrees where the temperature of a body changes when a certain amount of heat is added or released also depends on the substance it is made of. The relationship between the change in temperature of a body and the heat it absorbs or releases is recorded in the basic equation of thermodynamics or respective basic equation of thermodynamics or equation for heat.

When the system jumps from subluminarity to superluminal speed the absolute values of both $p$ and $V$ will change in exactly the same way, certainly in inverse proportion. The same of course applies to their signs as well, which then both will change from plus to minus, like

$$+p \longrightarrow -p \quad , \quad +V \longrightarrow -V \quad . \qquad (59)$$

From this follows the statement $T$ does not change during the transition of the time intervals, *i.e.*, remains always positive and does not assume a negative amount. That does not mean a constant in $T$, rather $T$ has to oscillate according the conditions eq.(8) as long as the absolute temperature is not zero. This statement refers to the Heisenberg's uncertainty, which reveals an oscillation at the absolute zero point [31].

The existence and the value of the absolute zero point can be extrapolated or checked for plausibility from various contexts. Gay-Lussac´s first law [32] describes the relationship between temperature and volume of a gas – at absolute zero this gas volume would be zero. If one takes the thermal energy, which relates to the disordered movement of particles in macroscopic matter, to the lowest possible value, where, graphically speaking, the movement of particles can no longer be reduced; this means also to arrive at absolute zero. According to the Nernst theorem [33], or equivalently to the third law of thermodynamics, absolute zero cannot be reached. However, real temperatures can be realized indefinitely close to absolute zero. With laser cooling, samples could be cooled down to a few billionths of a Kelvin. The Kelvin scale is a ratio scale. Other temperature scales refer to an arbitrarily fixed zero point, such as the Celsius scale, whose zero point was originally the freezing point of water. Thermodynamic systems with infinite phase space cannot reach negative temperatures. However, if described a state of population inversion that is not a state in thermodynamic equilibrium, negative absolute temperatures would appear in the calculation describing the probability distribution. Such negative temperatures, then correspond to higher-energy, *i.e*., in a way "hotter" states.

Munich researchers experimentally achieved such negative values with an atomic gas. They have succeeded in falling below absolute zero by a billionth of a K. In order to achieve an inversion of the classical Boltzmann´s distribution [34]. The Nernst´s theorem, another name for the third law of thermodynamics, makes thermodynamic statements about the zero point in connection with entropy (see formula below).

It states the absolute zero point of temperature l – here 0 K (Kelvin scale), -273.15 degrees C (Celsius scale) – cannot be reached. The sentence can be proven with the help of quantum mechanics [35]. Perfect crystals reach a constant value for the zero point for the entropy, since the entropy according to the statistical definition as that with the Classically, this would be a state of immobility, but quantum uncertainty, according to Heisenberg statistics, dictates the particles still have finite zero-point energy. Perfect crystals attain a constant value at the zero point for entropy, since entropy is statistically defined as that with the Boltzmann constants multiplied logarithm of the number of possible microstates and there is only one possible realization of the observed macrostate. With (amorphous) glasses there are several realizations of a state with the same energy. It is impossible for any process, no matter how idealized, to reduce the entropy of a system to its absolute zero value in a finite number of operations via

$$\lim_{T \to 0} \Delta S = 0 \quad , \qquad (60)$$

the way the entropy is non-zero. At normal pressure all elements are solid at the zero point, apart from Helium, which is in a liquid or superfluid phase there [36].

As a result, a special mathematical formulation is required to prevent the absolute zero point from falling below, *i. e*, will not become negative if an oscillation in *T* is considered. This requirement is achieved in

$$T(\omega_t) = \|\omega t\| \pm \omega t \quad \longrightarrow \quad T(\omega_{\min}) = 0 \text{ or } 2\omega \quad , \qquad (61)$$

where the time variable ***t*** is compared with its minimum. The Heisenberg´s uncertainty requires a zero-point oscillation at absolute zero [31]. Absolute standstill does not exist - not even at absolute zero temperature, *i.e*. at minus 273.16 degrees Celsius. The laws of quantum mechanics require that the smallest particles, such as atoms and molecules, continue to move even after our everyday world has long since frozen. The motions of atoms near absolute zero physicists call quantum fluctuations. Gay-Lussac´s first law [32]. It describes the relationship between the temperature and the volume of a gas - at absolute zero this gas volume would be zero. If one takes the thermal energy, which relates to the disordered movement of particles in macroscopic matter, to the lowest possible value, where, graphically speaking, the movement of particles can no longer be reduced, one has also arrived at absolute zero.

According to the smallest and quantized unit of time ***τ***, a statement can of course be made about the oscillation around absolute zero of the temperatur $T_0$,

$$T(\omega, \tau) = T_0 \cdot \left[ e^{i(\vec{k} \cdot \vec{r} - \omega \cdot \tau)} \right] \hbar \cdot \omega \qquad (62)$$

satisfying the requirement of the Heisenberg´s uncertainty. This calculation is important but not decisive nor essential for the topics in this study.

## 3 Force between two gravitational currents

In this part of the investigation the analogy of gravitation to classical electrodynamics is presented. This supports the understanding of the expression in terms of gravitation Here, the Maxwell´s equations are used in order to treat the variables of gravitation mentioned above in a similar way. This results in an interaction between two "gravitational beams" in opposite directions to each other in mathematical description.

In regard of the two topics in this paper an amalgamation between electrodynamics / electrostatics and gravitation is essential, since this is to lead to the required gravitoelectodynamics: the interaction of both subjects in free space, displaying the "particle´s charges" *e* and $m_g$ the same as $\varphi_{el} \;\longrightarrow\; \varphi_g$. Therefore, the two classic basic equations required for this are now first written down. In electrostatic argument follows the Coulomb's law [37]

$$|\vec{F}_C| \quad \rightarrow \quad |\vec{F}_{el}| = \frac{1}{(4\pi\varepsilon_0)} \cdot \frac{\vec{q}_1 \cdot \vec{q}_2}{(\vec{D}_g)^2},$$

$$|\vec{F}_C| \quad \rightarrow \quad |\vec{F}_{el}| = \frac{1}{(4\pi\varepsilon_0)} \cdot \frac{\vec{q}_1 \cdot \vec{q}_2}{(\vec{D}_g)^2}, \tag{63}$$

On the other side, that of Newton applies to

$$\vec{F}_N \quad \rightarrow \quad \vec{F}_g = G \cdot \frac{\vec{m}_1 \cdot \vec{m}_2}{\vec{D}_g}. \tag{64}$$

Since the bodies under consideration are of the same mass and composition, the sub-indices can be waved. Hence, the statement follows from

$$|\vec{F}_C| \quad \rightarrow \quad |\vec{F}_{el}| = \frac{1}{(4\pi\varepsilon_0)} \cdot \frac{\vec{q}_1 \cdot \vec{q}_2}{(\vec{D}_g)^2} \tag{65}$$

into

$$|\vec{F}_{el}| = \frac{1}{(4\pi\varepsilon_0)} \cdot \frac{\vec{e}_1 \cdot \vec{e}_1}{(\vec{D}_e)^2} \equiv \frac{1}{(4\pi\varepsilon_0)} \cdot \frac{e^2}{(\vec{D}_e)^2}, \tag{66}$$

with **e** as the identical unit electrical charge of the electron and *m* can later be replaced from the graviton $\mu_g$. It must be strictly observed all these variables disclose vector characters, both for electric charge **e** and for matter in form of the mass *m*.

In electrostatics the forces are described using Coulomb's law [37]

$$I_{el} = \frac{q}{t}\,, \;\; \text{from} \quad \varphi_e(\vec{r}\,) = \frac{E_{pot}}{q}, \tag{67}$$

$$U_e = q \cdot \varphi_e(\vec{r}\,), \tag{68}$$

with electrical voltage $U_e$, electric flow $\varphi_g$, electrical potential energy $E_{pot}$.

Certainly, according to the comparison between electrodynamics and gravitation required here, *i. e.*, leading to gravitoelectrodydamics, the two constants

$$\frac{1}{(4\pi\mu_0)} \;\longrightarrow\; G \tag{69}$$

multiplicating the expressions for the forces must be compared with each other. With a time transition this leads to the expressions for the flux

$$\vec{\varphi}_e(e \leftrightarrow -e)\,, \qquad \vec{\varphi}_{m_g}(m_g \leftrightarrow -m_g) \tag{70}$$

with

$$\varphi_e = \frac{E_e}{e}\,, \quad \text{unit}\left[\frac{\mathrm{J}}{\mathrm{C}}\right]\,. \tag{71}$$

That attained

$$\vec{\varphi}_g = \frac{\vec{\mu}_g \cdot c^2}{e}\,, \quad \text{unit}\left[\frac{\mathrm{J}}{\mathrm{kg}}\right]$$

$$\vec{\varphi}_g = \frac{\vec{E}_g}{e} \equiv \frac{\vec{v}_{\min} \cdot h}{e} \equiv \frac{h \cdot 1/\Delta \vec{t}_{\min}}{e} \tag{72}$$

and is an important finding, since it opens up access to the gravitational flow $\varphi_e \longrightarrow \varphi_g$ as discussed below. Furthermore, expressions must be formulated which can translate the two formulations mentioned above into a negative period of time.

$$+\vec{F}_{el}(-\Delta t) = \frac{1}{(4\pi\varepsilon_0)} \cdot \frac{(+\vec{q}_1)\cdot(-\vec{q}_2)}{-\vec{D}_e} \equiv \frac{(+\vec{e}_1)\cdot(-\vec{e}_2)}{-\vec{D}_e}\,, \tag{73}$$

$$+\vec{F}_g(-\Delta t) = G \cdot \frac{(+\vec{m}_g)\cdot(-\vec{m}_g)}{-\vec{D}_g}\,. \tag{74}$$

It sounds astonishing: both forces remain positive during the transition from positive time to negative time. Since in the present theory the absolute values of *m* are the same for both interacting bodies, albeit in opposite signs, expression simplifying the last two expressions,

$$\vec{F}_{el} = \frac{1}{(4\pi\varepsilon_0)} \cdot \frac{\vec{e}_1 \cdot \vec{e}_1}{\vec{D}_e} \equiv \frac{1}{(4\pi\varepsilon_0)} \cdot \frac{e^2}{\vec{D}_e}\,, \tag{75}$$

$$\vec{F}_g = G \cdot \frac{\vec{m}_1 \cdot \vec{m}_1}{\vec{D}_g} \equiv G \cdot \frac{m^2}{\vec{D}_g}\,. \tag{76}$$

## 4 Maxwell equations

The Maxwell´s equations [22] are a special system of first-order linear partial differential equations. They can also be represented in integral form in differential geometric form and in covariant form. These are needed for further work, because understanding here is required and they are explicitly mentioned here,

$$\vec{\nabla} \cdot \vec{E} = \frac{\rho}{\varepsilon_0}\,,$$

$$\vec{\nabla} \cdot \vec{B} = 0 \quad ,$$

$$\vec{\nabla} \times \vec{E} = -\frac{\partial \vec{B}}{\partial \vec{t}} \quad ,$$

$$\vec{\nabla} \times \vec{B} = \mu_0 \cdot \vec{I} + (\mu_0 \varepsilon_0) \cdot \frac{\partial \vec{E}}{\partial \vec{t}} \quad . \tag{77}$$

At this point, it is not important to look only at the constants, $\mu_0 , \varepsilon_0$ , which, as multipliers, transfer the electric field *E* and the magnetic *H* into the SI units. All expressions presented here are vector equations, which consequently change the sign from plus to minus when there is a transition from subluminal to superluminal conditions. It should be noted here this is about a comparison and connection between classical electrodynamics and gravitation. Here, this is about a comparison and connection between classical electrodynamics and gravitation and essential to consider the angle $\boldsymbol{\vartheta}$ (see below), which makes the angles between *E* and *H* not appear perpendicular to each other in $\vartheta(e , g) \neq 0$ as described below. A desired transfer from electrodynamic equations into a gravitoelectrodynamics – the interaction of gravitation and electrostatics – therefore differs from Maxwell´s equations applying to free space, which means no external influence, *i. e.*, stemming from gravitation. When jumping over the light and time barrier, the angle $\boldsymbol{\vartheta}$ will reverse from plus into minus so the sum doubles in this regard. It seems amazing this small angle, revealed from the electrodynamics, is crucial. However, this is the cause of a real interaction of two gravitational beams in *I*.

In classical electrodynamics applies

$$\vec{H} \,\square\, \vec{E} \quad , \tag{78}$$

but in the ensemble action of gravitation and electrodynamics, together, results

$$\text{not} \ \ \vec{\boldsymbol{\xi}} \,\square\, \vec{\eta} \ , \ \ \text{but} \ \ \vec{\boldsymbol{\xi}} \,\square\, (\vec{\eta} \cdot \vartheta_e) \quad , \tag{79}$$

due to the angle $\boldsymbol{\vartheta}$ between the gravitational current $I_g$ and the influence of the electrostatic arround; this tiny angle can be visualized like a movement of the EMW in a waveguide, say “hollow conductor” (Fig. 5).

## 5 Gravitational flux

Actually, this "flux" is defined as the electrical potential in

$$\varphi_e = \frac{E_e}{e} \ , \quad \text{unit} \ \left[\frac{J}{C}\right] \quad . \tag{80}$$

Static electric fields $\vec{E}$ are turbulence-free, they can therefore be represented as a gradient of a scalar field. The negative scalar field

$$-\vec{\nabla}\, \varphi = \vec{E} \tag{81}$$

is called the electric potential. In the Heaviside-Lorentz system [38-40] simplified because of $\varepsilon_0 = 0$ the expression

$$\varphi(\vec{r}\ ) = \frac{q}{4\pi |\vec{r}\ |} \tag{82}$$

is valid. A gravitational flux $\varphi_g$ can be generated here from comparing it with the experiences from electrostatics. This definition in electrodynamics is an advantage since not only *m* is included here rather an electric charge **e**. This becomes important for the transfer of a real particle from the current positive time into a negative time from which the origin of *m* and real matter from Nothing can later be explained. It follows

$$\vec{\varphi}_e \longrightarrow -\vec{\varphi}_e$$

$$\vec{\varphi}_e(e \leftrightarrow -e), \qquad \vec{\varphi}_{m_g}(m_g \leftrightarrow -m_g) ,$$

$\rightarrow$

$$\vec{\varphi}_e = \frac{\vec{E}_e}{e} , \quad \text{unit} \left[\frac{\mathrm{J}}{\mathrm{C}}\right]$$

$\rightarrow$

$$\varphi_g = \frac{\mu_g \cdot c^2}{e} , \quad \text{unit} \left[\frac{\mathrm{J}}{\mathrm{kg}}\right]$$

$\rightarrow$

$$\vec{\varphi}_g = \frac{\vec{\mu}_g \cdot c^2}{e} , \quad \text{unit} \left[\frac{\mathrm{J}}{\mathrm{kg}}\right]$$

$\rightarrow$

$$\vec{\varphi}_g = \frac{\vec{E}_g}{e} \equiv \frac{\vec{v}_{\min} \cdot h}{e} \equiv \frac{h \cdot 1/\Delta \vec{t}_{\min}}{e} . \tag{83}$$

The constants such as $\Delta t_{\min}$ have already been determined above. Furthermore, the superluminarity should be included in considering *φ*. Since the field $\vec{E}(\vec{r})$ is turbulence free a reversal in time will change the field $\vec{E}$ from positive to negative as previously predicted [9]. This statement entails a similar reversal in the sign of ***φ***, per

$$-\vec{\nabla}\varphi = \vec{E} \quad \longrightarrow \quad +\vec{\nabla}\varphi = -\vec{E} , \tag{84}$$

$$\varphi^{-}(\vec{r}) = \frac{-q}{4\pi|\vec{r}|} . \tag{85}$$

In the same extent the direction is reversed giving evidence to

$$\vec{E}(-\vec{r}) \quad \longrightarrow \quad -\vec{E}(\vec{r}) . \tag{86}$$

So the expression for the flux $\vec{\varphi}$ ,

$$\vec{\varphi}_g = \frac{\vec{E}_g}{e} \equiv \frac{\vec{v}_{\min} \cdot h}{e} \equiv \frac{h \cdot 1/\Delta\vec{t}_{\min}}{e} \qquad (87)$$

splits into the two cases

$$\vec{\varphi}_g^{\,+} = \frac{+\vec{E}_g}{e} \equiv \frac{+\vec{v}_{\min} \cdot h}{e} \equiv \frac{h \cdot 1/(+\Delta\vec{t}_{\min})}{e} \quad , \qquad (88)$$

$$\vec{\varphi}_g^{\,-} = \frac{-\vec{E}_g}{e} \equiv \frac{-\vec{v}_{\min} \cdot h}{e} \equiv \frac{h \cdot 1/(-\Delta\vec{t}_{\min})}{e} \quad . \qquad (89)$$

All variables, including the frequency, are vectors, even if, for example, the frequency does not change in its absolute value. The here represented phenomenon affects the gravitational current the same way,

$$I_g^+(\vec{D}) \leftrightarrow -I_g^-(\vec{D}) \quad . \qquad (90)$$

It is very prominent at this point the angle ***ϑ*** of the two! involving GW. These are identical in absolute value, but they change in sign as well. In time reversal this means the two vectors $\vec{r}$, being positive and negative, not parallel during the propagation of the GW, but will differ each in their angle $\vartheta_g$ in

$$+\vartheta \cdot r \leftrightarrow -\vartheta \cdot r \quad \longrightarrow \quad +\vartheta - (-\vartheta) = +2\vartheta \quad . \qquad (91)$$

This angle is very significant for the components *Y* and *Z*, while the time vector $\vec{X}_0$ in the direction of the wave *X* is strictly coupled with the propagation direction of the GW though distorted due to this influence causing an oscillation in $\vec{\omega}_g$. The fact in a time transition proves the vectors *Y* and *Z* reverse in their signs. In this way the GW reverses its movement from a "right-turning system" into a "left-turning",

$$+Y(+\vartheta), +Z(+\vartheta) \longrightarrow -Y(-\vartheta), -Z(-\vartheta)$$

$$\vec{\omega}_{y,\,z}: \quad \omega^+(+Y,+Z)\,,\ \vec{\varnothing} \ \longrightarrow \ \omega^-(-Y,-Z)\,,\ \overleftarrow{\varnothing} \quad . \qquad (92)$$

It is evidently this is determined via the angle

$$\vartheta \approx 0\ 10\ 803\ 07\ 851\ 63\ 676 \cdot 10^{-6}\,{}^{\circ}$$

and the difference, respective it is the sum of both of the sides regarding sub- and superluminarity

$$2\vartheta(x,z) \approx 0\ 21\ 606\ 15\ 703\ 27\ 352 \cdot 10^{-6}\ \ulcorner \quad . \qquad (93)$$

This numerical value indicates a connection to the rotation of the GW. It is amazing such a determining effect of the incredibly tremendous effect in gravitation is so low and tiny in comparison to the sense of the vividly formulated “gravitational screw” [10. 11] in propagation at $v_g \cong c$; this means the propagation speed of a GW does not necessarily have to correspond to that of an EW.

In comparison to the strong effect of gravity – at relatively short distances – the influence of electrostatics is tiny. This connection / interaction can be visualized in the form of a big screw forming the gravitational current with turns constituting the distance between them. The latter follows from the angle ***ϑ***, measured from the center of the "gravity screw". Since ***ϑ*** results from electrostatics, it is tiny and very delicate, almost vanishingly small, which seems feeble. The distance $D_{el}$ between these “rings” around the strong gravitational current, the gravitational screw, is just as tiny. The $\vartheta$ , entailed from electrostatics, therefore means the enclosing threads in this descriptive notation have a gradient of $\vartheta$, albeit a very small one (Fig. 6). At a time transition from positive to negative time interval

$$\Delta t^{+}_{g,e}(+\vec{D}) \leftrightarrow \Delta t^{-}_{g,e}(-\vec{D}) \tag{94}$$

is the consequence a right turn changes to the left turn, and the two angles (positive and negative) $\vartheta$ and slope under the transition

$$\Delta t^{+}_{g,e}(+\vec{D}) \leftrightarrow \Delta t^{-}_{g,e}(-\vec{D}) \tag{95}$$

changes from positive to negative values in the sign of the time interval

$$\vartheta^{+}(+\Delta t) \leftrightarrow \vartheta^{-}(-\Delta t) \quad , \tag{96}$$

but the absolute amounts will remain exactly the same. It is up to note the two $m$ under consideration do not get too close in their interaction distance $D$, otherwise they will cancel each other out. The angle $\vartheta$ is at a certain angle between gravitational flow $\varphi$ and current $I$ to the electrostatic interaction. This looks, figuratively speaking, as if this angle forms an aslant connection like the propagation of an EW inside a waveguide (a hollow conductor) of an EMW (Fig. 3). The time barrier mentioned above plays a major role here.and permits a

$$+\vec{m}(+\mathrm{v},+D) \rightarrow +\vec{m}(-\mathrm{v},-D) \quad . \tag{97}$$

## 7 Gravitation with electrostatics

As already explained, the alternating angle exists between two gravitational currents. This says

$$\vartheta(e,g) \neq 0 \tag{98}$$

as already explained, the alternating angle exists between two opposite gravitational movements currents and means the vectors $\vec{r}_g(x),\ \vec{r}_e(z)$ are, of course not parallel to each other, but rather

$$|\vec{r}_g(x)| \neq |\vec{r}_e(z)| \quad . \tag{99}$$

This meaning is very decisive, because as a result of gravitation the two interacting massive bodies $m$ are pressed together in the direction of propagation $x$, *i.e.*, squeezed [11]. As a result, the relations $x$ to $z$ will differ significantly if the distance between them is relatively small, such as

$$|\vec{r}_g(x)| \ll |\vec{r}_e(z)| \tag{100}$$

Regardless of the angle $\vartheta$ the two directions of these components are almost perpendicular to each other. A simple comparison or even the addition of the two forces

$$\vec{F}_g(x,\omega)\ ,\quad \vec{F}_e(z,\vartheta) \tag{101}$$

as in their absolute values – without considering the frequency $\omega$ and the angle $\vartheta$ – is therefore out of question; otherwise a complete description in the gravitoelectrodynamics, GED mentioned here,

$$\vec{F}_g(x,\omega)\ ,\quad \vec{F}_e(z,\vartheta) \longrightarrow \vec{F}_g(x,\omega_T)\ ,\quad \vec{F}_e(z,\vartheta) \tag{102}$$

is not possible. Due to these circumstances arises

$$x \ll z,\quad \vec{r}_g(x) \ll \vec{r}_e(z) \quad ,$$
$$\vec{F}_g(x,\omega_T) \ll \vec{F}_e(z,\vartheta)\ ,\quad \text{for very short } D \quad . \tag{103}$$

In an unpretentiously pictorial representation and at a very close and short interaction distance $D$ between both of the two considered massive bodies $m$ this can be viewed as two coins: both having a “height” $z$ and a “diameter” of $x$. This is explained from the fact the effect of gravity is a short-range interaction over electrostatic interaction showing long-range interaction. In that case this squeezing causes an advantage of electrostatics over the influence of gravity. of course, the absolute amount of all space coordinates, describing an average radius of the particle, remains unchanged. As *D* increases both bodies will approach more and more an equalizing spherical shape [11].

## 8 Maxwell´s equations in gravitation space

In order to obtain a reference to gravity important for a description of the coupling to electrodynamics the Maxwell´s equations must be set up with regard to gravity. The electric and magnetic fields can be represented in field lines. In SI units the electric field is represented in the fields of electric flux density $\vec{D}$ and the magnetic flux density $\vec{B}$ in

$$\vec{D} = \varepsilon_0 \cdot \vec{E}\ , \qquad \vec{B} = \mu_0 \cdot \vec{H} + \vec{J} \quad . \qquad (104)$$

For electrical and magnetic susceptibilities applies

$$\frac{1}{\sqrt{\varepsilon_0 \cdot \mu_0}} = c \quad \text{with} \quad \varepsilon_0 = \frac{e^2}{2hc\alpha} \quad , \qquad (105)$$

$$\frac{\varepsilon_0 \cdot \mu_0}{1} = \frac{1}{c^2} \quad \longrightarrow \quad \mu_0 = \frac{2h\alpha}{c \cdot e^2} \quad . \qquad (106)$$

Supplementary explanations regarding the interaction of the EMW are useful to support a detailed understanding.

In the magnetic-charge model, the pole surfaces of a permanent magnet are imagined to be covered with so-called magnetic charge, north pole particles on the north pole and south pole particles´ on the south pole and are the source of the magnetic field lines. The field due to magnetic charges is obtained from the Coulomb´s law with magnetic instead of electric charges. If the magnetic pole distribution is known the pole model will give the exact distribution of the magnetic field intensity *H* both inside and outside the magnet. The surface charge distribution is uniform, if the magnet is homogeneously magnetized and has flat end facets such as a cylinder or prism. Hence, the interaction force discribes for repulsion up-index (−) and attraction up-index (+) the two possible expressions

$$F^{-}_{\text{magn}} = \frac{\mu_0 \cdot (+q_{m_1}) \cdot (+q_{m_2})}{\pi r^2} \overset{\leftrightarrow}{=} \frac{\mu_0 \cdot (-q_{m_1}) \cdot (-q_{m_2})}{\pi r^2} \quad , \qquad (107)$$

$$F^{+}_{\text{magn}} = \frac{\mu_0 \cdot (+q_{m_1}) \cdot (-q_{m_2})}{\pi r^2} \overset{\leftrightarrow}{=} \frac{\mu_0 \cdot (-q_{m_1}) \cdot (+q_{m_2})}{\pi r^2} \quad , \qquad (108)$$

with *q* the magnitudes of magnetic charge on magnetic poles (SI unit A · m). It becomes evident from this repulsion occurs in case of parallel currents (Figs. 1, 7, 9), whereas attraction shows from counter currents, *i. e.*, in opposite direction to each other. Though, the electric charge is in fact quantized in the elementary **e**, which is consistent with (but does no prove) the existence of monopoles. The mechanical force between two nearby magnetize surfaces can be calculated in the following. This is valid only for cases the effect of fringing is negligible and the volume of the air gap is much smaller rather than the magnetized material. The force for each magnetized surface is

$$F = \frac{\mu_0 \vec{H}^2 \cdot A}{2} \equiv \frac{\vec{B}^2 \cdot A}{2} ; \quad H : \left[ \frac{A}{m} \right] , \; B : \left[ T \right] \quad , \qquad (109)$$

$$\mu_0 = 4\pi \cdot 10^{-7} \left[ \frac{T \cdot m}{A} \right] \quad . \qquad (110)$$

## 9 Current flow

Although, the basic considerations relating to electrophysics are well known an introduction to the comparison to a gravitational current $I_g(X)$ is essential. Such a consideration enables a relationship between electrophysics and gravitation in relation to their currents $I_{el}(X) \leftrightarrow I_{gr}(X)$. The current intensity always refers to a suitably selected oriented area, *e. g.*, the cross-sectional area of a conductor, convection current, or the cross-section of a capacitor, displacement current. In the simplest case of a constant current flow its intensity is the amount of charge flowed through the cross-section and is related to the period of time under consideration. In electrophysics the unit Ampère $1A = \left[ \frac{1C}{s} \right]$ is defined as the strength of a time-constant $\Delta t$ electric current flowing through parallel and straight conductors spaced 1 m apart. This causes a $F_{el}(X) = 2 \cdot 10^{+7} N$ between these conductors per 1 m cable length. The cross-section of the considered conductor should be negligibly small and located in a vacuum. For a charge of **e** flow is $I_{el} = \frac{\Delta q}{\Delta t}$ passing through an oriented surface *A*. The unit of electric current is the Ampère

$$1A = \left[ \frac{1C}{s} \right] \qquad (111)$$

as the same in SI unit of the derived variable magnetic flux leading to an electrical current. In a certain respect this suggests a gravitational current

$$I_{el}(X) = \frac{\Delta q_{el}}{\Delta t_{el}} \quad \leftrightarrow \quad I_{gr}(X, \vartheta_{X,Z}) = \frac{\Delta q_{gr}}{\Delta t_{gr}} \quad , \quad \Delta t_{el} \neq \Delta t_{gr} \quad ,$$

with

$$\Delta q_{el} = (+e) - (-e) \equiv +2e \; , \; \Delta q_{gr} = (+\mu_g) - (-\mu_g) \equiv +2\mu_g \; ,$$

$$\Delta q_{gr} = (+\mu_g) - (-\mu_g) \equiv +2\mu_g \qquad (112)$$

in the assigned unit

$$I_g(X, \vartheta) \longrightarrow 1A_{gr} = \left[ \frac{1\,kg}{s} \right] \quad . \qquad (1$$

.Here, a kind of “gravitational Ampère” was chosen for A in order to reveal the distinction

$$1A_{el} = \left[ \frac{1C}{s} \right] \quad \leftrightarrow \quad 1A_{gr} = \left[ \frac{1\,kg}{s} \right] \quad , \qquad (114)$$

→

$$I_{\mathrm{el}}(x) = \frac{\Delta q_{\mathrm{el}}}{\Delta t_{\mathrm{el}}} \quad \leftrightarrow \quad I_{\mathrm{gr}}(x, \vartheta_{x,z}) = \frac{\Delta q_{\mathrm{gr}}}{\Delta t_{\mathrm{gr}}} \quad , \quad \Delta t_{\mathrm{el}} \neq \Delta t_{\mathrm{gr}}$$

$$I_{\mathrm{gr}}(x, \vartheta_{x,z}) = \frac{\Delta q_{\mathrm{gr}}}{\Delta t_{\mathrm{gr}}} \quad , \quad \Delta t_{\mathrm{el}} \gg \Delta t_{\mathrm{gr}} \text{ for } D_x \cong 2 r_e(x) \tag{115}$$

with $r_e \longrightarrow m(r)$, because *m* determining the body or particle's size is a function of the inner radius determined from electrostatics [10],

$$\vec{r}_e = \begin{bmatrix} F_g(x) \rightarrow r_e \leftarrow F_g(x) \\ F_g(y) \leftarrow r_e \rightarrow F_g(y) \\ F_g(z) \leftarrow r_e \rightarrow F_g(z) \end{bmatrix} \longrightarrow \vec{m}_e = \begin{bmatrix} m_e(x) > m_e(z) \\ m_e(y) < m_e(x) \\ m_e(z) < m_e(x) \end{bmatrix} \tag{116}$$

with regard to

$$\underset{x \rightarrow \infty}{F_g}(x) = F_{\mathrm{el}}(x) \tag{117}$$

This is the result of a squeezing in *x*-direction propagation of the wave to a particle from influence of gravity, if that is effective "nearby". At large distances, already mentioned, the electrostatic predominates. This effect is long-ranging, which is related to later statements at the borders of the two universes. At faster than light speed, *i.e*. when crossing the time barrier the result is

$$\vec{r}_e^{\,-} = \begin{bmatrix} F_g(x) \leftarrow r_e \rightarrow F_g(x) \\ F_g(y) \rightarrow r_e \leftarrow F_g(y) \\ F_g(z) \rightarrow r_e \leftarrow F_g(z) \end{bmatrix} \longrightarrow \vec{m}_e^{\,-} = \begin{bmatrix} m_e(x) < m_e(z) \\ m_e(y) > m_e(x) \\ m_e(z) > m_e(x) \end{bmatrix} . \tag{118}$$

## 11 Separation of time and space

The above results show, especially on the distances, an integration via *r* or $D_x$ according to the GR is not necessary. Here it has to be repeated with the acceleration, i.e., expansion of the universe for the calculation m in the equations compared cancelling each other out. In addition, the large $D_x$ lead to a disappearance of $\vartheta(x, z)$ and the entire further calculation can be continued on the basis of pure electrostatics. Such a basis allows separation of space and time in a separation approach

$$\psi(r, t) = R(r) \cdot T(t) \tag{119}$$

similar to quantum theory can be set up. In contrast to the simpler descriptions of wave equations given above, the normalization constants are included here. The original form of a wave is natural

$$\psi(x, t) = A \cdot \mathrm{e}^{(k_x \cdot x - \omega_x \cdot t_x)} \equiv A \cdot \mathrm{e}^{(k_x \cdot x)} \cdot \mathrm{e}^{(-\omega_x \cdot t_x)} \tag{120}$$

separated into

$$R(x) = \frac{1}{\sqrt{N_r}} \cdot e^{(k_x \cdot x)} \quad \text{and} \quad T(t) = \frac{1}{\sqrt{N_t}} \cdot e^{(-\omega_x \cdot t_x)} \tag{121}$$

with the normalization constants

$$\frac{1}{\sqrt{N_r}} \quad \text{and} \quad \frac{1}{\sqrt{N_t}} \quad . \tag{122}$$

in accordance to general quantum mechanics.

A representative and simultaneously descriptive example in electrophysics / atomic physics is the ortho-normalized orbital for the ground state of the H-atom

$$\psi_{100} = \sqrt{\frac{4Z^3}{a_0^3}} \cdot e^{-\frac{Zr}{a_0}} \cdot \sqrt{\frac{1}{4\pi}} \quad . \tag{123}$$

As known the radial function R is the same for all values of the magnetic quantum number m. The angle-dependent functions Y are independent of the principal quantum number n.

Though, the vectors for space in propagation *x* and time are parallel in *x*-direction there is still the interaction in the orthogonal *z* for electrostatic interaction. This consideration as a statement seems to sound superfluous, but both wave functions, *i. e.*, for space and time are square integrable and linear as required in quantum theory to prove a steady state. Such behavior will be a condition for a standing wave within the light chamber, time-limiting structure within a period of time, developing and signifying. The same as in the intensity

$$I_\psi \equiv (\psi(x,t))^2 \rightarrow \| (\psi(x,t))^2 \| = A^2 \cdot e^{2 \cdot (k_x \cdot x - \omega_x \cdot t_x)} \tag{124}$$

becomes true for the two existing and separated waves for running space *R* and time *T*;
a roll out leading to the time chamber a half-wave is captured (trapped) and occupied inside (Fig.9). This is explained in detail.

## 12 Energy of an electromagnetic wave

Before a discussion about the passage of time or the origin of an *m* from the Nothing can be pursued further requiring some explanation in relation to an oscillating wave, EMW in relation to the gravitational wave, GW in strict relation to the EMW. The EM “far-field” is composed of radiation free of the transmitter in the sense the transmitter requires the same power to send these changes in the fields out (Figs. 10, 11), whether the signal is immediately picked up or not. This is a distant part of the EM field in radiation. These fields propagate and radiate without allowing the transmitter to affect them and causes be independent in the sense their existence and energy. After they have left the transmitter they are completely independent of both transmitter and receiver. Due to conservation of energy, *i.e.*, the amount of power passing through any spherical surface drawn around the source is the same. Because such a surface has an area ***A*** proportional to the square of its distance from the source. The power density of EMW radiation always decreases with the inverse square of *D* from the source called the inverse-square law, and this is important to note (see above). This discloses the contrast to dipole parts of the EMW field close to the near-field source varying in power according to an inverse cube power law. Thus, there is no transport of a conserved amount of energy over *D*. Instead it fades with increasing *D* (see above), the energy rapidly returning to the transmitter or absorbed by a nearby receiver.

The far-field depends on a different mechanism for its production than the near-field, and upon different terms in Maxwell's equations. Whereas the magnetic part of the near-field is due to currents in the source, the magnetic field in EMR is due only to the local change in the electric field. In a similar way, while the electric field in the near-field is due directly to the charges and charge-separation in the source, the electric field in EMR is due to a change in the local magnetic field. Both processes for producing electric and magnetic EMR fields have a different dependence on distance than do near-field dipole electric and magnetic fields. That is why the EMR type of EM field becomes dominant in power "far" from sources. The term "far from sources" refers to how far from the source (moving at the speed of light) any portion of the outward-moving EM field is located (see, *e.g*., Figs. 11, 12). With increasing time that source currents are changed from the varying source potential, and the source has therefore begun to generate an outwardly moving EM field of a different phase. The important fact is the energy balance described

$$c \quad \frac{1}{\sqrt{\left(8.85\cdot 10^{-12}\frac{\mathrm{C}^2}{\mathrm{N}\cdot\mathrm{m}^2}\right)\left(4\pi\cdot 10^{-7}\frac{\mathrm{T}\cdot\mathrm{m}}{\mathrm{A}}\right)}} \;\triangleq\; 0.29\ 979\ 24\ 58\cdot 10^{+9}\ \mathrm{m/s} \tag{125}$$

demanding the energy balance described

$$U_{\mathrm{el}} = \frac{\varepsilon_0\cdot E^2}{2} + \frac{B^2}{2\mu_0} \quad , \tag{126}$$

$$U_{\mathrm{el}} \quad \longrightarrow \quad \frac{\partial U}{\partial t} + \nabla\cdot\rho_{\mathrm{Energy}} = E\cdot J \quad , \tag{127}$$

with *U* the density of the conserved quantity and

$$\rho_{\mathrm{Energy}} = \frac{1}{2}\left(\vec{E}\cdot\vec{D} + \vec{H}\cdot\vec{B}\right) \equiv \frac{\varepsilon_0}{2}\left(E^2 + c^2\cdot B^2\right) \quad ,$$

↔

$$\rho_{\mathrm{Energy}} = \frac{\vec{E}\ \square\ \vec{B}}{\mu_0} \tag{128}$$

the flux of it. However, the scalar product $E\cdot J$ is the rate per unit volume where electric charge gain energy via interaction between the EM fields. The associated Pointing´s vector reads

$$\vec{S} = \vec{E}\ \square\ \vec{H} \quad ,$$

$$\vec{S}^{\,+} = \vec{E}^{\,+}\ \square\ \vec{H}^{\,+} \ \overset{\leftrightarrow}{=}\ \vec{E}^{\,-}\ \square\ \vec{H}^{\,-} \quad , \tag{129}$$

the electrodynamic power flow in propagation direction, meaning ***c***.

In the last version a clear statement can be recognized in relation to the propagation speed ***c***, a constant not become negative and does not run back. So, in a posi-verse exactly as in a nega-verse this constant ***c*** will be described being the same !

With regard to the interaction obviously determining long-ranging *D* due to pure electrostatic the task now consists of finding out a certain distance $D_{\mathrm{el}}(r_B, r_T)$ within the space in between, the light-chamber. First, per eq. (75) recalls

$$\vec{E}_{\mathrm{el}}(D) = \frac{(-e)\cdot(+e)}{(4\pi\,\varepsilon_0)\vec{D}} \equiv \vec{m}_e\cdot c^2 \quad ,$$

and exclusive

$$E_{\mathrm{el}}(D_x) = \frac{(-e)\cdot(+e)}{(4\pi\,\varepsilon_0)D_x} \equiv m_{e,x}\cdot c^2 \quad . \tag{130}$$

The angle $\vartheta$ gradually disappears with increasing *D* since the effect of gravity outweighs the long-ranging electrostatic interaction since at these large *D* between the interacting bodies and these particles behave like ideal spherical objects; a comparison of the two *E* follows later. As a result of the entire consideration and discussion applies

$$|E_{\text{mec}}(x)| \sim |E_{\text{el}}(z)| \quad \longrightarrow \quad |a_x \cdot E_{\text{mec}}(x)| = |a_z \cdot E_{\text{el}}(z)| \quad ! \tag{131}$$

A comparison of the *E* will follow later. It appears to result in a negative *m*, which is not critical as in the chamber this is a standing wave. Though, the distances are actually determined from each other at the transition of the two universes the quantized time constant $\boldsymbol{\tau}$ points to other possibilities. An equating with eq. (129) and

$$E_{\text{el}}(D_x) = \frac{h}{\boldsymbol{\tau}_x} \equiv h \cdot \nu_{\text{el},x} \equiv \frac{h \cdot c}{\lambda_x} \tag{132}$$

shows

$$\frac{-e^2}{(4\pi\varepsilon_0) D_x} = \frac{h}{\boldsymbol{\tau}_x} \equiv m_{e,x} \cdot c^2 \equiv \frac{h \cdot c}{\boldsymbol{\lambda}_x}$$

→

$$-\frac{(4\pi\varepsilon_0) D_x}{e^2} = \frac{\boldsymbol{\tau}_x}{h} \equiv \frac{\boldsymbol{\lambda}_x}{h \cdot c}$$

→

$$\boldsymbol{\lambda}_x = -\frac{(4\pi\varepsilon_0) h c \cdot D_x}{e^2} \equiv \boldsymbol{\tau}_x \cdot c$$

→

$$½\,\boldsymbol{\lambda}_x = -\frac{(4\pi\varepsilon_0) h c \cdot D_x}{2e^2} \equiv \frac{\boldsymbol{\tau}_x \cdot c}{2} \quad , \tag{133}$$

the half-wave seeking for the inside of the light / time chamber. From this, of course, the $D_x$ separating the two fictitious plates (as with a plate capacitor) and limited due to the two speeds of light can be determined.

## 13 Light chamber

Within this space, a standing half-wave forms, figuratively speaking, an oscillating between and inside the both sides. This wave can be normalized, comparable to quantum theoretical representations. In contrast, outside of the two fictive “plates” shown this light-chamber, EMW randomly crash into the outside comparable in the Casimir performance (Fig.1); these outside-waves cannot be localized, not be normalized, either. Thus, no real *m* can be assigned to the outer EMW as with a standing well inside the light-chamber implying and originating such a real *m* or respective matter. If such a stationary, time-independent state is given, an *m* can be clearly assigned to the wave via the frequency and the associated wavelength $\boldsymbol{\lambda}_x = \boldsymbol{\tau}_x \cdot c$ is known. Hence, the electrostatic *m* inside the light-chamber gives

$$\boldsymbol{\lambda}_x = \boldsymbol{\tau}_x \cdot c \quad \longrightarrow \quad \nu_x = \frac{c}{\boldsymbol{\lambda}_x} \equiv \frac{1}{\boldsymbol{\tau}_x}$$

associated

$$m_e \longrightarrow \mu_e = \frac{E_e}{c^2} \equiv \frac{h \cdot v_e}{c^2} \triangleq 0.19\ 339\ 60\ 010 \cdot 10^{-6}\,\mathrm{kg} \quad , \qquad (134)$$

an Electronium, the lightest electromagnetic, *i.e.*, electrostatic *m* discernible within both borders of time or respective light barrier [9 – 11]. This is reminiscent of the smallest *m* particle, the graviton $\mu_g$. Starting from these explained basic conditions the theory allows say how matter can generate from the Nothing as the same applies to time transition

$$\underbrace{+\Delta t \quad \leftrightarrow \quad -\Delta t}_{\longrightarrow \text{ time transfer } \longleftarrow} \quad , \qquad (135)$$

since both topics are linked in space-time. Due to the completeness the associated

$$E_e = h \cdot v_e \equiv \mu_e \cdot c^2$$
$$\triangleq 17.38\ 156\ 57\ 445\ 74 \cdot 10^{+9}\,\mathrm{J} \equiv 0.10\ 848\ 71\ 521\ 57 \cdot 10^{+30}\,\mathrm{eV} \qquad (136)$$

exposes the *E* for a transfer across, *i. e.*, entering and leaving the light barrier / chamber. (Fig.2). The latter figure exemplifies the ratio of the two vectors perpendicular to each other, ***α*** and *G*.

## 14 Electrical and gravitational potentials

For further discussion, a description of the two potentials $\phi_{\mathrm{el}}, \phi_{\mathrm{gr}}$ – electrostatic and gravitational – is required for a detailed and clear understanding. Of course, this also includes the electrical (voltage) and gravitational tensions regarding the two different phenomena a performance ultimately calculates. These are

$$\phi_{\mathrm{el}} = \frac{1}{(4\pi\varepsilon_0)} \cdot \frac{q_{\mathrm{el}}}{r_{\mathrm{el}}} \;, \left[\frac{\mathrm{J}}{\mathrm{C}}\right] \quad \text{with} \quad r_{\mathrm{el}} \gg r_{\mathrm{gr}} \quad , \qquad (137)$$

$$\phi_{\mathrm{gr}} = G \cdot \frac{m_{\mathrm{gr}}}{r_{\mathrm{gr}}} \;, \left[\frac{\mathrm{J}}{\mathrm{kg}}\right] \quad \text{with} \quad r_{\mathrm{gr}} \ll r_{\mathrm{el}} \quad . \qquad (138)$$

## 15 Gravitation wave character and atoms created from Gravitation

It should be noted that a gravitational wave exists and is created, similar to that in electrodynamics. This is not superfluous since a gravitational wave has – outside the time chamber – a huge power and great influence on the events, because the energy to create the conditions inside the chamber comes from the outside.

## 16 Time barrier

The time barrier or respective light barrier, provides the gap between the electrically positively charged and the co-particle $m_{\mathrm{B}}, m_{\mathrm{T}}$ [9] at a transition from sub- to superluminarity as required. The *m* has or is connected to the electrical charge e,

$$m_{g,e} = m \cdot e \quad . \qquad (104)$$

It is then possible in a way to “pull over” a certain amount of *m*. Otherwise this transition would be impossible, since the gravitational effect alone does not achieve this. It is certain the two m delete each other, they cancel each other out and therefore disappear. In this case, this would lead to an appearance of both *m* to a zero, *i.e.*

Nothing, without radiation and no "big bang". That would contradict the emergence of *m* from the Nothing. Therefore, the distance $\vec{D}_{\text{light}}$ must now be determined to allow where such a transition can take place. The same applies to the time transition from a positive time interval to a negative one. in this task it must not be forgotten both time and distance between the two observed and alternating bodies oscillates due to the superimposition – gravity and electrostatic – albeit the latter a very small one, due to the electrostatic influence $\omega_{\text{el}}$. The distance has already been calculated as

$$\delta_i \triangleq 4.22\,091\,45\,332\,185\,46 \cdot 10^{-94}\,\text{m}$$

in above. This distance is the absolute prerequisite for a time transition and the origin of *m* out of the Nothing. Although, this is actually an approximation in terms of the influence of electrostatics it is valid because at such a short distance gravity produces tremendous influence. The transition from positive space-time to a negative space over a distance $\boldsymbol{\delta}$ will not take place in zero time, $\Delta t \neq 0$, but exactly in the time described in $\boldsymbol{\tau}$.

## 17 Energy

When considering the total energy in an interaction between two bodies, $m_B, m_T$ the two active energies for the actual gravitation beam, caused between the two m and the one resulting from the electrostatics, have to be related to the two electrical elementary charges $e_B^+, e_T^-$. The gravitational stream or I-beam $\vec{I}_{g,e}(\vec{r}_x)$ moves in the x-direction, but is superimposed due to the charge-carrying bodies. The "curl" influences emerge through the electrodynamics. This means, clearly this main ray is surrounded by a kind of rings, which are generated from the two vectors of y and z and emerge. The subsequent calculation must be carried out very precisely, since both of the factors mentioned here produce the result together. For these orthogonal “curl rings” applies

$$E_{\text{el}} = \frac{h}{\boldsymbol{\tau}} \equiv h \cdot \nu_{\text{el}}$$

→

$$E_{\text{el}}(r, \omega) = \left[ e^{i(\vec{k} \cdot \vec{r} - \omega \cdot t)} \right] h \cdot \nu_{\text{el}} \equiv \left[ e^{i(\vec{k} \cdot \vec{r} - \omega \cdot t)} \right] \hbar \cdot \omega_{\text{el}} \quad . \qquad (105)$$

In the last formula it should be emphasized the variables *ω* and *t* have vector characters

$$\vec{\omega}(y, z) \quad \text{and} \quad \vec{t}(x) \quad , \qquad (106)$$

which would mean their scalar product would lead to

$$\vec{\omega}(y, z) \cdot \vec{t}(x) = 0 \quad \text{without} \quad \vartheta \quad , \qquad (107)$$

a disappearance and vanishing of the "electromagnetic rings" around the gravitational flow and gravitational current *I* propagating in the *x*-direction in free space. However, in the current theory, considering and including this angle leads to a slight interference between the two vectors applying

$$\vec{\omega}(y, z) \cdot \vec{t}(x) \neq 0 \quad \text{follows} \quad \vartheta \quad , \qquad (108)$$

and the "electromagnetic rings" around the gravitational current remain, of course in both directions, *i.e.*, positive and negative. Although this angle $\vartheta_e$ is tiny, it has a decisive effect due to the electrodynamics. This determination is crucial because only then can an interaction of two opposing gravito-electro currents running parallel to one another

$$\vec{I}_g(+x,-e+) \quad \rightarrow \quad -\vec{I}_g(-x,-e) \qquad (109)$$

appears to be recorded and represented. For the further discussion, the two energy expressions are necessary, which are obtained through integration from the two forces through integration. These are

$$|\vec{F}_C| \quad \rightarrow \quad |\vec{F}_{el}| = \frac{1}{(4\pi\varepsilon_0)} \cdot \frac{\vec{q}_1 \cdot \vec{q}_2}{(\vec{D}_g)^2} ,$$

$$|\vec{F}_C| \quad \rightarrow \quad |\vec{F}_{el}| = \frac{1}{(4\pi\varepsilon_0)} \cdot \frac{\vec{q}_1 \cdot \vec{q}_2}{(\vec{D}_g)^2} , \qquad (63)$$

while, on the other side, that of Newton applies to

$$\vec{F}_N \quad \rightarrow \quad \vec{F}_g = G \cdot \frac{\vec{m}_1 \cdot \vec{m}_2}{\vec{D}_g} . \qquad (64)$$

## 18 Gravitational current

First, two "wires" through which electricity flows – *i.e.*, carrying elemental electric charges *e* – are compared with each other. Thus a comparison from replacing *e* with $m_g$ becomes clear. Since these wires are electrically charged, a relativistic comparison is possible in case the charges flow forwards in the one wire while backwards in the other. This results in two opposite electrical charges attracting electrically to each other, from which the force $\vec{F}_e$ in the interaction becomes evident. If the currents in both the wires flow in opposite directions the wires will attract to each other, since the electrical charges are opposite. In contrast, if the currents in both the wires follow the same direction the wires will move awa
y from each other, since both wires contain charges with the same sign. It is clear the force between the wires and the distance between them vary inversely with each other: double the distance between them, the force $\vec{F}_e$ becomes half – half the distance between them entails the force becomes double. In classical electrostatic applies

$$F_{el}(D) = (4\pi\mu_0) \cdot 2D\,(I_1 \cdot I_2) \quad \text{in unit } [\mathrm{N}/m] . \qquad (110)$$

Now, the task is to replace the electrostatic constant $(4\pi\mu_0)$ with an own constant from the gravitation in order to observe two gravitational beams interacting with each other. Of course, the gravitational currents $+I_g, -I_g$ must also be entered the same. All necessary constants have already been calculated and the numerical values are available. In order to continue a further discussion of the two topics it is necessary to consider the coordinates in space-time. This will refer to the relevant and related vector character for $\vec{m} = m(x, y, z)$ and the angle $\vartheta(x, z)$ in the view of $\vec{I}_x$. Such a comparison requires a whole consideration in relation to the prevailing tendencies. Before further discussion can be discussed, the effect of gravity must be disclosed. It has already been shown [10] the gravitational field "squeezes" an object to a certain extent in

a) electrostatic pure point-point for any $D$

$$\mathbf{e}_0(\text{start}) \rightarrow \phi_0(\mathbf{e}_0) \rightarrow D_x \rightarrow \quad \phi_x(\mathrm{e}_x) \rightarrow \mathrm{e}(\text{end})$$

b) electrostatics point-body for shorter $D$

$$\mathbf{e}_0(\text{start}) \rightarrow \phi_0(\mathbf{e}_0) \rightarrow D_1 \rightarrow \quad \phi_1(\mathbf{e}_1) \rightarrow \mathbf{e}_1(\text{body}) \rightarrow r_{\mathrm{e},1}$$

$$r_{\mathrm{e},1} \rightarrow |m_{\mathrm{e},1}|$$

c) electrostatics point-body for larger $D$

$$\mathbf{e}_0(\text{start}) \rightarrow \phi_0(\mathbf{e}_0) \rightarrow D_2 \rightarrow \quad \phi_2(\mathrm{e}_2) \rightarrow \mathrm{e}_2(\text{body}) \rightarrow r_{\mathrm{e},2}$$

$$r_{\mathrm{e},2} \rightarrow |m_{\mathrm{e},2}|$$

## 19 Comparison of the coordinates

It is repeated the gravitational current and the direction of the EW

$$\vec{X}_0 \leftrightarrow \vec{I}_x \triangleq \vec{I}_g \tag{111}$$

are exactly parallel. The both oscillate, which does not necessarily apply the same to the two (almost perpendicular to that) coordinates determined from the electrostatics;

properties and behavior of the vectors components $X_1, X_2, X_3$ have already been disclosed above. A circulation is described around the gravitational stream [11] via the two possible directions

$$\vec{X}^+(y,z) = \begin{bmatrix} +Y \\ +Z \end{bmatrix}, \qquad \vec{X}^-(y,z) = \begin{bmatrix} -Y \\ -Z \end{bmatrix} \tag{112}$$

What remains is the assessment of $m$, which has vector property and the value is not identical in all directions, although the absolute value of it holds

$$x \ll z, \quad \vec{r}_g(x) \ll \vec{r}_e(z)$$

In considering the state further, it is crucial to mention the relationships, as

$$|\vec{r}_g(x)| \neq |\vec{r}_e(z)|, \quad |\vec{r}_g(x)| \ll |\vec{r}_e(z)|$$

$$\vec{F}_g(x,\omega), \quad \vec{F}_e(z,\vartheta) \longrightarrow \vec{F}_g(x,\omega_T), \quad \vec{F}_e(z,\vartheta)$$

$$\vec{F}_g(x,\omega_T) \ll \vec{F}_e(z,\vartheta), \quad \text{for very short } D \tag{113}$$

It is essential the ratio

$$\chi = \frac{v_B}{c} \; , \quad \text{say} \; \frac{v_B}{v_c} \quad \text{for easier handling} \tag{114}$$

to put in the foreground precisely to build a vector in

$$\vec{s}^{+}(y,z) = \begin{bmatrix} +x_g(\omega t) \\ +y_e \\ +z_e \end{bmatrix} , \qquad \vec{s}^{-}(y,z) = \begin{bmatrix} -x_g(\omega t) \\ -y_e \\ -z_e \end{bmatrix} . \tag{115}$$

In the sense of classical ED this means a frequency modulation, determined in $\omega_g$ ) for the propagation direction *x* of the gravitational wave belonging to $l_g(x)$ , influenced from the almost orthogonal (compare $\vartheta$) components *y* and *z* belonging to pure electrostatics reflecting an amplitude modulation; the latter is independent of energy, but influences x through the superposition. Clear, it is

$$\chi = \frac{|v_B|}{|c|} \; , \quad \text{say} \; \frac{|v_B|}{|v_c|} \quad \text{for easier handling} \; , \tag{116}$$

with $v_B = v_B(z)$ . Such a statement is clearly sufficient to disregard the angle $\vartheta(x,z)$ , since the fraction $\chi$ enables a comparison to be made immediately. A determination of the distances is necessary for a description of the entire system. According to the procedure used above, Greek symbols are used here again for distinction. This means $s(x,y,z) \longrightarrow \sigma(x,y,z) \; , \quad s = 2r$ and $v_B = v_B(z) \; , \; \chi(v_b, c)$ still remaining.

## 20 Specific Energy

For the further discussion, the two energy expressions are necessary, which are obtained through integration from the two forces eqs. (63, 64) through integration,

$$\begin{aligned} \vec{E}_N(\vec{r}\,) &= -\frac{1}{2}\,G \cdot \frac{\vec{m}_1 \cdot \vec{m}_2}{\vec{D}_g} \\ &= -\frac{1}{2}\,G \cdot \frac{(\vec{m}\,)^2}{\vec{D}_g} \; , \quad m_1 = m_2 = m \; , \end{aligned} \tag{117}$$

$$\vec{E}_{el}(\vec{r}\,) = -\frac{1}{2}\,\frac{1}{4\pi\varepsilon_0} \cdot \frac{\vec{q}_1 \cdot \vec{q}_2}{\vec{r}} \equiv -\frac{1}{2}\,\frac{(-\vec{e}) \cdot (-\vec{e})}{(4\pi\varepsilon_0)\,\vec{D}_{el}}$$

$$= -\frac{1}{2}\frac{(-\vec{e})^2}{(4\pi\varepsilon_0)\ \vec{D}_{el}} \quad . \qquad (118)$$

Now it becomes obvious it makes sense to declare both of the energies as vectors, since these energies differ in the direction of their effect.

## 21 Specific distances

This consideration is essential and refers to a later calculation of the specific mass components. According to the above remark their absolute values are not identical, but differ considerably in their 3 directions $\vec{m} = m(x, y, z)$ ,

$$\vec{\sigma}^{+}(y, z) = \begin{bmatrix} +x_g(\omega t) \\ +y_e \\ +z_e \end{bmatrix}, \qquad \vec{\sigma}^{-}(y, z) = \begin{bmatrix} -x_g(\omega t) \\ -y_e \\ -z_e \end{bmatrix} . \qquad (119)$$

With the aim of later determining the ratio of the vector components of *m*, the components representing the directions in *x* and the almost vertical *z* are determined here. This project can be achieved via Heisenberg's uncertainty. As will be shown later, the twins of canonically conjugate variables reveal a vector character, although this sounds strange for *E* and *t* at first,

$$\Delta E \cdot \Delta t \geq \frac{\hbar}{2} \quad \longrightarrow \quad \Delta \vec{E} \cdot \Delta \vec{t} \geq \frac{\hbar}{2} \quad . \qquad (120)$$

Since the canonically conjugated vectors are exactly parallel to each other, the equals sign is true,

$$\Delta E_z \cdot \Delta t_z = \frac{\hbar}{2} \quad \text{with} \quad E_y \parallel t_y \quad , \qquad (121)$$

$$\Delta E_y \cdot \Delta t_y = \frac{\hbar}{2} \quad \text{with} \quad E_y \parallel t_y \quad . \qquad (122)$$

The reason lies in the different behavior in relation to the directions, and also the time *t* respective Δ*t* behaves differently. Regarding the two different influences on the two different distances $s_g \text{and} s_e$ , *i. e*., gravitation and electrostatic, two terms from the interactions eqs. (63, 64) can be set up to describe it via $E_g,\ E_e$ . Since the two vectors involved are definitely parallel to each other, the equal sign is true. Since the canonically conjugated vectors are exactly parallel to each other the equal sign is true. With the relationships revealed regarding the two energies the Heisenberg's uncertainty can lead directly and accurately to the two different distances *D*. From here, the two *s* can be determined. First, the difference on the direction of propagation of the gravitational wave with omega g leaves

$$\Delta E_x \equiv (+E_x) - (-E_x) \equiv 2E_x \equiv +G \cdot \frac{\vec{m}^{\,2}}{\vec{D}_g}$$

$$= \; G \cdot \frac{m^2}{D_x} \qquad , \qquad (123)$$

where the direction indicated ***g*** with respect to the gravitation runs in *x*. This gives

$$\Delta E_x = G \cdot \frac{m^2}{D_x}$$

$$\frac{\hbar}{2} = E \cdot \tau \quad \longrightarrow \quad E = \frac{\hbar}{2 \cdot \tau}$$

$$G \cdot \frac{\mu_g^2}{D_x} = \frac{\hbar}{2 \cdot \tau} \qquad , \qquad (124)$$

and finally

$$D_x = \frac{2G \cdot \tau \cdot \mu_g^2}{\hbar} \equiv \sigma_x \qquad . \qquad (125)$$

In the same manner

$$\Delta E_z \equiv (+E_z) - (E_z) \equiv 2E_z \equiv + \frac{(\vec{-e})^2}{(4\pi\varepsilon_0) \cdot \vec{D}_{el}}$$

$$= + \frac{e^2}{(4\pi\varepsilon_0) \cdot \vec{D}_z} \qquad , \qquad (126)$$

shows the difference due to the vertical and electrostatic effect in *z*-direction and can be formulated a similar way.

In the present study, minimum distances are considered. An approach of two objects will therefore allow the two $\Delta t$ to be equated, *i.e.*, valid for both directions. This is also reflected in the nature of the very pronounced gravitational beam, which is superimposed by the electrostatic forces and therefore oscillates (see above). As a result of this statement, Heisenberg's statistics or respective uncertainty can be used to calculate the distances in the following. Starting on

$$\frac{\hbar}{2} = E \cdot \tau \quad \longrightarrow \quad E = \frac{\hbar}{2 \cdot \tau} \qquad (127)$$

opens up the way to determine the two distances exactly. With the energy for gravitation,
in the determining main direction of the energy-dependent frequency modulation oscillating GW, superimposed with an energy-independent amplitude modulation, applies. Here, this ***τ*** still means the smallest time interval as already shown above. In observing the vertical directions in *y* and *z* from electrostatics a representation is consequently similar to the last one. In this plan, *G* has only to be replaced from the constant $1/(4\pi\varepsilon_0)$ and in the case of electrostatic interaction substitutes $\mu_g^2 \longrightarrow e^2$. From these facts follows immediately, and with

$$\Delta E_z = +\frac{e^2}{(4\pi\varepsilon_0)\cdot D_z} \quad . \qquad , \qquad (128)$$

the expression for the z-direction as orthogonal to the to the propagation direction of the gravitational wave.

$$D_z = \frac{2\cdot T\cdot e_z^2}{\hbar\cdot(4\pi\varepsilon_0)} \equiv \sigma_z \qquad . \qquad (129)$$

A clear view results with increasing distance $x$ into

$$\text{coin shape} \longrightarrow \text{egg shape} \longrightarrow \text{perfectly spherical} \qquad .$$

This means the “coin” clearly considered here is parallel to y and z, say in height $y$ and $x$, but $x$ is completely different resulting from the longitudinal direction in propagation like $(y,z) \,\square\, x$. Therefore, $x$ sure determines the "expansion" expressed in a squeezing at close distances. Of course, it applies $x_g(\vartheta),\ z_e(\vartheta)$. The tiny angle on the “gap” between the two velocities, B and T (see above) exists and has determined the time transition.

For better understanding, the two distances $s$ are now given in numericals

$$s_g \equiv D_x \triangleq 1.80\ 471\ 05\ 521\ 49\ 922\cdot 10^{-33}\,\mathrm{m}$$

$$s_z \equiv D_z \triangleq 4.42\ 103\ 91\ 979\ 96\ 644\cdot 10^{-51}\,\mathrm{m} \qquad . \qquad (130)$$

This output is deciding to the transmission of the “main wave” or propagation of the superposition for the effects in $g$ and **e**.

## 23 Contrast of the distances

These statements allow a comparison of the 3 directions, opening up a 3-dimensional space. It is therefore also possible to represent m as a vector. At very short distances, the two interacting bodies behave like coins, whose longitudinal width is given from $x$, while the “height” points in $y$- and $z$-direction; figuratively speaking, the latter correspond to the distance from edge to edge of a coin standing vertically. Such an effect can be represented in the distance of the two m in the x-direction. That appears as coin, oval, spherical with increasing distance between the two interacting $m$, like

$$m\!:\ \text{coin} \longrightarrow \text{egg shaped} \longrightarrow \text{perfectly spherical} \quad , \quad \text{with distance } D_x \qquad . \qquad (131)$$

This means at very close $D$ between the two $m$ interact "face to face" or surface to surface in $x$-direction, while those on their edge are perpendicular to $x$, but point to $y$ and $z$. The ratio of the two energies

$$\frac{E_{\mathrm{el}}}{E_{\mathrm{mec}}} \triangleq 1.15\ 372\ 75\ 417\ 39\ 231\cdot 10^{+177} \qquad (132)$$

is enormous, which has to be considered. The other two vectors will therefore compensate for this energy. Although the diameter d-e decreases with increasing distance D-x, and therefore a higher m-x results [10, 11], the total amount according to Pythagoras

$$m = \frac{1}{3} \cdot \sqrt{(m_x)^2 + (m_y)^2 + (m_z)^2} \tag{133}$$

remains the same, albeit the angle $\vartheta$ acts on both of the vertical directions as

$|+\vartheta| \longrightarrow |-\vartheta|\ , \quad (+\vartheta) \parallel (-\vartheta)$ . This gives the vector

$$\vec{m}^{+}(y, y, z) = \begin{bmatrix} +m_g(\omega t) \\ +m_y(e, \vartheta) \\ +m_z(e, \vartheta) \end{bmatrix} . \tag{134}$$

for positive values.

## 24 Expansion of the universe

For a further consideration of the emergence of an *m* from nothing, the entire universe must be rotated. In a first consideration, this problem is discussed in classical mechanics. It will be modified later, because at such high speeds close to *c* the view has to be processed relativistically. All that is obviously of philosophical character, but will be honestly presented in physical theory. In a related investigation, the theory of Casimir and Polder [54, 55] was shown a vacuum consideration produces an enormous effect in its effect, though there is only a standing wave here, which consists of the Nothing [55]. On the attraction between two perfectly conducting plates can be considered, which describe two plates of ideally electrically conductive plates, which do not attract each other but are pressed together via the external fields and is an effect to the quantum vacuum [56, 57] (Fig.8). Here, the possible standing waves between the two plates are effective, while the outer ones are not subject to any modes. This is very important for the theory proposed by here, because then a space opens up between two worlds and the two energies $+E_{\mathrm{el}} \leftrightarrow -E_{\mathrm{el}}\ , \quad +E_{\mathrm{gr}} \leftrightarrow -E_{\mathrm{gr}}$ on either side cannot extinguish each other in this space. The difference in energy is trapped between these two “plates” – the time and light interval – to a certain extent and there is energy from which a new *m* is created.

Such a calculation seems philosophical, it is not. It is still real and due to actual physics. The fastest speed for a *B*, in a “positive space” is given above. With the Heisenberg´s uncertainty, a first assessment succeeds and presented here. For such a project, first two equations are required, which serve to describe the situation. These are momentum and centrifugal force according to the classical mechanics [58].

$$\vec{p} = m \cdot \vec{\mathrm{v}}\ , \qquad \vec{F}_{\mathrm{cf}} = \frac{m \cdot \mathrm{v}^2}{\vec{r}} \equiv m\,\omega^2 \cdot \vec{r} \ , \tag{135}$$

and with regard to the task show the centrifugal forces related to the $\mu_g$ and to the long-ranging distance $\vec{D}_e(\vec{r}_e)$ due to **e** compared to short-ranging distance for gravity $\vec{D}_g(\vec{r}_g)$ gets the expressions

$$\vec{p} = \mu_g \cdot \vec{\mathrm{v}}_{\mathrm{B}}\ , \qquad \vec{F}_{\mathrm{cf}} = \frac{\mu_g \cdot \mathrm{v}_{\mathrm{e}}^2}{\vec{r}} \equiv m\,\omega_{g,e}^2 \cdot \vec{r}_e \ . \tag{136}$$

The constants necessary for the description have already been determined. It is important to include the Graviton, although the far-reaching force is exerted by the elemental charge e of the electrostatic. So, the Graviton is “sent” to the end of the universe.

With regard to the rotation $\omega_{g,e}$ of the entire universe, which is related to the rotation of a black hole, BH [10] there must be a finite expansion for the entire positive universe exists owing to the facts already established. A guess is generally the universe is homogeneous and isotropic. For the later calculation of the expansion of the universe, which is related to the origin of an *m* from the Nothing the $p_x$, e. g., $p_{x,\text{world}}$ is required. This can then be achieved via the Heisenberg´s statistic / uncertainty to represent the distance in *x*-direction,

$$p_x = \mu_g \cdot \mathrm{v_B} \tag{137}$$

to give

$$\frac{\hbar}{2} = p_x \cdot x \equiv \mu_g \cdot \mathrm{v_B} \cdot x \quad . \tag{138}$$

Since the two canonical conjugated vectors are parallel to each other the relation becomes minimal and the equality sign is true leading to

$$x_{\text{uni}} = \frac{2\mu_g \cdot \mathrm{v_B}}{\hbar} \tag{139}$$

→

$$\begin{aligned} x_{\text{uni}} \equiv D_{g\,,\,\text{uni}} &\triangleq 6.51\;047\;53\;506\;91\;8 \cdot 10^{+36}\,\text{m} \\ &= 2.10\;968\;09\;302\;30\;654 \cdot 10^{+21}\,\text{pc} \\ &\equiv 0.68\;821\;09\;250\;20\;275\;9 \cdot 10^{+21}\,\text{ly}\ \ (\text{light year}) \quad . \end{aligned} \tag{140}$$

It is true, acceleration of an electrically charged body is evident. Such a consideration demands the observation such a particle would lose energy when accelerated [59] if it did not obey as a standing wave according to atomic physics presented [60, 61**]**, [24], where this special effect does not appear [62, 63]. Of course, this only applies to a standing wave, which can also be used as a basis here. The Cherenkov radiation in a "positive" universe, posi-versum, will arise as well as in an "anti-universe" say nega-versum, opposite in relation to the angular frequency $\vec{\omega}_{g,e}$, which both cancel each other out at the jump or respective transition from one positive space into the negative other compare [10, 64].

## 25 Classical Force, rotation and acceleration in the universe

First applies according to the Newton´s classical mechanics

$$\vec{p} = m \cdot \vec{\mathrm{v}}\ , \qquad \vec{F}_{\text{cf}} = \frac{m \cdot \mathrm{v}^2}{\vec{r}} \equiv m\,\omega^2 \cdot \vec{r} \quad ,$$

which can be transferred to describe the effect of a positive particle B in

$$\vec{p} = \mu_g \cdot \vec{\mathrm{v}}_{\mathrm{B}}\ , \qquad \vec{F}_{\text{cf}} = \frac{\mu_g \cdot \mathrm{v_e^2}}{\vec{r}} \equiv m\,\omega_{g,e}^2 \cdot \vec{r}_e \quad . \tag{141}$$

Since the two opposing charges **e** through a center in their electrostatic interaction do not exactly face each other in a direction $x_e$, there is a small, albeit effective $\vartheta_e$, in $\omega_e$. This results in the same frequency as in the discussion about the BH [65]. The results of Hubble [66] show

$$t_H = \frac{1}{H_0} \triangleq \frac{67.8\,\text{km/s}}{Mpc} = 4.55 \cdot 10^{+17}\,\text{s} = 14.4\ \text{milliarden years} \tag{141}$$

and should result from the current study. The task is to determine the acceleration $a_x(F_x, v_x, D_x)$ especially as a function of the distance $D_x$. This still is described in classical mechanics from the Newton´ s axiom $\vec{F} = m \cdot \vec{a}$. For further calculation rotation is decisive and depicted via the calculated angular frequency $\omega$ [10] for a BH to give

$$\begin{gathered} v \triangleq 53.25\ 206\ 34\ 74 \cdot 10^{-6}\ \mathrm{s}^{-1} \equiv 53.25\ 206\ 34\ 74\ \mu\mathrm{Hz} \\ 2\pi v = \omega \triangleq 0.10\ 650\ 41\ 269\ 48 \cdot 10^{-3}\ \mathrm{s}^{-1} \end{gathered} \quad , \qquad (142)$$

valid for free space and consequently also for the universe. Generally, in classic and non-relativistic representation yields

$$\vec{F}_g = G \cdot \frac{(\vec{m})^2}{\vec{D}_g} , \quad \vec{F}_g = m \cdot \vec{a} \quad , \qquad (143)$$

$$\vec{F}_{\mathrm{Cf}} = \frac{m \cdot v^2}{\vec{r}} \equiv m \cdot \omega^2 \cdot \vec{r} \qquad (144)$$

to describe the centrifugal force Cf An equating gives

$$\begin{gathered} m \cdot a = m \cdot \omega^2 \cdot r \quad \longrightarrow \quad a = \omega^2 \cdot r \quad , \\ m \cdot a_g(X) = m \cdot \omega^2 \cdot r_g(X) \quad \leftrightarrow \quad a_g(X) = \omega^2 \cdot D_g(X) \end{gathered} \quad , \qquad (145)$$

as the same propagation direction *x* the vector symbols can be waived. Now, *r* respective the distance $D_g$ has to be determined. It should be noted it is precisely the gravitation involved here. This part of the description is semi-relativistic since the equations used here are classical. A further assessment in relation to relativistic principles will follow below; here this does not apply to the graviton and the temptron in $\mu_g, \tau$, which are Lorentz invariant. With $\boldsymbol{\tau}$ leaves

$$v_g = 0.02\ 623\ 20\ 887\ 69\ 396\ 4 \cdot 10^{+45}\ \mathrm{s}^{-1} \quad ,$$

→

$$\omega_g = 0.16\ 482\ 10\ 747\ 32\ 502\ 1 \cdot 10^{+45}\ \mathrm{s}^{-1} \quad . \qquad (146)$$

In classical perspective the following expressions eqs. (140, 142) result in the acceleration inside the universe with the effect of gravity in the *x*-direction

$$a_g = \omega_g^2 \cdot D_g \qquad (147)$$

with

$$\begin{gathered} \omega_g^2 \triangleq 11.\ 34\ 312\ 90\ 569\ 55\ 7 \cdot 10^{-9}\ \mathrm{s}^{-2} \\ x_{\mathrm{uni}} \equiv D_g \triangleq 6.51\ 047\ 53\ 506\ 91\ 8 \cdot 10^{+36}\ \mathrm{m} \end{gathered}$$

accomplishing the numerical value

$$a_g(x) \triangleq 73.\,84\,916\,21\,250\,26\,01 \cdot 10^{+27}\ \frac{\mathrm{m}}{\mathrm{s}^2} \tag{148}$$

for the posi-versum. In comparison to the values is

$$1\,\mathrm{psc} = 30.85\,7 \cdot 10^{+15}\,\mathrm{m} \equiv 30.85\,7 \cdot 10^{+12}\,\mathrm{km}$$

with $m(2,2) = 0.19\ 339\ 60\ 010 \cdot 10^{-6}$ from below leaving a

$$C_{\mathrm{Hubble}} = 74.2 \pm 3.6 \cdot \frac{\mathrm{km}}{\mathrm{s}\ \cdot \mathrm{Mpc}} \approx 77 \cdot \frac{\mathrm{km}}{\mathrm{s}\ \cdot \mathrm{Mpc}} \equiv 77 \cdot 10^3\ \frac{\mathrm{m}}{\mathrm{s}\ \cdot \mathrm{Mpc}}$$

$$= 77 \cdot 10^3 \cdot \frac{\mathrm{m} \cdot 10^{-12}}{\mathrm{s}\ \cdot \mathrm{pc}} \equiv 77 \cdot \frac{\mathrm{m} \cdot 10^{-9}}{\mathrm{s}\ \cdot \mathrm{pc}},$$

which is in agreement to the constant of Hubble. In the nega-versum the acceleration is reversed and as opposite to an expansion. This gives a kind of anti-expansion, *i.e*., a contraction. As the posi-versum expands with $+a$, the same effect, according to ideal reflection, acts on this phenomenon with $-a$ in the nega-versum. This means, with regard to these statements, the one universe is getting bigger and the other is getting smaller.

To complete the understanding, it is now interesting to show the real, classically calculated rotational speed of the entire posi-versum at its border before a jump into an anti-universe, nega-versum can occur

$$\vec{\mathrm{v}} = \vec{\omega} \,\square\, \vec{r}\ , \quad \longrightarrow \quad |\mathrm{v}_z| = \omega_x \cdot r_x\ , \ \text{not}\ D_x$$

$$|\mathrm{v}_z| = \omega_x \cdot r_x\ , \ \mathrm{v}_z \,\square\, r_x\ . \tag{149}$$

From here the rotational speed for both universes can be determined; it sounds strange for the nega-versum, but it is valid because there is no restriction. Both "types" of universes do not touch each other, for they are separated from the light and / or time barrier, which is discussed below. In classic calculation, the value comes to

$$\mathrm{v} \triangleq 1.07\ 306\ 35\ 443\ 20\ 486 \cdot 10^{+81}\ \mathrm{m}/s \tag{150}$$

→

$$\frac{\mathrm{v}_z}{c} \triangleq 3.57\ 935\ 47\ 025\ 13\ 85 \cdot 10^{+72},$$

and that can never be true. It is clear such a calculation requires relativistic treatment. The above is purely classical consideration. Considering the "jump" between both of the light speeds, regarding the speeds of B and T [9], $c$ will decrease in a very small amount. Such a consideration applies equally to

$$\Delta\mathrm{v} = c - \mathrm{v}_{\mathrm{B,T}} \triangleq 299\ 79\ 245\ 8\ \mathrm{m/s} - 8\ 067.66\ 285\ \mathrm{m/s}$$

$$= 0.29\ 978\ 43\ 903\ 37\ 15 \cdot 10^{+9}\ \mathrm{m/s}\ , \tag{151}$$

with

$$\mathrm{v}_{\mathrm{T,B}} = c \pm 8\ 067.66\ 285\ \mathrm{m/s}\ .$$

Since the $m$ in eq. (145) cancel each other out in the comparison of attraction and centrifugal force this calculation is independent of the two interacting $m$ and is valid for the Nothing. At such high speeds, relativistic arguments come into play, *i. e*., the Lorentz transformation [65]:

$$z_{\text{rel}} = z_{\text{class}} \cdot \sqrt{1 - \frac{(\Delta \text{v})^2}{c^2}} \quad . \tag{152}$$

An observer looking in ***x***-direction will therefore always determine the ***z***-distance perpendicular to this observer in a length contraction, no matter where, left or right, for example measuring. Thence, there is a difference between the classical representation and this relativistic image in scope to their circumferences is

$$U_{\text{rel}} = \pi \cdot D_z \cdot \sqrt{1 - \frac{(\Delta \text{v}_z)^2}{c^2}} \triangleq 0.10\,610\,48\,327\,07\,251 \cdot 10^{+30}\ \text{m}\ ,\ U_{\text{pos-verse}}$$

regarding

$$\frac{(\Delta \text{v}_z)^2}{c^2} \triangleq 0.99\,997\,30\,880\,48\,799\,4 \quad , \tag{153}$$

see the angle above.

This seems irrelevant at first glance, but is the result of the ***y***-component, which has received little attention due to its tiny size, hitherto. However, such an effect is decisive for an exact assessment of the situation inside and outside both external the both sides outside –left and right – of the "chamber" as well as it causes the time-beam or respective gravitation-beam to be deflected via the theory as given above. So far it determines the “slightly crooked” (see above with the angle) appearance of the chamber; outside of the very strict and restricted borders of the chamber, the waves move independently in proportion.

A comparison between classical calculation and the inclusion of relativistic phenomena shows clearly a $U_{\text{relativ}} \ll U_{\text{classic}}$ for the posi-verse. The nega-verse is the reciprocal value according to this ideal reflection. Both types of universe do not touch each other but are separated, *i.e*., the “wall of light”.

## 26 Energy and mass

In further consideration, the m must first be illuminated. From $r_e \longrightarrow m(r)$ m delineates the vector

$$\vec{r}_e^{\,+} = \begin{bmatrix} F_g(x) \rightarrow r_e \leftarrow F_g(x) \\ F_g(y) \leftarrow r_e \rightarrow F_g(y) \\ F_g(z) \leftarrow r_e \rightarrow F_g(z) \end{bmatrix} \longrightarrow \vec{m}_e^{\,+} = \begin{bmatrix} m_e(x) > m_e(z) \\ m_e(y) < m_e(x) \\ m_e(z) < m_e(x) \end{bmatrix} \tag{154}$$

with $\displaystyle F_{g \atop x \to \infty}(x) = F_{\text{el}}(x)$. At faster than light speed, *i.e.*, when crossing the time barrier, the result becomes

$$\vec{r}_e^{\,-} = \begin{bmatrix} F_g(x) \leftarrow r_e \rightarrow F_g(x) \\ F_g(y) \rightarrow r_e \leftarrow F_g(y) \\ F_g(z) \rightarrow r_e \leftarrow F_g(z) \end{bmatrix} \longrightarrow \vec{m}_e^{\,-} = \begin{bmatrix} m_e(x) < m_e(z) \\ m_e(y) > m_e(x) \\ m_e(z) > m_e(x) \end{bmatrix} . \tag{155}$$

Comparing the two vectors clearly shows a sub-velocity approach to the time barrier favoring a squeezing of the particle in *x*-diameter (like a coin), while after passing through, the same particle gradually moves away from there in *x*-diameter stretches. The entire *m*

$$m(3-\text{vect}) = \sqrt{\sum_{i=1}^{3} m_i^2} \quad , \quad m(4-\text{vect}) = \sqrt{\sum_{i=0}^{3} m_i^2} \tag{156}$$

remains constant because of the other dimensions those are also changing; the 0-dimension is kept for the "”inside” of the time barrier (Fig.6). The *m* can be assigned the “electronium” –
as a minimal *m* in electrostatics – is

$$m_e \longrightarrow \mu_e = \frac{E_e}{c^2} \equiv \frac{h \cdot \nu_e}{c^2} \triangleq 0.19\ 339\ 60\ 010 \cdot 10^{-6}\,\text{kg}$$

$$E_e = h \cdot \nu_e \equiv \mu_e \cdot c^2$$

$$\triangleq 17.38\ 156\ 57\ 445\ 74 \cdot 10^{+9}\,\text{J} \equiv 0.10\ 848\ 71\ 521\ 57 \cdot 10^{+30}\,\text{eV} \quad . \tag{157}$$

**27 Power and Sources**

For a further development it is important to clearly explain currents, electrical voltage and in case of gravity tension in facts. Due to the good and plausible understanding the relationships between electrodynamics and gravitation are established here. As the electric field is irrational it is possible to express the electric field as the gradient of a scalar function, the electrostatic potential $\phi_{\text{el}}(2r) \equiv \phi_{\text{el}}(D)$ to compare

$$\phi_{\text{el}} = \frac{1}{(4\pi\varepsilon_0)} \cdot \frac{q_{\text{el}}}{r_{\text{el}}} \quad , \quad \left[\frac{\text{J}}{\text{C}}\right] \quad \text{with} \quad r_{\text{el}} \gg r_{\text{gr}} \quad , \tag{158}$$

$$\phi_{\text{gr}} = G \cdot \frac{m_{\text{gr}}}{r_{\text{gr}}} \quad , \quad \left[\frac{\text{J}}{\text{kg}}\right] \quad \text{with} \quad r_{\text{gr}} \ll r_{\text{el}} \quad , \tag{159}$$

with test body and test charge

$$\mu_g \ \text{in}\ [\text{kg}] \quad ; \quad e \ \text{in}\ [\text{C}]\,,\,[\text{A}\cdot\text{s}] \quad ,$$

$$E_e = h \cdot \nu_e \equiv \mu_e \cdot c^2 \quad / \quad E_g = h \cdot \nu_g \equiv \mu_g \cdot c^2 \quad . \tag{160}$$

Definition: The difference in electric potential between two points in a static electrical field corresponds to the work needed per unit of charge to move a test charge **e** over *D*. This leaves the power

$$P_{\text{el}} = \frac{W_{\text{el}}}{\Delta t_{\text{el}}} = \frac{W_{\text{el}}}{q_{\text{el}}} \cdot \frac{q_{\text{el}}}{\Delta t_{\text{el}}} \quad , \quad \left[\frac{\text{Volt}}{\text{Ampère}}\right] \ ; \ \left[\frac{\text{kg}\cdot\text{m}^2\text{s}}{\text{s}^3\cdot\text{A}}\right] \quad , \tag{161}$$

$$P_{\text{gr}} = \frac{W_{\text{gr}}}{\Delta t_{\text{gr}}} = \frac{W_{\text{gr}}}{\mu_{\text{gr}}} \cdot \frac{\mu_{\text{gr}}}{\Delta t_{\text{gr}}} \quad , \quad \left[\frac{\text{Joule}}{\text{seconds}}\right] \ ; \ \left[\frac{\text{kg}\cdot\text{m}^2}{\text{s}^3}\right] \quad . \tag{162}$$

For a more detailed understanding the atomic physics disclosures for a standing wave in an, albeit, spherical field of the H-atom can be considered. The function in the ground state (lowest energy) is

$$\psi_{100} = \sqrt{\frac{4Z^3}{a_0^3}} \cdot e^{-\frac{Zr}{a_0}} \cdot \sqrt{\frac{1}{4\pi}}$$

$$I(\psi_{100}) \rightarrow \|\psi_{100}\|^2 = \frac{4Z^3}{4\pi \cdot a_0^3}$$

$$I(\psi_{100}) \rightarrow \|\psi_{100}\|^2 = \frac{1}{\pi \cdot a_0^3} \quad \text{for a} \quad Z = 1 \qquad . \qquad (163)$$

This is essential to recognize, though the further aspects point to a more longitudinal propagation, but it well indicates a normalizability important for the inside of the light-chamber. It is a good example of a stable state and can also be assigned an *m*. In the case of a progressing wave, such as a light beam in free space, there is no normalization and a “wave packet” can not be considered in case of a free light-beam, a real *m* can not be clearly assigned. Within the light barrier, however, a standing wave can form implying an m later be transported to the “outside”. Inside the chamber forms the standing wave limited in the borders resulting from the two light speeds,

$$\psi_n(x,n) = \sqrt{\frac{2}{L}} \cdot \sin\left(\frac{n \cdot \pi \cdot x}{L}\right)$$

$$= \sqrt{\frac{2}{L}} \cdot \frac{e^{\frac{+\boldsymbol{i} \cdot n \cdot \pi \cdot x}{L}} - e^{\frac{-\boldsymbol{i} \cdot n \cdot \pi \cdot x}{L}}}{2\boldsymbol{i}}, \quad \text{with} \quad L(x_B, x_T)$$

$$I(\psi_{x,n}) \rightarrow \|\psi_{x,n}\|^2 = \frac{2}{L} \cdot \sin^2\left(\frac{n \cdot \pi \cdot x}{L}\right) \qquad , \qquad (164)$$

$$\psi_n(x,½) = \sqrt{\frac{2}{L}} \cdot \sin\left(\frac{½ \cdot \pi \cdot x}{L}\right)$$

$$= \sqrt{\frac{2}{L}} \cdot \frac{e^{\frac{+\boldsymbol{i} \cdot ½ \cdot \pi \cdot x}{L}} - e^{\frac{-\boldsymbol{i} \cdot ½ \cdot \pi \cdot x}{L}}}{2\boldsymbol{i}}, \quad \text{with} \quad L(x_B, x_T)$$

$$I(\psi_{x,½}) \rightarrow \|\psi_{x,½}\|^2 = \frac{2}{L} \cdot \sin^2\left(\frac{½ \cdot \pi \cdot x}{L}\right) \qquad , \qquad (165)$$

the latter is due to the half-wave, obeying the Fermi-Dirac statistics.. Against that the case of gravitation, Bose-Einstein statistics comes to the forth showing

$$I(\psi_{x,½})_{\mathrm{gr}} \;\rightarrow\; \|\psi_{x,1}\|^2 = \frac{2}{L}\cdot\sin^2\left(\frac{1\cdot\pi\cdot x}{L}\right) \quad . \tag{166}$$

A wave packet

$$\psi(x,t) = \frac{1}{\sqrt{2\pi}}\int_{-\infty}^{+\infty} A(k)\cdot e^{\,\boldsymbol{i}\,(\vec{k}\cdot\vec{r}\;-\;\omega(k)\cdot t)}\,\mathrm{d}k \quad ,$$

$$\omega(k) = \frac{\hbar}{2m}\cdot\vec{k}^{\,2} \tag{167}$$

can describe an *m* moving in spatial coordinates. It can be analyzed into or synthesized from an infinite set of component sinusoidal waves of different wave numbers with phases and amplitudes $A(k)$ such they interfere constructively only over a small region of space and destructively elsewhere. Each component wave function and hence the wave packet are solutions of a wave equation. Depending on the wave equation the wave packet´s profile may remain constant (no dispersion) or it may change (dispersion) while propagating. An infinitely extended wave in free space

$$E = h\nu,\; E = mc^2 \;\rightarrow\; m_{\mathrm{EMW}} = \frac{h\nu}{c^2} \equiv \frac{h}{c\lambda} \quad \text{at} \;\; -\infty \leftrightarrow +\infty \tag{168}$$

can indeed be assigned an *m*, but can never be localized anywhere. This is the reason for including a chamber, otherwise a time transfer and the origin of matter from the Nothing is not possible to prove, because in the second case a transport of “charged” particles - electrical or gravitational – can not be described, consequently no current flows.

Now, the “voltages” and currents are to be examined. In the following, the facts mentioned may sound trivial or superfluous. It is not ! A clear representation based on electrodynamics is important to achieve an analogous description of the relationships in gravity then enabling a correct and clear comparison. This plan starts with the set

$$W_{\mathrm{el}} = U_{\mathrm{el}}\cdot q_{\mathrm{el}} \quad\rightarrow\quad \Delta W_{\mathrm{el}}(\Delta t_{\mathrm{el}}) = U_{\mathrm{el}}\cdot q_{\mathrm{el}}\cdot\Delta t_{\mathrm{el}} \quad ,$$

$$P_{\mathrm{el}} = U_{\mathrm{el}}\cdot I_{\mathrm{el}} \equiv \frac{W_{\mathrm{el}}}{\Delta t_{\mathrm{el}}}\;\left[\frac{\mathrm{J}}{s}\right],\;\left[\mathrm{V\cdot A}\right] \quad ,$$

$$I_{\mathrm{el}} = \frac{q_{\mathrm{el}}}{\Delta t_{\mathrm{el}}} \equiv \frac{P_{\mathrm{el}}}{U_{\mathrm{el}}} \equiv \frac{W_{\mathrm{el}}}{U_{\mathrm{el}}\cdot\Delta t_{\mathrm{el}}}\;\left[\frac{\mathrm{J}}{\mathrm{V\cdot s}}\right],\;\left[\mathrm{A}\right] \quad ,$$

$$\mu_g \;\text{in}\; [\mathrm{kg}] \quad ; \quad e \;\text{in}\; [\mathrm{C}],\,[\mathrm{A\cdot s}] \quad ,$$

$$E_{\mathrm{el}} = h\cdot\nu_e \equiv \mu_e\cdot c^2 \quad / \quad E_{\mathrm{gr}} = h\cdot\nu_g \equiv \mu_g\cdot c^2 \quad , \tag{169}$$

– besides $\Delta t_{\text{el}} \ll \Delta t_{\text{gr}}$ – used for confrontation and comparison between the two determining reasons (due to the gravitational effect the time interval slows down and appears stretched). Before doing so it must again be pointed out lower-case ***r*** refers to the description "inside" a body while upper-case ***R*** means an "outside" effect. In advance it can not be determined where and what a radius *R* an intersection of electrostatic and gravitational effects exists and jointly occurs. An observance of eqs. (158, 159) leads to a comparison with electrostatic to gravity.

The task now is basically to amalgamate the two spaces, one is the regular quantum theory based on electrostatic calculations revealed in the Hilbert space with another, previously unknown "gravitational space". The dimensions are chosen analogously. Plainly, the both *R* are provided with factors, $R_{\text{el}}\,,\; R_{\text{gr}} \;\leftrightarrow\; \kappa_{\text{el}}\,,\; \kappa_{\text{gr}}$ in order to be able represent and compare the two distinctly differing states. An equating would show

$$\frac{\phi_{\text{el}} + \phi_{\text{el}}}{2} \;=\; \frac{1}{2}\left\{\left(\frac{1}{(4\pi\varepsilon_0)}\cdot\frac{q_{\text{el}}}{r_{\text{el}}}\right) + \left(G\cdot\frac{m_{\text{gr}}}{r_{\text{gr}}}\right)\right\}$$

$$\left[\frac{\text{J}}{\text{C}}\right] \neq \left[\frac{\text{J}}{\text{kg}}\right],\;\; \text{C} \overset{\textbf{?}}{\longleftrightarrow} \text{kg} \qquad , \qquad (170)$$

and that reveals the problem. However, the present project refers to a combination and an included, clear interaction seen as a relationship between the two facts, *i.e*., electrical charge **e** and matter in *m*.

## 28 Involve both characters

Such a detailed representation, as already given in relation to the electrodynamics with its basic elements, can also be transferable to gravity. The goal is on the one side to create real existing matter out of nothing and to the same extend can explain the entry of a real particle into the light chamber, where matter can develop from the Nothing. The theory also must be able to describe the same exit from the chamber showing a time reversal. The following explanation is essential for a thorough and in depth understanding.

if, under certain conditions, it was already possible to separate a wave function into a location-dependent and a time-dependent part,

$$\psi(\vec{r}\,,\,t) \;=\; \pm A\cdot \mathrm{e}^{\,\boldsymbol{i}(\vec{k}\,\vec{r}\,-\,\omega t)} \;\equiv\; \pm A\cdot\left[R(\vec{r}\,)\cdot T(\vec{t}\,)\right] \qquad (171)$$

then, a kind of merger should be equally possible under certain conditions, just the same To do this, the statements on both systems

$$\vec{\chi}_{\text{el}} \;=\; \begin{bmatrix} -\,\omega^{\text{el}}\cdot t^{\text{el}} \\ +\,k_x^{\text{el}}\cdot x^{\text{el}} \\ +\,k_y^{\text{el}}\cdot y^{\text{el}} \\ +\,k_z^{\text{el}}\cdot z^{\text{el}} \end{bmatrix} \quad \text{and} \quad \vec{\chi}_{\text{gr}} \;=\; \begin{bmatrix} -\,\omega^{\text{gr}}\cdot t^{\text{gr}} \\ +\,k_x^{\text{gr}}\cdot x^{\text{gr}} \\ +\,k_y^{\text{gr}}\cdot y^{\text{gr}} \\ +\,k_z^{\text{gr}}\cdot z^{\text{gr}} \end{bmatrix} \qquad (172)$$

simply have to be added together in the exponent, if the vector character of both is taken into account, because it is generally not $\left(k^{\mathrm{el}} \cdot r^{\mathrm{el}} - \omega^{\mathrm{el}} \cdot t^{\mathrm{el}}\right) \parallel \left(k^{\mathrm{gr}} \cdot r^{\mathrm{gr}} - \omega^{\mathrm{gr}} \cdot t^{\mathrm{gr}}\right)$. In case of true scalar products the latter declaration omits vector symbols. On the basis

$$\psi(\vec{r}\,,\vec{t}\,) = \pm A \cdot \mathrm{e}^{\,i\,(\vec{k}\,\cdot\vec{r} - \vec{\omega}\,\cdot\vec{t}\,)} ,$$

(the variables $\boldsymbol{\omega}$ and $\boldsymbol{t}$ can be direction-dependent as well) a proposition for the product

$$\psi_{\mathrm{el}}(\vec{r}\,,t) \cdot \psi_{\mathrm{gr}}(\vec{r}\,,t) = \psi_{\mathrm{el}\,,\mathrm{gr}}(\vec{r}\,,t)$$

reads

$$\psi_{\mathrm{el}\,,\mathrm{gr}}(\vec{r}\,,t) = \pm A \cdot \mathrm{e}^{\,i\left[\left(k\cdot r - \omega\cdot t\right)^{\mathrm{el}} + \left(k\cdot r - \omega\cdot t\right)^{\mathrm{gr}}\right]} , \quad (173)$$

Admittedly, a simple scalar product is certainly not correct at every location, like

$$\left(k^{\mathrm{el}} \cdot r^{\mathrm{el}} - \omega^{\mathrm{el}} \cdot t^{\mathrm{el}}\right) \parallel \left(k^{\mathrm{gr}} \cdot r^{\mathrm{gr}} - \omega^{\mathrm{gr}} \cdot t^{\mathrm{gr}}\right) . \quad (174)$$

At short distances a vector (cross) product is more likely. Such a state consisting of two waves $\omega_{\mathrm{el}}$ and $\omega_{\mathrm{gr}}$ with completely different descriptive properties can only be experienced through a certain superimposition of them, whereby a transience, evanescence, or even disappearance of mutually moving waves can be ruled out [9]. According to this statement, it requires comparing the two facts in such a way the same cause is produced in both meaning $D_{\mathrm{el}}$ and $D_{\mathrm{gr}}$ will differ significantly. Since these two phenomena, *i.e.*, el and gr do not coincide and never correspond, it is clear a way must be described to compare the two respective constants $k = 2\pi/\lambda$ and $\omega$ exactly make a comparison possible. This idea is achieved in

$$1 = \frac{e_{\mathrm{el}}^{2} \cdot \dfrac{1}{(4\pi\varepsilon_0)} \cdot \dfrac{1}{D_{\mathrm{el}}}}{\mu_{\mathrm{gr}}^{2} \cdot G \cdot \dfrac{1}{D_{\mathrm{gr}}}} \equiv \frac{\mu_{\mathrm{gr}}^{2} \cdot G \cdot \dfrac{1}{D_{\mathrm{gr}}}}{e_{\mathrm{el}}^{2} \cdot \dfrac{1}{(4\pi\varepsilon_0)} \cdot \dfrac{1}{D_{\mathrm{el}}}}$$

→

$$\frac{(\mu_{\mathrm{gr}}^{2} \cdot G)\cdot(4\pi\varepsilon_0)}{e_{\mathrm{el}}^{2}} = \frac{D_{\mathrm{gr}}}{D_{\mathrm{el}}} , \quad D = 2R \equiv \lambda$$

→

$$D_{\mathrm{gr}} = D_{\mathrm{el}} \cdot \frac{(\mu_{\mathrm{gr}}^{2} \cdot G)\cdot(4\pi\varepsilon_0)}{e_{\mathrm{el}}^{2}} \equiv D_{\mathrm{el}} \cdot \left[(4\pi\varepsilon_0)\cdot G\right] \cdot \frac{\mu_{\mathrm{gr}}^{2}}{e_{\mathrm{el}}^{2}} ,$$

$$\xi_{g,e} = \frac{D_{gr}}{D_{el}} \triangleq 12.30\ 149\ 43\ 539\ 35 \cdot 10^{+3} \quad \text{with} \quad D_{gr}(\boldsymbol{\tau}),\ D_{el}(e) \quad . \tag{174}$$

A clear introduction to the given conditions is the Shapiro delay [69]. From the definition for an infinitesimal time interval

$$\mathrm{d}\boldsymbol{\tau} = \sqrt{+g_{00}(r)}\ \frac{\mathrm{d}x^0}{c} \quad , \tag{175}$$

and $x^0 = c\,t$ as time component, the intrinsic time measured by an external observer the radial length contraction near an *m* becomes

$$\mathrm{d}x_r = \sqrt{-g_{11}(r)}\ \mathrm{d}r \quad . \tag{176}$$

In this delay an existing attractive gravitational potential (negative) the measured locale speed of light relative to *m* of a light beam – related to the Schwarzschildt radius $r_s = 2r_G$ – will appear locally less than $c_0$ in the zero potential,

$$c_{n,\,\text{radial}} = c_0 \cdot \left(1 - \frac{r_s}{r}\right) \ , \qquad c_{n,\,\text{transv}} = c_0 \cdot \left(1 - \frac{r_s}{r}\right)^{½} \quad . \tag{177}$$

Due to the length contraction, the gravitostatic – though not subject to a shielding – in accordance to GR gradually loses its effect with increasing distance from an *m* compared to electrostatic. This phenomenon is reminiscent of the angle $\vartheta_{gr,el}$ described above and can be easily as well as impressively illustrated

$$\begin{aligned} \vec{\Psi}_{el}(x \approx d_e)\ \square\ \vec{\Psi}_{gr}(x \approx d_e) &\longrightarrow \vec{\Psi}_{el}\ \square\ \vec{\Psi}_{gr} \\ \vec{\Psi}_{el}(x \gg d_e) \parallel \vec{\Psi}_{gr}(x \gg d_e) &\longrightarrow \vec{\Psi}_{el} \cdot \vec{\Psi}_{gr} \quad . \end{aligned} \tag{178}$$

Since, at the moment neither any *m* let alone a "mighty" graviton *M* is shown such a statement is still irrelevant up to now.

## 29 Factors for gravitoelectrodynamics compare to pure electrodynamics

The considerations made so far suggest a reference to the Maxwell´s equations of electrodynamics, since they establish a vectorial connection between, in this case, electric and magnetic fields. Such a set in a system of equations could be useful to a certain extent in relation to gravity. To do this, the fields must essentially be adapted to the gravitational conditions creating a new set of equations.

In short summary the electric flux density respective electric displacement field $\vec{D}^{el}$ and the magnetic field strength $\vec{H}^{el}$ are only auxiliary fields introduced in order be able to maintain the structure of the Maxwell´s equations of the vacuum in matter as well. The physically relevant measured variables are the electric field strength $\vec{E}^{el}$ and the magnetic flux density respective magnetic induction $\vec{B}^{el}$. For materials without polarization nor magnetization the constitutive relations are the permittivity of free space $\varepsilon_0^{\mathrm{el}}$ and the permeability of free space $\mu_0^{\mathrm{el}}$ to connect. As well known means clear and detailed

$$\vec{D}^{\mathrm{el}} = \varepsilon_0^{\mathrm{el}} \cdot \vec{E}^{\mathrm{el}} \quad \text{and} \quad \vec{B}^{\mathrm{el}} = \mu_0^{\mathrm{el}} \cdot \vec{H}^{\mathrm{el}} \quad , \quad c^2 = \frac{1}{\varepsilon_0^{\mathrm{el}} \cdot \mu_0^{\mathrm{el}}} \quad , \qquad (179)$$

$$\alpha^{\mathrm{el}} = \frac{e^2}{2 \cdot h \cdot c \cdot \varepsilon_0^{\mathrm{el}}} \quad \rightarrow \quad \varepsilon_0^{\mathrm{el}} = \frac{e^2}{2 \cdot h \cdot c \cdot \alpha^{\mathrm{el}}} \; , \; \mu_0^{\mathrm{el}} = \frac{2 \cdot h \cdot \alpha^{\mathrm{el}}}{e^2 \cdot c} \quad . \qquad (180)$$

In the next it is to "transform" or respective convert the designations el into gr. The dimensionless quantity fine-structure constant $\alpha$ is a fundamental physical constant quantifying the strength of the EM interaction between elementary charged particles and independent of the system of used units. Appropriate for interpretation or determination of the two mentioned electrodynamic constants this is the starting point and should speak for the gravitational interaction in a comparable way. Such a project can be achieved in exact analogy to the intrinsic derivation of $\alpha$ already presented before [10] in simply replace the elementary charge **e** with $\mu_{\mathrm{g}} \triangleq m_{\mathrm{min}}$ and this must be explained in detail.

From electrostatic point of view related to the critical speed [28, 29] gets

$$\begin{aligned} \gamma^{-1} &= \sqrt{1 - \frac{\mathrm{v}_{\mathrm{crit}}^2}{c^2}} \\ &= \sqrt{\frac{1 - (2h\ \varepsilon_0\ c / q^2)^2}{1 + (2h\ \varepsilon_0\ c / q^2)^2}} \\ &= \frac{1}{1 + (2h\ \varepsilon_0\ c / q^2)^2} \\ &\approx \frac{(q^{\mathrm{el}})^2}{2h\ \varepsilon_0^{\mathrm{el}}\ c} = \alpha^{\mathrm{el}} \end{aligned} \quad . \qquad (181)$$

Of course, an analogue comparison requires the integrity

$$\left[\frac{1}{(4\pi\,\varepsilon_0)}\right]^{\mathrm{el}} \triangleq G^{\mathrm{gr}} \quad \rightarrow \quad \varepsilon_0^{\mathrm{el}} \triangleq \left[\frac{1}{(4\pi\,G)}\right]^{\mathrm{gr}} \quad , \qquad (182)$$

because

$$\alpha^{\mathrm{el}} = \frac{(q^{\mathrm{el}})^2}{2 \cdot h \cdot c \cdot \varepsilon_0^{\mathrm{el}}} \quad , \quad \varepsilon_0^{\mathrm{el}} \triangleq \left[\frac{1}{(4\pi G)}\right]^{\mathrm{gr}} \tag{183}$$

displays

$$\alpha^{\mathrm{gr}} = \frac{(4\pi G) \cdot (q^{\mathrm{gr}})^2}{2 \cdot h \cdot c} \equiv \frac{G \cdot (q^{\mathrm{gr}})^2}{\hbar \cdot c} \quad . \tag{184}$$

Now the electric charge has to be replaced by a fictitious mass charge $M \longrightarrow q^{\mathrm{gr}}$, *i. e.*, matter. belonging to gravitation eq. (22). Now the electric charge **e** has to be replaced via an $M$ per

$$\alpha^{\mathrm{gr}} = \frac{G \cdot (q^{\mathrm{gr}})^2}{\hbar \cdot c} \longrightarrow \frac{G \cdot M^2}{\hbar \cdot c} \quad . \tag{185}$$

From here the two constants associated with gravity can be determined, which are then analogous to the Maxwell´s equations in ED the factors

$$\alpha^{\mathrm{gr}} = \frac{G \cdot M^2}{\hbar \cdot c} \left[\frac{\mathrm{m}^3 \cdot \mathrm{kg}}{\mathrm{J} \cdot \mathrm{m}}\right] , \left[s^2\right] \quad , \tag{186}$$

$$\varepsilon_0^{\mathrm{gr}} = \frac{1}{(4\pi G)} \left[\frac{\mathrm{kg} \cdot \mathrm{s}^2}{\mathrm{m}^3}\right] \Leftrightarrow \frac{1}{\varepsilon_0^{\mathrm{gr}}} = (4\pi G) \left[\frac{\mathrm{m}^3}{\mathrm{kg} \cdot \mathrm{s}^2}\right] \tag{187}$$

$$\mu_0^{\mathrm{gr}} = \frac{(4\pi G)}{c^2} \left[\frac{\mathrm{m}}{\mathrm{kg}}\right] \Leftrightarrow \frac{1}{\mu_0^{\mathrm{gr}}} = \frac{c^2}{(4\pi G)} \left[\frac{\mathrm{kg}}{\mathrm{m}}\right] \tag{188}$$

generally known via

$$\mu_0^{\mathrm{gr}} = \frac{1}{\varepsilon_0^{\mathrm{gr}} \cdot c^2} \quad .$$

can be involved to later show the “Gravito Maxwell´s equations”. In accordance with the above agreement, the symbols for gravito-dynamics are made clear in Greek characters

$$\vec{D}^{\mathrm{el}} = \varepsilon_0^{\mathrm{el}} \cdot \vec{E}^{\mathrm{el}} \longrightarrow \vec{D}^{\mathrm{gr}} = \varepsilon_0^{\mathrm{gr}} \cdot \vec{E}^{\mathrm{el}} \leftrightarrow \vec{\delta} = \varepsilon_0^{\mathrm{gr}} \cdot \vec{E}^{\mathrm{el}} \quad ,$$

$$\vec{B}^{\mathrm{el}} = \mu_0^{\mathrm{el}} \cdot \vec{H}^{\mathrm{el}} \longrightarrow \vec{B}^{\mathrm{gr}} = \mu_0^{\mathrm{gr}} \cdot \vec{H}^{\mathrm{el}} \leftrightarrow \vec{\beta} = \mu_0^{\mathrm{gr}} \cdot \vec{H}^{\mathrm{el}} \quad , \tag{189}$$

giving the Maxwell´s equations assigned to gravitodynamic

$$\vec{\nabla} \cdot \vec{D}^{\mathrm{el}} \equiv \vec{\nabla} \cdot (\varepsilon_0^{\mathrm{el}} \cdot \vec{E}^{\mathrm{el}}) = \rho^{\mathrm{el}} \leftrightarrow \vec{\nabla} \cdot \vec{\delta} = \rho^{\mathrm{gr}}$$

$$\vec{\nabla}\cdot\vec{B}^{\,\mathrm{el}} \equiv \vec{\nabla}\cdot(\mu_0^{\mathrm{el}}\cdot\vec{H}^{\,\mathrm{el}}) = 0^{\mathrm{el}} \quad\leftrightarrow\quad \vec{\nabla}\cdot\vec{\beta} = 0^{\mathrm{gr}}$$

$$\vec{\nabla}\,\square\,\vec{D}^{\,\mathrm{el}} \equiv \vec{\nabla}\,\square\,(\varepsilon_0^{\mathrm{el}}\cdot\vec{E}^{\,\mathrm{el}}) = -\frac{\partial\vec{B}^{\,\mathrm{el}}}{\partial t} \quad\leftrightarrow\quad \vec{\nabla}\,\square\,\vec{\delta} = -\frac{\partial\vec{\beta}}{\partial t}$$

$$\vec{\nabla}\,\square\,\vec{B}^{\,\mathrm{el}} \equiv \vec{\nabla}\,\square\,(\mu_0^{\mathrm{el}}\cdot\vec{H}^{\,\mathrm{el}}) = +\frac{\partial\vec{D}^{\,\mathrm{el}}}{\partial t} \quad\leftrightarrow\quad \vec{\nabla}\,\square\,\vec{\beta} = +\frac{\partial\vec{\delta}}{\partial t}. \tag{190}$$

These expressions are valid for the free space and in vacuum, whereas for the latter it sounds generally

$$\vec{\nabla}\,\square\,\vec{B}^{\,\mathrm{el}} \equiv \vec{\nabla}\,\square\,(\mu_0^{\mathrm{el}}\cdot\vec{H}^{\,\mathrm{el}}) = +\mu_0^{\mathrm{el}}\cdot\varepsilon_0^{\mathrm{el}}\cdot\frac{\partial\vec{D}^{\,\mathrm{el}}}{\partial t} + \mu_0^{\mathrm{el}}\cdot\vec{I}^{\,\mathrm{el}}$$

$$\leftrightarrow\quad \vec{\nabla}\,\square\,\vec{\beta} = +\mu_0^{\mathrm{gr}}\cdot\frac{\partial\vec{\delta}}{\partial t} + \mu_0^{\mathrm{gr}}\cdot I^{\mathrm{gr}}(D)\ ,\ \text{ with } D \text{ the distance}. \tag{191}$$

Here, it is remarkable to recognize

$$I^{\mathrm{gr}}(D_x) \neq I^{\mathrm{gr}}(D_{\pm\infty}) \quad\longrightarrow\quad I^{\mathrm{gr}}(D_{x\cong d_e}) \gg I^{\mathrm{gr}}(D_{x\gg d_e}) \tag{192}$$

as a GR effect and not linear.

## 30 Observation *m* as matter and heat

In the last section it became already clear an m (mass packet) – here defined moving in ***x***-direction – cannot be described linearly in its movement. At both very big (massive) *m* and relatively short distances *D* the gravitational effect comes to the fore outweighing electrostatics. Such a state is to be expected in the following calculation, which is why general relativistic, GR conditions clearly prevail. The gravitational flow is therefore considered in particular, since an EM will presumably form in the chamber, then be interpreted as a real *m*. For an in-depth consideration, some statements are required which relate to the basic statement or respective definition of the measurement of a body, $m(d_{\mathrm{el}}) \leftrightarrow m(d_e)$. These say

$$m^{\mathrm{el}}(D_x) \neq m^{\mathrm{el}}(D_{\pm\infty}) \quad\longrightarrow\quad m^{\mathrm{el}}(D_{x\cong d_e}) \ll m^{\mathrm{el}}(D_{x\gg d_e})$$

$$I^{\mathrm{gr}}(D_x) \neq I^{\mathrm{gr}}(D_{\pm\infty}) \quad\longrightarrow\quad I^{\mathrm{gr}}(D_{x\cong d_e}) \gg I^{\mathrm{gr}}(D_{x\gg d_e})$$

$$m_{\mathrm{el}}^{x}(d_{\mathrm{el}}^{x}):\ m_{\mathrm{el}}^{x}(d_{\mathrm{el}}^{x}) \longrightarrow m_{\mathrm{el}}^{x}(D_{x\longrightarrow\infty}) \overset{!}{\gg} m_{\mathrm{el}}^{x}(D_{x=d_e})$$

$$m_{\mathrm{gr}}^{x}(d_{\mathrm{el}}^{x}) : m_{e}^{x}(d_{\mathrm{el}}^{x}) \longrightarrow m_{\mathrm{gr}}^{x}(D_{x \longrightarrow \infty}) \overset{!}{\ll} m_{\mathrm{gr}}^{x}(D_{x = d_{e}}) \quad . \tag{193}$$

These statements may sound superfluous, but they make it clear what the relationship between the gravitational effect and electrodynamics means. The particle (body) is defined $m(d_e)$ via the electrostatics. It is to be regarded as a real *m* to which an attraction force of both electrostatic nature and outside gravitational (!) refers. The *m* is the nature of and inside the body, not influenced from the outside, only measured from the distance in the *x*-direction with increasing distance between the two interacting bodies considered as mentioned above already, not in *y*- and *z*-direction; the latter both behave constant in this movement (Figs. 9, 10).

All of the previous statements reveal that a gravitational effect may be present, but this is not of much use in the analysis. It is true a true an existing and real worth particle must be able to be transported out of the chamber where it is created. This “chamber” is the birth of being. It will thus be located between the two worlds, characterized by electrostatics, since here, according to the above announcements, gravitation recedes into the background. It must also be calculated how the chamber should be designed, because the two real mechanical “Casimir-Polder plates” do not really exist here: it is rather a fictitious structure. However, it can be expected standing waves can form within the specified limits in analogy to Casimir and Polder, whereby two half-waves can exist within this space. Each half-wave in

$$\lambda_{x\,\mathrm{total}}^{\mathrm{el}} = \left| \frac{+\lambda_{x}^{\mathrm{el}}}{2} \right| + \left| \frac{-\lambda_{x}^{\mathrm{el}}}{2} \right| \tag{194}$$

will claim a spin 1, both together spin 2 [11], These two half-waves are mirror images of each other, since time seen from the “center point” within the chamber is running forwards and backwards, just like the waves or associated and assigned *m*; they are mirrored to each other, thus the one is vertically in *z*-direction turned around to the other giving a total of a one complete wave together. These two half-waves do not cancel each other out [9]. The legitimate question is about the proper and real system, because it would actually be with the running index

$$\lambda_{\mathrm{chamber}}^{\mathrm{el}}(n) = \lambda^{\mathrm{el}} \cdot \frac{n_{\mathrm{inside}}^{\mathrm{el}}}{n_{\mathrm{outside}}^{\mathrm{el}}} \approx 0 \ ! \quad , \tag{195}$$

$$x_{\mathrm{limit}} = \frac{n_{\mathrm{crit}}+1}{n_{\mathrm{crit}}} \cdot x_{\mathrm{free}} \quad ,$$

one cycle $n$=1 more inside the chamber, where the one complete wave exists alone, in contrast all the modes *n* outside remain in free space. According to the entropy already addressed in eq. (60)

$$\Delta S(t>0) \geq 0 \ , \ \Delta S(t<0) \leq 0 \ , \ \Delta S(t=0) = \mathrm{e}^{-\boldsymbol{i}(\omega_{\mathrm{C}} \cdot t_{\mathrm{C}})} \left[ \frac{+, -, \pm \mathrm{J}}{+K} \right] \tag{196}$$

and the statistics

$$\langle n(E) \rangle = \frac{1}{\mathrm{e}^{(E-\mu)/(k_{\mathrm{B}} \cdot T)} - 1} \ , \quad E - \mu > 0 \quad \text{Bose} - \text{Einstein} \quad ,$$

$$\langle n(E)\rangle = \frac{1}{e^{(E-\mu)/(k_B \cdot T)} + 1} \quad , \qquad \text{Fermi} - \text{Dirac}$$

,

and these statistics go at the barriers of the chamber due to the energy – entailed both from the current and the very high electrical voltage to be expected at both ends (left and reight) – a very large amount of heat is generated transfering directly into

$$\langle n(E)\rangle = e^{-E/(k_B \cdot T)} \quad , \qquad \text{Boltzmann} \quad . \tag{197}$$

.

The spin of the body itself is remaining constant. Consequently, something else is to be expected, because an *m* respective matter – even if it only exists in the chamber – will not simply disappear. With regard to thermodynamics, a few remarks must be made.

The energy expected at the edges of the chamber will be enormous meaning very high temperatures are generated leading to plasmatization of the observed particle, which also - as mentioned above - leads to an "escape" or leaving from the chamber for a particle only vertically, so in the *z*-direction, is possible, not in the direction of the gravitational stream $I_g(x)$. This is represented in classical terms of thermodynamics

$$dU = dQ - p \cdot dV \quad ; \quad U, Q \ [\mathrm{J}]$$

$$\Delta G = \Delta H - T \cdot \Delta S \longrightarrow dG = dH - T \cdot dS \quad ; \quad G \ [\mathrm{J}]$$

$$dH = d(U + p \cdot V) \equiv dU + p \cdot dV + V \cdot dp \quad , \quad dU = dQ - p \cdot dV$$

$$dH = dQ \quad \text{at} \quad dp, dV \overset{!}{=} 0 \quad ; \quad H, Q \ [\mathrm{J}]$$

$$E_{\text{therm}} = k_B \cdot T \quad , \quad \langle E_{\text{mec}}\rangle = \frac{3}{2} k_B \cdot T \tag{198}$$

Within the chamber regarding the barriers

$$s_g \equiv D_x \triangleq 1.80\ 471\ 05\ 521\ 49\ 922 \cdot 10^{-33}\,\mathrm{m}$$

shows the energy for an *M* as

$$E_g(D_x) \triangleq 4.96\ 842\ 85\ 806\ 69 \cdot 10^{+144}\,\mathrm{J} \quad . \tag{199}$$

Within physics, the Ehrenfest´s theorem establishes a connection between classical mechanics and quantum mechanics. It states under certain conditions the classical equations of motion apply to the mean values of quantum mechanics; so classical mechanics is to some extent contained within quantum mechanics. This means that the expected value of the position moves on a classical trajectory and follows the classical equation of motion. The Ehrenfest´s theorem thus leads directly to an analogy between quantum mechanics and classical mechanics. However, this statement and thus also the classic equation of motion for quantum mechanical expected values only apply exactly if, *e. g*., the force ***F*(*x*)** is a linear function of the position *x*. This applies to the simple cases of the harmonic oscillator or the free particle because then all spatial derivatives of the force of degree greater than or equal to 2 vanish. Furthermore, the theorem holds when the breadth of the probability of presence is small compared to the typical length scale on which the force $\boldsymbol{F(x)}$ varies. According to the Ehrenfest´s Theorem ([86] a wave in quantum theory can be assigned a mechanical *m* to allow the relativistic invariant thermodynamic relation

$$E_{\text{therm}} = k_{\text{B}} \cdot T \quad , \quad \langle E_{\text{mec}} \rangle = \frac{3}{2} k_{\text{B}} \cdot T \qquad , \qquad (200)$$
$$k_{\text{B}} = 13.80\ 649 \cdot 10^{-24} \frac{\text{J}}{\text{K}}$$

→

$$T_g(x) = \frac{2E_{\text{mec}}}{3k_{\text{B}}} \triangleq 4.60\ 216\ 33 \cdot 10^{+165}\ {}^{\circ}\text{K} \qquad (201)$$

illustrative the conditions in the immediate vicinity of two interacting particles through the gravitational effect; a description of the gravitational flow or respective current seems to be superfluous at this point. Such a high temperature would lead to a transfer of the state of aggregation into a plasma (plasmatisation). Since already mentioned above the electrostatic interaction is far-reaching, and this must be proven and explicitly shown.

## 31 Large distance interaction in electrostatics

Following recent investigations it has been determined and proved the *y*-component in the propagation of a wave interacting with a co-wave can then be neglected as soon as interaction processes are first-order and linear [87]. This is factual in the present work. It is the task in this section to show

1) the specific position in space where transition can take place inside the chamber

2) show a reason for a far-reaching or respective long-ranging electrostatic interaction

3) provide an intrinsic theory later generating real matter and also can justify time reversal

The exact and sole location will be between the two “worlds” or respective posi-verse and nega-verse, *i.e.*, far outside the strong effects of gravity with electrostatic predominating.

In a kind of reversal in the discussion on BH [10], the following can be written. Essentially it is about the parallel setting of the propagation, also parallel to the time coordinate

$$\Delta r'_{\parallel}(r) = r_{\text{S}} \cdot \sqrt{\frac{r}{r_{\text{S}}}} + \frac{r_{\text{S}}}{2} \cdot \ln\left[2\frac{r}{r_{\text{S}}} - 1 + 2 \cdot \sqrt{\frac{r}{r_{\text{S}}}\left(\frac{r}{r_{\text{S}}} - 1\right)}\right] \quad ,$$

and according to the agreement and to distinguish the radius outside upper case symbols *R* are chosen in contrast to the radius inside the interacting bodies in lower case *r*. The relationships become more clearly how the relationships behave via exponentiation providing

$$e^{(\Delta R'_{\parallel}(R))} = e^{(r_{\text{S}} \cdot \sqrt{R/r_{\text{S}}})} \cdot \left\{ e^{(r_{\text{S}}/2)} + \left[2\frac{R}{r_{\text{S}}} - 1 + 2 \cdot \sqrt{\frac{R}{r_{\text{S}}}\left(\frac{R}{r_{\text{S}}} - 1\right)}\right]\right\}$$

→

$$e^{(\Delta R'_{\parallel}(R))} = e^{(r_{\text{S}} \cdot \sqrt{R/r_{\text{S}}} + (r_{\text{S}}/2)}$$

$$+\,e^{\left(r_S \cdot \sqrt{R/r_S}\right)} \cdot \left\{ \frac{2R}{r_S} - 1 + 2 \cdot \sqrt{\left(\frac{R}{r_S}\right)^2 - \frac{R}{r_S}} \right\} \quad . \tag{202}$$

This is still the parallel statement and the same as the time interval behaves. Thus, the conditions will change at speeds faster than light – superluminarity – *i., e.*, transition from a "universe", posi-verse, to an "anti-universe" or respective nega-verse into reciprocal behavior [10]. When viewed

$$R_x^+ \gg r_{S,x}^+ \quad , \qquad R_x^- \ll r_{S,x}^- \tag{203}$$

it is only necessary to explain the positive side, since the negative through the reciprocal behavior as `conjugate transposed´ presents itself the same way and the terms behave

$$e^{\left(\Delta R'_{\parallel}(R)\right)} = e^{\left(\sqrt{R \cdot r_S} + (r_S/2)\right)}$$

$$+\,e^{\left(\sqrt{R \cdot r_S}\right)} \cdot \left\{ \frac{2R}{r_S} - 1 + 2 \cdot \sqrt{\left(\frac{R}{r_S}\right)^2 - \frac{R}{r_S}} \right\} \quad . \tag{204}$$

Now, $R = R_{\text{uni}} \quad , \quad r_S : \text{Schwarzschild radius}$ are not unknown, so this is not an approximation in the true sense, which would not allow an exact intrinsic proof. The distance $D$ between the two rooms, *i. e*, the diameter of the positive universe, posi-verse needs to be clarified. The coordinate $z$ is still perpendicular to $\boldsymbol{x}$, $z \perp x$ . Although the gravitational current $I_g(x)$ runs in $\boldsymbol{x}$-direction, the same direction as the time vector $x_0$ , there is an interaction between the two spaces on the electrostatic basis in $\boldsymbol{z}$-direction. The reason is the quasi-circulation of such a current through the electrostatic "rings" around the propagation current (Fig.7), as mentioned above is

$$D_{\text{uni}} \equiv \frac{\Delta v}{\tau} = \frac{v_T - v_B}{\tau} \triangleq \frac{16.17\ 809\ 31\ 391\ 73 \cdot 10^{+3}\ \text{m/s}}{38.12\ 124\ 49\ 662\ 89 \cdot 10^{-45}\ \text{s}}$$

$$= 0.42\ 438\ 52\ 254\ 42 \cdot 10^{+48}\ \text{m} \quad ,$$

$$R_{\text{uni}} = \frac{D_{\text{uni}}}{2} \triangleq 0.21\ 219\ 26\ 127\ 21 \cdot 10^{+48}\ \text{m} \tag{205}$$

Such an expression involving this $\boldsymbol{\tau}$ is semi-classical. A modification happens in a special-relativistic way through time-dilation. The other formulas are listed explicitly to avoid confusion with many symbols, *e.g.*, in this case $\boldsymbol{\gamma}$.

## 32 Electrostatic distances and time transition

In this paragraph, the distance between the two rooms needs to be clarified. The coordinate $z$ is almost still perpendicular to $x$ , $z \perp x$ . Although the gravitational current $I_g(x)$ runs in the $x$-direction, *i.e.*, the same direction as the time vector $X_0$ there is an interaction between the two spaces on the electrostatic basis in *z*-direction. The reason is the quasi-circulation of such a current through the electrostatic "rings" around the propagation current, as mentioned above is

$$s_{\text{ideal}} \equiv \frac{\Delta v}{\tau} = \frac{v_T - v_T}{\tau} \triangleq \frac{16.17\,809\,31\,391\,73 \cdot 10^{+3}\ \text{m/s}}{38.12\,124\,49\,662\,89 \cdot 10^{-45}\ \text{s}}$$

$$= 0.42\,438\,52\,254\,42\,648 \cdot 10^{+42}\ \text{m} \quad . \qquad (206)$$

Such an expression involving this $\tau$ is semi-classical. A modification happens in a special-relativistic way through time-dilation. The other formulas are listed explicitly to avoid confusion with many symbols, *e. g.*, in this case $\gamma$. With

$$\Delta v = c - v_B \triangleq 0.29\,978\,43\,903\,37\,15 \cdot 10^{+9}\ \text{m/s}$$

leaves for the time factor

$$\tau_{\text{rel}} = \tau_{\text{class}} \cdot \frac{1}{\sqrt{1 - \frac{(\Delta v)^2}{c^2}}} \longrightarrow \tau_{\text{rel}} = \tau_{\text{class}} \cdot \frac{1}{\sqrt{1 - \frac{(c - v_B)^2}{c^2}}}$$

(207)

in positive direction or respective positive space. As a result, it is only halfway between the two worlds. Therefore, *D* will refer to one side making it easier to include the angle $\vartheta$. The numeric value of the time interval factor is

$$\zeta = \frac{1}{\sqrt{1 - \frac{(c - v_B)^2}{c^2}}} \triangleq 4.30\,473\,76\,329\,98\,901 \cdot 10^{+3} \quad . \qquad (208)$$

Here, the electrostatic shows up appearing in a plate capacitor, but the angle $\vartheta$ still has to be considered since the interaction is not linear, not straight ahead,

$$2\vartheta(x, z) \approx 0\ 21\,606\,15\,703\,27\,352 \cdot 10^{-6}\ ⌜ \quad ,$$

worded differently slightly differently, though clearer and more specific in the theme

$$2\vartheta(\alpha, G) \approx 0\ 21\,606\,15\,703\,27\,352 \cdot 10^{-6}\ ⌜ \quad .$$

## 14 Time reversal

The presence of virtual particles can be rigorously based upon the non-commutation of the quantized electromagnetic fields. Non-commutation means although the average values of the fields vanish in a quantum vacuum, their variances do not.[16] The term "vacuum fluctuations" refers to the variance of the field strength in the minimal energy state [17] and is described picturesquely as evidence of “virtual particles” [18] It is sometimes attempted to provide an intuitive picture of virtual particles, or variances, based upon the Heisenberg energy-time uncertainty principle.

According to present-day understanding of what is called the vacuum state or the quantum vacuum, it is "by no means a simple empty space".[88]. According to quantum mechanics, the vacuum state is not truly empty but instead contains fleeting electromagnetic waves and particles that pop into and out of the quantum field.
It follows from Kramer's theorem that the degeneracy of any energy state can never be completely lifted simply by applying an electric field ([91. Further follows from Kramer's theorem [89, 90].

The degeneracy of any energy state can never be completely lifted simply by applying an electric field [89]. According to present-day understanding called the vacuum state or the quantum vacuum, it is “by no means a simple empty space”, similar the universe. In according to quantum mechanics the vacuum state is not truly empty it is rather and instead containing a fleeting electromagnetic waves and particles pop into and out of the quantum field [89, 90]. It follows from Kramer's theorem the degeneracy of any energy state can never be completely lifted simply by applying an electric field [90]. This is in accordance to Tasaki [95].

The Kramers' theorem holds in the presence of electric fields, since these do not affect the time-reverse invariance of the Hamiltonian $\mathcal{H}$ while the presence of magnetic fields breaks the time-reverse invariance of the Hamiltonian $\mathcal{H}$ (***r***, *t*). For the form of the Hamilton operator see charged, spinless particle in the electromagnetic field, further additive terms for the consideration of the spins cannot restore the time reversal invariance.

$$\begin{aligned} &\boldsymbol{\vartheta}_{x,z} = \boldsymbol{\vartheta}_{x_0,z}\,, && \text{with } x \equiv X_0 \text{ the time component} \\ &\vec{P}(r)\cdot\vec{r} = \frac{\hbar}{2} && \text{Heisenberg} \\ &\vec{P}(r)\cdot\vec{r} = \boldsymbol{\vartheta}(z,y)\cdot\frac{\hbar}{2} && \text{correctur due to vector } y \\ &|\, p(\boldsymbol{\vartheta} > 0)| \leftrightarrow |\, p(\boldsymbol{\vartheta} = 0)| \quad \longrightarrow \quad |\, p(\boldsymbol{\vartheta} > 0) > p(\boldsymbol{\vartheta} = 0)| \end{aligned} \tag{209}$$

However, this statement is not very important at this moment for a state of discussion here, since within the “chamber” only affects a slanting position affecting *G* (Figs. 6, 10, 11) – recalled later; It serves completeness in the theory as the vacuum state or the quantum vacuum in a simple empty space. The question is from where does the energy comes for a time transfer and, coupled with it, the matter, both of which are evoked "out of nowhere" (Figs. 1-3, 8).

The vacuum state is associated with a zero-point energy, and this zero-point energy is equivalent to the lowest possible energy state has measurable effects, *e.g.,* Casimir and Polder [54, 55]. In the laboratory it may be detected as the Casimir-Polder effect (Figs. 8, 13, 14). This does not mean the opposite plates must be exactly parallel [94]. As mentioned before a former mentioned $\boldsymbol{\vartheta}$ influences them resulting from the ***y***-component, which has so far hardly been considered and is also not exactly perpendicular to the propagation in *x*-direction, *i.e.*, perpendicular to the propagation of the beam in *x*-direction.

In physical cosmology the energy of the cosmological vacuum appears as the cosmological constant. In fact, the energy of a cubic centimeter of empty space has been calculated figuratively to be one trillionth of an 0.6 eV). An outstanding requirement imposed on a potential `Theory of Everything´ is the energy of the quantum vacuum state must explain the physically observed cosmological constant.

The Heisenberg uncertainty will be minimal if the two vectors exactly canonical conjugate (Fig.6). If this is not the case these vectors are also – in the simplest case *x* and $\vec{P}_x$ – are not exactly parallel due to the case of $\boldsymbol{\vartheta}$. Thus, the "chamber” is not exactly a kind of cube, but slightly crooked (Fig. 10).

The vacuum state is associated with a zero-point energy, and this zero-point energy (equivalent to the lowest possible energy state) has measurable effects. In the laboratory, it may be detected as the effect of Casimir and Polder. In physical cosmology, the energy of the cosmological vacuum appears as the cosmological constant. In fact, the energy of a cubic centimeter of empty space has been calculated figuratively to be one trillionth of an erg (or 0.6 eV). An outstanding requirement imposed on a potential Theory of Everything is that the energy of the quantum vacuum state must explain the physically observed cosmological constant. In cosmology, the cosmological constant denoted in the Greek capital letter lambda **Λ** is the constant coefficient of a term added in the field equations of general relativity from Hilbert [96]. Later it was revived and reinterpreted as the energy density of space, or vacuum energy arising in quantum mechanics. It is closely associated with the concept of dark energy [97] seeing the cosmological constant and dark energy. Even though this statement is important to complete understanding, it is not decisive to the present theory. The time quantization in the Cordula constant $\boldsymbol{\tau}$ and the consideration of the influence of the coordinate *y*, which has an effect on G, is essential

$$G = G(\vartheta)\,, \quad \text{with} \quad \vartheta(y) \quad . \qquad (210)$$

This means within the chamber the propagation dominates in the *x*-direction, since this is determined on the frequency $\boldsymbol{\nu}$ according to the energy $E_{\text{wave}} = h\nu \equiv mc^2$, but there is a fluctuation due to the quasi-perpendicular *G* to the propagating wave consequently

$$\Delta E \cdot \Delta t = \frac{\hbar}{2} \text{ Heisenberg minimum}\,,\ \Delta E \cdot \Delta t = \frac{\hbar}{2} + \sin\vartheta \quad \text{Heisenberg actual} \quad . \qquad (211)$$

The character in the oscillation and variable of $\boldsymbol{t}$ inside the chamber can be illustrated in words.

A variable speed of light, VSL is a feature of a family of hypotheses stating the speed of light may in some way not be constant. It varies in space or time, or depending on frequency. Accepted classical theories of physics, and in particular GR, predict a constant speed of light in any local frame of reference and in some situations these predict apparent variations of the speed of light depending on frame of reference. There are various alternative theories of gravitation and cosmology; many of them non-mainstream, incorporate variations in the local speed of light.

Attempts to incorporate a variable speed of light into physics were made from *e. g*., Dicke in 1957 [98]. The VSL should not be confused with faster than light theories, its dependence on a medium's refractive index or its measurement in a remote observer's frame of reference in a gravitational potential. In this context, the “speed of light” refers to the limiting speed *c* of the theory rather than the velocity of propagation of photons.

The conditions outside and inside the chamber are decisive and very important to constitute. Due to its simplicity, this theory can be based on the example of Casimir and Polder, since only the three Cartesian coordinates are taken into account here. The two plates are pressed together from the enormous force / energy from the outside. The condition inside the chamber is totally different, since a standing wave prevails here. Outside the waves are uncontrolled, *i.e.,* freely swinging / oscillating, hence this enormous power from outside the chamber (compare eq. 132). Inside the chamber, the constant time can be determined using the (still undisturbed) Heisenberg´s statistics with

$$\mu_g \triangleq 0.19\,339\,60\,010\,38\,087 \cdot 10^{-6}\,\text{kg} \quad \text{from } \boldsymbol{\tau} \quad . \qquad (15)$$

$$\boldsymbol{\tau} = 3.81\,212\,49\,466\,289 \cdot 10^{-44}\,\text{s} \quad . \qquad (2)$$

This compares the compression with the enormous effect of the undisturbed waves outside the fictitious plates, whereas the standing wave inside the chamber is subject to a restriction or respective limit. This statement is strictly valid for the time interval as well as the matter since both self properties are coupled, and of course nothing stands in the way of a transformation or transfer between time and matter.

It must be mentioned here again at this point there will be an oscillation in *y*-direction, which means the time interval within the chamber must not be regarded as a constant in rather as an oscillating time interval. Since in Cartesian space the three directions are almost perpendicular to each other or orthogonal (in the simplest case) the expression from Euler

$$\sin\, y \;=\; \frac{e^{+i\,y} - e^{-i\,y}}{2\,\boldsymbol{i}} \quad , \quad \cos\, z \;=\; \frac{e^{+i\,z} + e^{-i\,z}}{+2} \tag{212}$$

[99] can also support this image. It illustrates the enormous effect of the ***y***-component, which was a little thoughtless at the beginning, albeit has a special influence on the entire system under consideration of the relations inside the chamber. Now the challenge is to determine the minimum constants ***x*** and ***t*** inside the chamber. The required energy, which is enormous outside and certainly sufficient for a concrete discussion, is "borrowed" from the two sides outside the chamber, which touches the fictitious plates. From

$$\frac{\hbar}{2} \;=\; \Delta\, x_{\text{in}} \cdot \Delta\, p(\,x)_{\text{in}} \;\equiv\; x_{\min} \cdot (m_{\min} \cdot c)$$

the calculation allows the expressions

$$m_{\min} \;=\; \boldsymbol{?}$$

$$x_{\min} \;=\; \frac{\hbar}{2 \cdot m_{\min} \cdot c} \;=\; \boldsymbol{?} \quad ,$$

$$t_{\min} \;=\; \frac{\hbar}{2 \cdot m_{\min} \cdot c^2} \;=\; \boldsymbol{?} \quad . \tag{213}$$

Together with exact numerical values are be calculated via $t_{\min} \longrightarrow \boldsymbol{\tau}$ determined via

$$\boldsymbol{\tau} \;=\; 3.81\;212\;49\;466\;289 \cdot 10^{-44}\,\text{s} \tag{2}$$

indicating the quantization of time $\boldsymbol{\tau}$ or respective the minimal time interval. This is the absolute minimum, which determines the basis for further discussion in between two mutually parallel plates defining the chamber with an absolute restriction to external influences

$$m_{\min} \;=\; \frac{\hbar}{2 \cdot \boldsymbol{\tau} \cdot c^2} \qquad \hat{=}\; 15.38\;995\;57\;19 \cdot 10^{-9}\,\text{kg} \quad , \tag{214}$$

$$x_{\min} \;=\; \frac{\hbar}{2 \cdot m_{\min} \cdot c} \;\equiv\; \boldsymbol{\tau} \cdot c \;\hat{=}\; 11.42\;846\;30\;79 \cdot 10^{-36}\,\text{m} \quad , \tag{215}$$

except the "borrowed" tremendous energies from the outside of the two theoretical and apparent plates as mentioned above, already.

## 15 Integrate the coodinates and directions together

The first result still refers exclusively to the *x*-coordinate, which is analogous to the time variable $X_0$ in

$$m_0 \;\leftrightarrow\; X_0 \;\longrightarrow\; \boldsymbol{i}\,c\,t_{\min}\,,\;\; \textbf{real} \;\; m_0(\,\alpha) \;\leftrightarrow\; X_0(\,\alpha) \;\longrightarrow\; \boldsymbol{i}\,c\,t_{\min}(\,\alpha) \tag{216}$$

This seems very simple, but is not complete in terms of the *m* as hitherto been considered an absolute amount. The terms *m* and matter are to be interpreted 4-dimensional, *i. e*., rather show vectorial behavior.

In order be able to describe a tensor, which can couple the two interacting line elements the influence from electrostatics ($\alpha$) and gravitation ($G$) must be taken into account, because an oscillation will be induced relating precisely to the $y$-component, *i.e.*, $\boldsymbol{\vartheta}$. Such a tensor has been given elsewhere [11] in relation to the spin / rotation of a BH externally electrically non-electrically charged. The statement for the macroscopic area (astronomy) must also apply to the microscopic (atomic physics) and is the requirement of gravitoelektrodynamics. This tensor comes to

## 16 Tensor to mass

Since the vector character of $m$

$$m_{\text{general}}(x_{\boldsymbol{i}},\ i = 0-4) = \begin{bmatrix} m_0 \\ m_1 \\ m_2 \\ m_3 \\ m_4 \end{bmatrix} \tag{217}$$

has already been disclosed in the current study it is necessary for a better understanding to also describe a tensor, which in this respect can couple two line elements. Although, these elements

$$x_{\boldsymbol{j}}\ ,\ \ \boldsymbol{j} = 0,1,2,3,4 \quad \text{and} \quad x_{\boldsymbol{k}}\ ,\ \ \boldsymbol{k} = 0,1,2,3,4 \tag{218}$$

are seen having the same absolute value, they must be complementary in sign. First, the general conditions are presented before those to the actual modifications can be described. Hence, it is then

$$T_{\text{general}}(x_{\boldsymbol{i}},\ i = 0-4) = \begin{bmatrix} m_0 & 0 & 0 & 0 & 0 \\ 0 & m_1 & 0 & 0 & 0 \\ 0 & 0 & m_2 & 0 & 0 \\ 0 & 0 & 0 & m_3 & 0 \\ 0 & 0 & 0 & 0 & m_4 \end{bmatrix} \leftrightarrow \begin{bmatrix} m_0\,0\,0\,0\,0 \\ 0\,m_1\,0\,0\,0 \\ 0\,0\,m_2\,0\,0 \\ 0\,0\,0\,m_3\,0 \\ 0\,0\,0\,0\,m_4 \end{bmatrix} \tag{219}$$

to show the coupling

$$T_{\text{gen appl}}(x_i,\ i=0-4)\ =\ \begin{bmatrix} x_0 \\ x \\ y \\ z \\ w \end{bmatrix} \begin{bmatrix} m_0 & 0 & 0 & 0 & 0 \\ 0 & m_1 & 0 & 0 & 0 \\ 0 & 0 & m_2 & 0 & 0 \\ 0 & 0 & 0 & m_3 & 0 \\ 0 & 0 & 0 & 0 & m_4 \end{bmatrix} \begin{bmatrix} x_0 & x & y & z & w \end{bmatrix} . \qquad (220)$$

These expressions symbolize a static behavior, and for example a rotation of a BH or atom is of course not given here, which will require a modification condition in the following, since here still neither electrostatic( $\alpha \rightarrow$ ) nor gravitational influences ( $G \rightarrow$ ) and interactions are included. Before a sensible success of swapping the $m_i$ in the middle rows, it must first be ensured all of these $m_i$ are subject to relativistic conditions. Certainly $X_0(t) \rightarrow \alpha$ is the determining link, the time determine variable, which will later determine the energy of the entire chamber, determinate the included $X_4(t) \rightarrow G$. This is very complicated, albeit essential and a condition for perfect and correct construction of the constitution inside the chamber. All $m_i$ inside the chamber are subject to an oscillation in $\boldsymbol{\vartheta}$ due to the "*y*"-component of the system

$$\text{Vector}_{\text{real}}(x_i,\ i=0-4)\ =\ \begin{bmatrix} m_0(t) \\ m_1(\Delta t, \alpha) \\ -\sin\vartheta \cdot m_2(\Delta t, \alpha, G) \\ +\ m_3(\Delta t, G, \alpha) \\ m_4(G) \end{bmatrix} \triangleq \begin{bmatrix} t \\ x \\ -y \\ z \\ w \end{bmatrix} . \qquad (221)$$

This vector certainly verifies torsion required for a complete system and can then be included for description in a bending on condition description via a tensor [10, 11]. The minus sign (−) in the ***y***-component refers to the mutual trust in the half-wave (integer spin) inside the chamber and is justified from the KFG allowing an *m* to move forward and backward.

It is still evident the two plates delimiting the chamber exist only theoretically, not materially. The *m* are, of course, be understood relativistic but that is not important in this study at the moment. As diversity as well as relationships inside and or all *m* and the interactions between the *m* – both in terms of electrostatic and gravitational – have already been discussed in detail elsewhere. However, it is important to take the rotation into account and later to determine the energies be assigned to the *m* in the tensor and the overall system within the chamber. In simplest case rotation is described according to Kerr [100]. In Kerr geometry the geometry of empty space-time around a rotating uncharged axially symmetric black hole with a quasi-spherical event horizon is described. Though, the Kerr metric is an exact solution of the Einstein field equations of general relativity those equations are highly non-linear making exact solutions very difficult to find.

This statement plays no role in the present case, since a continuous movement, say oscillation, of ***t*** with associated coordinates and *m* can be taken as a basis. The proposed tensor reads therefore in accordance eq. (221)

$$\mathrm{Tensor}_{\mathrm{real}}(x_i,\ i=0-4)\ =\ \begin{bmatrix} m_0(t) \\ m_1(\Delta t,\alpha) \\ -\sin\vartheta\cdot m_2(\Delta t,\alpha,G) \\ +\ m_3(\Delta t,G,\alpha) \\ m_4(G) \end{bmatrix} \triangleq \begin{bmatrix} t \\ x \\ -y \\ z \\ w \end{bmatrix}$$
$$[\,x_0 \quad x \quad -y \quad z \quad w\,] \qquad , \qquad (222)$$

where the zeros have been omitted due to the size of the pictorial tensor. The problem of the *m* respective matter shape remains, which is determined via the electrostatic energy in $x_0 \rightarrow t(\alpha)$ and solely determines the gravitational compound $x_5 \rightarrow G$ .

In this project first must be ensured what values are generated in relation to the orthogonal component, depending on *G* due to. As shown above, the difference between electrostatic and gravitational interaction outside the chamber is enormous, inside the relationships are completely different. As mentioned, the 5-th (here numbered 4) coordinate is required to set up the chamber; In this case, the ***y***-coordinate with $\boldsymbol{\vartheta}$ plays a subordinate role, since it affects the oscillation but not the absolute magnitudes of the important coordinates in the vectors 0 and 4. This settles on the 5 times 5 tensor, $\mathrm{Tensor}_{\mathrm{dim}} \rightarrow 5\square 5$ , since the quantum theory according to the, *e. g.*, KGF refers to 5 dimensions [101] . Here, electromagnetic interactions can be incorporated forming the topic of being scalar, but because common spinless particles, *e.g.*, pions are unstable and also experience the strong interaction with unknown interaction term in the classical $\mathcal{H}$ (***r***, *t*) the practical utility is limited. In a first comparison the effects of electrostatic to gravitation show

$$\frac{E_e}{E_g} = \frac{e^2}{(4\pi\varepsilon_0)\cdot D}\,\frac{D}{G\cdot m^2} \equiv \frac{e^2}{m^2}\left[\frac{(4\pi\varepsilon_0)}{G}\right]$$
→
$$E_g = \frac{1}{E_e} \equiv \frac{m^2}{e^2}\,\frac{G}{(4\pi\varepsilon_0)}\ ,\ \text{with}\ \ m \equiv m_e$$
→
$$\frac{G}{(4\pi\varepsilon_0)} \triangleq 5.27\ 593\ 16\ 740\ 14\ 2\,204\cdot 10^{-3}\left[\mathrm{C}^2\cdot\mathrm{kg}^2\cdot\mathrm{s}\right] \qquad . \qquad (223)$$

The essence here is the relationship of the two acting influences $\boldsymbol{\alpha}$ and *G*. Albeit gravity seems to disappear behind the tremendous force of electrostatics gravity is not shielded, unlike electrostatic interactions. Furthermore, *G* is not truncated, *i.e.*, it is free to movement. Therefore, regardless of the other variables in the vectors, it lends itself to be described as a “mean” to an acceptable total value of *m* or say matter. In regardless of the other vectors, as off-diagonal elements in the tensor,

$$x_1,\ x_2,\ x_3\ \leftrightarrow\ m(x_1),\ m(x_2),\ m(x_3)$$

$$\uparrow\ [m_1, m_2, m_3] \approx [m_1, (1+\sin\vartheta)\cdot m_2, m_3] \tag{224}$$

a relationship will be established refer to absolute amounts,

$$m_e^2,\ m_g^2 \quad \longrightarrow \quad \pm\sqrt{m_e},\ \pm\sqrt{m_g} \quad . \tag{225}$$

Now, the search for the "upper cover"of the chamber remains and stands determined from the gravitational influence. A comparison of the two energies reveals in

$$\frac{E_e}{E_g} = \frac{e^2}{(4\pi\varepsilon_0)\cdot D}\frac{D}{G\cdot m^2} \equiv \frac{e^2}{m^2}\left[\frac{(4\pi\varepsilon_0)}{G}\right]$$

$\rightarrow$

$$E_g = \frac{1}{E_e} \equiv \frac{m^2}{e^2}\frac{G}{(4\pi\varepsilon_0)},\ \text{with}\ m \equiv m_e$$

$\rightarrow$

$$E_g = \frac{1}{E_e} \equiv \frac{m_e^2}{e^2}\frac{G}{(4\pi\varepsilon_0)} \triangleq 5.27\ 593\ 16\ 740\ 14\ 2\,204\cdot 10^{-3}\,\text{kg} \tag{226}$$

The cap of the so-called `time chamber´ is relatively "far away" from any cosmic system reflecting in the ratio of the gravitational force and the influence of the really strong long-ranging electrostatic [102]. This applies to the posi-verse as well as to the nega-verse though their signs for time and matter are reversed. It becomes now possible to determine a real mass – notwithstanding the $\boldsymbol{\vartheta}$ in the off-diagonal element $\boldsymbol{y}$-compound of the tensor, via the Pythagoras' theorem as in

$$E_{\text{chamber}} = \pm\sqrt{E_e^2 + E_g^2}\ \text{with}\ E = mc^2 \longrightarrow m_{\text{chamber}} = \pm\frac{E_{\text{chamber}}}{c^2}$$

$$E_{\text{chamber}} = \pm\sqrt{[E_e(\alpha)]^2 + [E_g(G)]^2}\quad \text{no off–diagonal / trace elements}$$

$$\text{with}\ \ E = mc^2 \longrightarrow m_{\text{chamber}} = \pm\frac{E_{\text{chamber}}}{c^2}$$

$$E_{\text{chamber}} = \pm\sqrt{[E_e(\alpha)]^2 + (-E_{g,\alpha})^2 + (E_{\alpha,g})^2 + [E_g(G)]^2}$$

$$\leftrightarrow\ \pm\sqrt{\sum_{\boldsymbol{i}=1}^{4} E_{\boldsymbol{i}}^2}\ ,\ \text{neither}\ X_0\,\text{nor}\ E_0\ \text{(the time compound)} \quad . \tag{227}$$

In this expression the time component $X_0 \longrightarrow m_0$ is not included as this runs parallel to $X_1 \longrightarrow m_1$ and is not significant or meaningful for the further calculation in relation to matter. Though, the ***y***-component in $X_2 \longrightarrow (1+\sin\vartheta)\cdot m_2$ is eloquent for the oscillation inside the chamber whereas its absolute amount is admittedly negligible especially in the aim of this scope; even though the tiny value is exclusively decisive for the chamber vastly and obliquely formed from one of the two off-diagonal elements as in the "***y***-component" in eq. (222).

From eq. (227) directly follows the entire energy leading to an *m* respective matter as a whole inside the chamber descriptive of both time interval and real matter.

## 17 Time chamber in free space

In this study the time chamber mentioned is located far outside of any direct influence of gravity, *i.e.*, since located in everywhere in free space due to the reason the system must be valid anyhow. If interacting any assumed *m* are far apart they will become spherical (**[10, 11]** Walden, Gerlitz) and there is no "squeezing" of any interacting material or respective bodies; consequently electrostatic "vanquishes" gravity inside the time-chamber.

Admit outside the considered chamber moving in free space the powerful forces of gravity are of course still constantly applying to supply this object with energy from both sides (+ on the left and − to the right), but cannot compress it. It should be noted here what effect the half-wave with integer spin causes inside the ensemble of the, *e.g.*, the Casimir-Polder plates pressed together from the outside. As a vivid consideration in free space two waves would run almost parallel propagating and the Heisenberg´s uncertainty is practically minimized – not affected via the interaction from any $\boldsymbol{\vartheta}$ (see above). This statement is crucial because then the two "rays" for example $\vec{x}_i$ and $\vec{p}_i$ , $i = 1,2,3$ posed via the Heisenberg´s uncertainty are almost running parallel (Fig. 6). A total *m* inside the chamber can now be determined. This *m* inside the time-chamber has already been introduced and given above because it results in these extreme representations from the electrostatic alone with

$$m_e \;\longrightarrow\; \mu_e = \;\; \triangleq\; 0.19\;339\;60\;010\cdot 10^{-6}\,\mathrm{kg} \quad ; \qquad (134)$$

this value is justified via the given explanations and "allowed" from the Pythagoras in eg. (227), of course closely related to the shortest time interval found above

$$\Delta t_{\min}(\sin\vartheta) \;\equiv\; \boldsymbol{\tau} \;\triangleq\; 3.81\;212\;49\;466\;289\cdot 10^{-44}\,\mathrm{s} \quad . \qquad (2)$$

It is still a theory of space-time. Obviously, time and space are inseparable and can not be "teared apart" from each other. It is true both time ***t*** and *m* will oscillate inside the chamber and when compared to matter this results from the oscillating half-wave.

The essential thing inside the chamber is the *x*-direction, which is directly coupled to the time. Above it applies

$$X_0(t) \;\square\; X_1(x) \;\square\; X_3(y) \;\square\; X_4(z) \;\square\; X_5(G) \quad ,$$

$$X_0 \leftrightarrow X_1 \;\text{ and }\; X_4 \leftrightarrow X_5 \quad . \qquad (135)$$

For an exact description of the chamber, an exact assessment and description of the vectors is useful. The first two vectors have already been dealt. The "middle" ***y***-vector has a special status because it describes the angle $\boldsymbol{\vartheta}$ between the running ***x***-component and the orthogonal ***z***-component causing the oscillation; this variable is responsible for the oblique angularity meaning skew for the chamber (Fig. 11).The last two vectors involuntarily refer to gravity with *G*.

In considering all 5 vectors are orthogonal to each other a description of the resulting tensor can be reproduced with absolute values, just as the important vector can result in the z-direction – the "height" of the chamber as appropriate for an experimental study. From

$$V_{E_i} \in 5 = \pm\sqrt{[E_e(\alpha)]^2 + (-E_{g,\alpha})^2 + (E_{\alpha,g})^2 + [E_g(G)]^2 + [E_\alpha(G)]^2}$$

gets for the volume

$$V_{m_i} \in 5 = \pm\sqrt{[m_e(\alpha)]^2 + (-m_{g,\alpha})^2 + (m_{\alpha,g})^2 + [m_g(G)]^2 + [m_\alpha(G)]^2} \quad . \qquad (136)$$

It can certainly be assumed all the vectors adapt to each other applying treated in equivalence applying

$$\frac{m_e(\alpha)}{\sqrt{5}} = m_\alpha(G) \qquad (137)$$

to allow exact calculation of the numerical values and a measurable tensor can be displayed. From eq. (226) follows the numerical fraction

$$f_m = \frac{0.19\ 339\ 60\ 010 \cdot 10^{-6}}{5.27\ 593\ 16\ 740\ 14\ 220 \cdot 10^{-3}} \equiv 36.65\ 627\ 74\ 490\ 72\ 6 \cdot 10^{-3}$$

→

$$m_\alpha(G) = 36.65\ 627\ 74\ 490\ 72\ 6 \cdot 10^{-3}\,\mathrm{kg} \triangleq m_z, m_w \quad . \qquad (138)$$

This tensor reads

$$\begin{aligned} m(1,1) &= 0.19\ 339\ 60\ 010 \cdot 10^{-6} \\ m(2,2) &= 0.19\ 339\ 60\ 010 \cdot 10^{-6} \\ m(3,4) &\approx 36.65\ 627\ 74\ 490\ 72\ 6 \cdot 10^{-6} \\ m(4,5) &= 0.19\ 339\ 60\ 010 \cdot 10^{-6} \\ m(5,5) &= 0.19\ 339\ 60\ 010 \cdot 10^{-6} \quad \text{all in kg} \end{aligned} \quad . \qquad (139)$$

This tensor seems to be orthogonalized regarding the element “in the middle” is decisive for the action of the powerful external force, it oscillates. In the case of the middle vector, the influence of the vibration / oscillation must be taken into account become the result in agreement with the other vectors (see above).

RESULTS

The numerical value for minimal gravitation distance inside the chamber in interaction is

$$\delta_i \triangleq 4.22\ 091\ 45\ 332\ 185\ 46 \cdot 10^{-94}\,\mathrm{m} \quad , \qquad (39)$$

via

$$T = 3.81\ 212\ 49\ 466\ 289 \cdot 10^{-44}\,\mathrm{s} \quad , \qquad (2)$$

as shortest time interval. This correlation originates the numerical values

$$\sin\vartheta \approx 0\ 39\ 603\ 41\ 032\ 40\ 402 \cdot 10^{-6}$$

as angle between direction of the main-coordinates ***x*** and ***z***.

$$M = \mu_{gr} \triangleq 11.59\ 090\ 90\ 909\ 09 \cdot 10^{+60}\,\mathrm{kg}$$

is the Graviton. The value, against that and inside the chamber reads

$$\mu_g \triangleq 0.\ 19\ 339\ 60\ 010\ 38\ 087 \cdot 10^{-6}\,\mathrm{kg} \quad \text{from } \boldsymbol{T}$$

as evaluated matter / *m* for minimal gravitation distance interaction in

$$\delta_i \triangleq 4.22\ 091\ 45\ 332\ 185\ 46 \cdot 10^{-94}\,\mathrm{m}$$

where time reversal occurs. In free space with

$$t_H = \frac{1}{H_0} \triangleq \frac{67.8\,\mathrm{km/s}}{Mpc} = 4.55 \cdot 10^{+17}\,\mathrm{s} = 14.4\ \text{milliarden years}$$

this results from

$$v \triangleq 53.25\ 206\ 34\ 74 \cdot 10^{-6}\,\mathrm{s}^{-1} \equiv 53.25\ 206\ 34\ 74\ \mu\mathrm{Hz}$$

This means the rotation of the entire posi-verse is

$$a_g(x) \triangleq 73.\ 84\ 916\ 21\ 250\ 26\ 01 \cdot 10^{+27}\,\frac{\mathrm{m}}{\mathrm{s}^2},$$

with a positive acceleration or, for the nega-verse, with a negative sign, since it “contracts”.
It applies in exactly the same way to the atomic sphere. Furthermore, the radii of the universe (positive, "posi-verse") are

$$\begin{aligned} x_{\mathrm{uni}} \equiv D_{g,\,\mathrm{uni}} &\triangleq 6.51\ 047\ 53\ 506\ 91\ 8 \cdot 10^{+36}\,\mathrm{m} \\ &= 2.10\ 968\ 09\ 302\ 30\ 654 \cdot 10^{+21}\,\mathrm{pc} \\ &\equiv 0.68\ 821\ 09\ 250\ 20\ 275\ 9 \cdot 10^{+21}\,\mathrm{ly}\ \ (\text{light year}) \end{aligned}$$

It is true, acceleration of an electrically charged body is evident. Such a consid

$$a_g(x) \triangleq 73.\ 84\ 916\ 21\ 250\ 26\ 01 \cdot 10^{+27}\,\frac{\mathrm{m}}{\mathrm{s}^2}$$

for the posi-versum. In comparison to the values is

$$1\,\mathrm{psc} = 30.85\ 7 \cdot 10^{+15}\,\mathrm{m} \equiv 30.85\ 7 \cdot 10^{+12}\,\mathrm{km}$$

gives

$$a_g(x) \triangleq 73.\ 84\ 916\ 21\ 250\ 26\ 01 \cdot 10^{+27}\,\frac{\mathrm{m}}{\mathrm{s}^2}$$

for the posi-verse. In comparison to the values is

$$1\,\mathrm{psc} = 30.85\ 7 \cdot 10^{+15}\,\mathrm{m} \equiv 30.85\ 7 \cdot 10^{+12}\,\mathrm{km}$$

with $m(2,2) = 0.19\ 339\ 60\ 010 \cdot 10^{-6}$ from the current theory leaving a

$$C_{\text{Hubble}} = 74.2 \pm 3.6 \cdot \frac{\text{km}}{\text{s} \cdot \text{Mpc}} \approx 77 \cdot \frac{\text{km}}{\text{s} \cdot \text{Mpc}} \equiv 77 \cdot 10^3 \frac{\text{m}}{\text{s} \cdot \text{Mpc}}$$

$$= 77 \cdot 10^3 \cdot \frac{\text{m} \cdot 10^{-12}}{\text{s} \cdot \text{pc}} \equiv 77 \cdot \frac{\text{m} \cdot 10^{-9}}{\text{s} \cdot \text{pc}},$$

having a

$$m_e \longrightarrow \mu_e = \frac{E_e}{c^2} \equiv \frac{h \cdot \nu_e}{c^2} \triangleq 0.19\ 339\ 60\ 010 \cdot 10^{-6}\,\text{kg}$$

inside the chamber with ***x***-expansion

$$s_g \equiv D_x \triangleq 1.80\ 471\ 05\ 521\ 49\ 922 \cdot 10^{-33}\,\text{m}$$

$$s_z \equiv D_z \triangleq 4.42\ 103\ 91\ 979\ 96\ 644 \cdot 10^{-51}\,\text{m}$$

## II. DISCUSSION

The quantum electrodynamics (QED) was first introduced from Dirac, which later led to a modification, and this execution refers to the QED to give gravito-electrodynamics, GED as topic of this study[21].

Following the Hawking radiation explains semi-classical be continuous. However, the Hawking quanta of energy are not able to hover at a fixed distance from the horizon in a black hole, BH since the geometry of it has to fluctuate; quantum effects are included. Those quantum fluctuations of the BH may modify, alter, or even obviate a semi classical spectrum [41, 42], either. It has been demonstrated [43] the natural width of the spectrum lines turns out to be smaller than the energy gap between two executive lines. It has been possible to demonstrate quantum geometry of horizons using precise methods in loop quantum geometry, LQG **[15, 16]**. This theory does not reproduce equally speed areas, instead the quanta become denser in larger values [6-8, 11]. Otherwise, some theories like [44-50], propose alternate suggestions.

Is the Big Bang, BB a BH ? This question can be made into several more specific questions with different answers. Why did the universe not collapse and form a black hole at the beginning? In contrast, there are a series of other approaches to this, *e. g.*, [87].

Sometimes people find it hard to understand why the BB is not a black hole. After all, the density of matter in the first fraction of a second was much higher than that found in any star, and dense matter is supposed to curve spacetime strongly. At sufficient density there must be matter contained within a region smaller than the Schwarzschild radius for its mass. Nevertheless, the Big Bang Theory, BBT manages to avoid being trapped inside a black hole of its own making and paradoxically the space near the singularity is actually flat rather than curving tightly. The short answer is the Big Bang gets away with it because it is expanding rapidly near the beginning and the rate of expansion is slowing down. Space can be flat even when spacetime is not (see above). Space-time´s curvature can come from the temporal parts of the spacetime metric which measures the deceleration of the expansion of the universe. So the total curvature of space-time is related to the density of matter *m*, but there is a contribution to curvature from the expansion as well as from any curvature of space. The Schwarzschild solution of the gravitational equations is static and demonstrates the limits placed on a static spherical body before it must collapse to a black hole. The Schwarzschild limit does not apply to rapidly expanding *m*.

The standard Big Bang models, BB are the Friedmann-Robertson-Walker, FRW [48] solutions of the gravitational field equations of general relativity. Those can describe open or closed universes. All of those FRW universes have a singularity at their beginning to represent the Big Bang. The BH also have singularities. Furthermore, in the case of a closed universe no light can escape, which is just the common definition of a black hole. The first clear difference is the BB singularity of the FRW models lies in the past of all events in the universe, whereas the singularity of a BH lies in the future. The BB is therefore more like a white hole, WH say time-reversed version of a BH. According to classical general relativity WH should not exist since they cannot be created for the same in time-reversed reasons as BH cannot be destroyed. However, this might not apply if they had always existed.

In contrast, the standard FRW-BB models are also different from a WH as this has an event horizon as is the reverse of a BH event horizon. Nothing can pass into this horizon and just as nothing can escape from this horizon. In roughly speaking is the definition of a WH. It would have been easy to show the FRW model is different from a standard BH and WH solution such as the static Schwarzschild solutions or rotating Kerr solutions, but it is more difficult to demonstrate the difference from a more general BH – or even a WH. The real difference is the FRW models do not have the same type of event horizon as a BH – or WH. Outside a WH event horizon there are world lines be traced back into the past indefinitely without ever meeting the WH singularity whereas in an FRW cosmology all world-lines originate at the singularity.

Stands the question is the BB a black- or white hole, WH ? The standard FRW BBT is distinct from a BH or WH. The real universe may be different from the FRW universe, thus it can be ruled out the possibility it is a black- or white hole. The argument against the BBT being a black hole still applies. The BH singularity always lies on the future light cone, whereas astronomical observations clearly indicate a hot BB in the past. The possibility the BB is actually a white hole remains. A major assumption of the FRW cosmologies is the universe is homogeneous and isotropic on large scales [31, 52]. That is, it looks the same everywhere and in every direction at any given time. There is good astronomical evidence that the distribution of galaxies is fairly homogeneous and isotropic on scales larger than a few hundred million light years. The high level of isotropy of the cosmic background radiation is strong supporting evidence for homogeneity. However, the size of the observable universe is limited by the speed of light and the age of the universe. An observer sees only as far as about ten to twenty thousand million light years, which is about 100 times larger than the scales on which structure is seen in galaxy distributions.

The homogeneity has always been a debated topic [32] and the universe itself may well be many orders of magnitude larger than what is observable, or: it may even be infinite. In that case, the question appears if there is a white hole model for the universe that would be as consistent with observations as the FRW models. Some scientists initially think that the answer must be no, because white holes (like black holes) produce tidal forces that stretch and compress in different directions. Hence, they are quite different from what is observable. This is not conclusive, it applies only to the spacetime of a black hole in the absence of matter. Inside a star the tidal forces can be absent. A white hole model that fits cosmological observations would have to be the time reverse of a star collapsing to form a black hole. A good approximation is to ignore pressure and treat it like a spherical cloud of dust with no internal forces other than gravity. A Stellar collapse has been intensively studied since the seminal work of Snyder and Oppenheimer in 1939 **(**see *e. g*, [40, 50] in the thermodynamics of BH and this simple case is well understood. It is possible to construct an exact model of stellar collapse in the absence of pressure by gluing together any FRW solution inside the spherical star and a Schwarzschild solution outside. Spacetime within the star remains homogeneous and isotropic during the collapse [52].

It follows time reversal of a model for a collapsing sphere of dust is indistinguishable from the FRW models if the dust sphere is larger than the observable universe. In other words: it can not be ruled out the possibility the universe is a very large white hole. Alone, waiting many billions of years until the edge of the sphere comes into view. It has to be admitted dropping the assumptions of homogeneity and isotropy then there are many other possible cosmological models, including many with non-trivial topologies. This makes it difficult to derive anything concrete from such theories, but this has not stopped some brave and imaginative cosmologists thinking about them. One of the most exciting possibilities was considered from Hellaby in 1987 **[**49] envisage the universe being created as a string of beads of isolated while holes that explode independently and coalesce into one universe at a certain moment. That is all described via a single exact solution of general relativity. It has been suggested from Hawking and Penrose **[51]** once quantum effects are accounted for, the distinction between black holes and white holes might not be as clear as it first seems. It is due to "Hawking radiation", a mechanism by which black holes can lose matter. A black hole in thermal equilibrium with surrounding radiation might have to be time symmetric, in which case it would be the same as a white hole. This idea is controversial, but if true it would mean the universe could be both a white hole and a black hole at the same time. Perhaps the truth is even stranger.

Munich researchers experimentally achieved such negative values with an atomic gas. They have succeeded in falling below absolute zero by a billionth of a K. In order to achieve an inversion of the Boltzmann´s distribution [34] the atoms of a specific gas were given an upper bound on their energy ([36] see, *e. g.*, Braun S. et al. Negative Absolute Temperature for Motional Degrees of Freedom. *Science*. 4. (2013). **[52]**. It said from Lindley in Degrees Kelvin: A Tale of Genius, Invention and Tragedy [53]. It is true the state with the lowest energy is a consequence of the Heisenberg`s statistics

$$E(T_0) = \frac{\hbar}{2} \cdot \omega$$

above the potential minimum. As a result, the particle is not located exactly at $x = 0$, $p = 0$ expected from a classical oscillator. This zero-point energy or zero-point oscillation leads to vacuum fluctuations in the QED. In quantum field theory, QFT, and specifically quantum electrodynamics, vacuum polarization describes a process in which a background electromagnetic field produces virtual electron–positron pairs that change the distribution of charges and currents that generated the original electromagnetic field. It is also sometimes referred to as the self-energy of the gauge boson *i.e*, a photon.

According to the statement described here, such a statement is strictly contradicted. The background to the calculated minimum size is a curvature of the universe could not be measured. However, the measurement inaccuracy is relatively large at 2 per cent. If assumed this measurement inaccuracy leads to a curvature of the universe of just this maximum 2 per cent then the universe could be curved back into itself. However, the curvature could actually be zero or it could have a value between zero and the maximum conceivable curvature. In the first case the universe would be infinitely large, in the latter it would be larger than 78 billion light years [62]. The good hypothesis: discovering design in our just right, Goldilocks universe. [107] from Deutsch.

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Since the cosmos looks the same in all directions, a simple calculation could be made: In each direction, the §edge” is more than 13 billion light-years away the diameter of the cosmos is around 26 billion *yl*, light-years According to Digman and Cornish [64] , where
Gravitational Wave Sources in a Time-varying Galactic Stochastic Background. Extreme Gravity Institute Department of Physics, Montana Sate University, Bozeman, MT 59717, U. S. A. (2022) data from the WMAP satellite shows that the universe must be at least 78 billion light-years across according to most models. In the Lambda CDM standard model, therefore, a flat geometry with infinite extension is usually considered. Since the cosmos looks the same in all directions, a simple calculation could be made: In each direction, the "edge" is more than 13 billion light-years away, so the diameter of the cosmos is around 26 billion light-years [65] from Hubble, as discussed in the relation between distance and radial velocity [64]. From Digman *et. al.* the universe must be at least 78 billion light-years across according to most models. In the Lambda CDM standard model a flat geometry with infinite extension is usually considered.. They found the universe must be at least 78 billion light-years across according to most models. This statement is not true, since the universe respective posi-verse / nega-verse can be regarded in the structure of an egg rotating as a whole and mentioned above already.

A "twin world" as used fundamentally here is not unknown, as many researchers have published on it since the current standard model of the universe together with quantum theory and implies a “twin world” must exist every meter on average. The arguments given also apply to a universe with a finite but sufficiently large volume. However, those arguments as well as the conclusions are disputed and have been, *e.g.*, described in another publication saying “these scenarios remain no more than literary tales” [66-68, 86 ].

The Standard Model is a generalization of the QED work to include all the known elementary particles and their interactions (except gravity). Quantum chromodynamics (or QCD) is the portion of the Standard Model that deals with strong interactions, and QCD vacuum is the vacuum of quantum chromodynamics. It is the object of study in the Large Hadron Collider and the Relativistic Heavy Ion Collider, and is related to the so-called vacuum structure of strong interactions [106, 109].

In the current study as well two worlds are compared introduced as posi-verse and nega-verse. Such an idea is not unknown in the professional world. The term “parallel world”, also “parallel universe”, denotes a hypothetical universe outside of the known [107, 108]. The entirety of all parallel worlds is called the multiverse [110].The assumption of parallel worlds (multiple world theory) has been discussed in philosophy since antiquity. A distinction must be made between the discussion of theoretically possible worlds from a formal point of view and the hypotheses in which such worlds are ascribed a real existence. The possibility of the real existence of parallel worlds is also discussed in physical cosmology. The idea is known to a broader public primarily from science fiction [111].

In contrast to QED `The Theory of the Everything for Nothing´ [67, 112, 113]. The present GED, Gravity Electrodynamics should be called `The Theory of the Nothing for Everything´ in contrast to `The theory of the everything for nothing" [113].

In quantum field theory the quantum vacuum state – also called the quantum vacuum or vacuum state – is the quantum state with the lowest possible energy. Generally, it contains no physical particles. The term zero-point field is sometimes used as a synonym for the vacuum state of a quantized field which is completely individual.

An essential point here is the temperature stability, which exists inside the chamber.
Thermodynamic systems with infinite phase space cannot reach negative temperatures. However, if described a state of population inversion not a state in thermodynamic equilibrium and negative absolute temperatures appear in the calculation describing the probability distribution. Such negative temperatures then correspond to higher-energy, *i.e*., in a way, hotter states.

In classical thermodynamics the description of the states of thermodynamic systems contemplates at near-equilibrium using macroscopic, measurable properties. It is used to model exchanges of energy, work and heat based on the laws of thermodynamics. The qualifier classical reflects the fact to represent the first level of understanding of the subject and describes the changes of a system in terms of macroscopic empirical (large scale, and measurable) parameters. A microscopic interpretation of these concepts was provided via development of statistical mechanics. Such effects are emerged with the development of atomic and molecular theories and supplemented classical thermodynamics with an interpretation of the microscopic interactions between individual particles or quantum-mechanical states. This field relates the microscopic properties of individual atoms and molecules to the macroscopic, bulk properties of materials be observed on the human scale, explaining classical thermodynamics as a natural result of statistics, classical mechanics, and quantum theory at the microscopic level. In Non-equilibrium thermodynamics *e., g.,* [111] the branch of thermodynamics deals with systems that are not in thermodynamic equilibrium. Most systems found in nature are not in thermodynamic equilibrium because they are not in stationary states, and are continuously and discontinuously subject to flux of matter and energy to and from other systems. The thermodynamic study of non-equilibrium systems requires more general concepts than are dealt with by equilibrium thermodynamics [112]. Many natural systems still today remain beyond the scope of currently known macroscopic thermodynamic methods.

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As long as no direct exchange with the "outside world" appears, than, *e. g*., the associated generation of the Graviton outside - which is excluded within the closed system of the chamber, such a connection – can not exist.

If the quantum field theory can be accurately described through perturbation theory, then the properties of the vacuum will be analogous to the properties of the ground state of a quantum mechanical harmonic oscillator, or more accurately, the ground state of a measurement problem. In this case the vacuum expectation value (VEV) of any field operator vanishes. For quantum field theories in which perturbation theory breaks down at low energies (for example, Quantum chromodynamics or the BCS theory of superconductivity field operators may have non-vanishing vacuum expectation values called condensates. In the Standard Model, the non-zero vacuum expectation value of the Higgs field, arising from spontaneous symmetry breaking, is the mechanism where the other fields in the theory acquire mass or respective real matter. The present work is a kind of mixture of electrodynamics and gravitation and forms, in a way, the counterpart or almost a complete opposite to the QED.

A very important statement relates to time and time reversal. Some work is known about this. In Loop quantum gravity, LQG is a theory of quantum gravity, which aims to merge quantum mechanics and general relativity, incorporating matter of the Standard Model into the framework established for the pure quantum gravity case. It is an attempt to develop a quantum theory of gravity based directly on Einstein's geometric formulation rather than the treatment of gravity as a force. As a theory LQG postulates that the structure of space and time is composed of finite loops woven into an extremely fine fabric or network. These networks of loops are called spin networks. The evolution of a spin network, or spin foam, has a scale above the order of a Planck length, approximately $10^{-35}$ meters, and smaller scales are meaningless. Consequently, not just matter, but space itself, prefers an atomic structure. The areas of research, which involves about 30 research groups worldwide,[1] share the basic physical assumptions and the mathematical description of quantum space. Research has evolved in two directions: the more traditional canonical loop quantum gravity, and the newer covariant loop quantum gravity, called spin foam theory. The most well-developed theory that has been advanced as a direct result of loop quantum gravity is called loop quantum cosmology, LQC advances the study of the early universe, incorporating the concept of the Big Bang into the broader theory of the Big Bounce, which envisions the Big Bang as the beginning of a period of expansion that follows a period of contraction, which one could talk of as the *Big Crunch* e.,g., [68-72]. This also contradicts the BBT.

Although it is possible to correctly describe the cosmos from the point of view of a rotating observer, the equations in a frame in which most objects are stationary or moving only slowly are usually simpler. The condition of a non-rotating coordinate system for inertial systems and the distinction in their consideration, which is required by classical physics, does not apply in principle.

A here considered parallel transport is a shift in one direction in which the orientation of the object to be shifted is retained, *i.e.*, a local coordinate system is carried along. A mere displacement in a spatial direction is clearly understandable in a space-time without *m*. According to the special theory of relativity the definition of time depends on the movement of the coordinate system. A constant time direction is only given for unaccelerated coordinate systems. In this case, a displacement in time in a space-time without *m* means an object is at rest relative to the coordinate system. It then moves along the time axis $X_0$ of this coordinate system: the stationary initial and final states are compared; a calculation in this regard has already been presented before [10].

In the GR the gravitomagnetic field or gravitomagnetism respective gravito-electromagnetism, GEM refers to those parts of the gravitational field, *i.e*., the curvature of space-time, not caused by mass or energy densities: *m* or *E* flows be evoked. The name derives from a formal resemblance of the linearized equations of GTR to the Maxwell´s equations of electromagnetism. There is a formal analogy between moving *m* and moving e. as in the actual presented paper. This similarity, however, only exists in the approximation of weak fields in weak field approximation and non-relativistic velocities. GEM has nothing to do with magnetism in the sense of classical electrodynamics, ED. Among other things, gravitomagnetism causes the lens thirring effect, which causes a rotating mass to pull space-time around it and twist it in the process. This Lense-Thirring effect [73] describes the influence of a rotating *m* on the local inertial frame. Simplified, this can be imagined as rotating matter dragging space around like viscous liquid. This twists space-time. It is therefore a gravitomagnetic effect derived this effect, which was difficult to prove and very small from the general theory of relativity. The satellite-based experiment (Gravity Probe B) attempted to prove the effect experimentally. After a lengthy evaluation lasting until 2011, the data recorded in 2004 / 2005 provided the expected confirmation of the general theory of relativity. The idea was first published from Oliver Heaviside in 1893 [74], before the publication of the theories of relativity. There are some statements in Riemannian geometry that are traditionally called comparison theorems. With these statements, one examines, for example, Riemannian manifolds whose sectional curvature or Ricci curvature is bounded above or below. For example, Bonnet's theorem asserts about manifolds whose sectional curvature is bounded below by a positive number. A stronger statement is Myers' theorem, which derives the same statement from the weaker condition of the Ricci curvature bounded below by a positive number. The Cartan-Hadamard theorem, on the other hand, shows a connection between manifolds with non-negative sectional curvature and their universal covering space. One of the most important comparative theorems in Riemannian geometry [75] is the sphere theorem. [76, 77].

The considerations for a "hyper-universe" as presented in the current paper – coint posi-verse, nega-verse – were already discussed elsewhere [78-80]**.** A gravitational wave is a wave in space-time triggered via an accelerated *m*. The term itself was first coined from Poincaré in 1905 [81]. According to the theory of relativity nothing can move faster than the speed of light. Local changes in the gravitational field can therefore affect distant locations only after a finite amount of time. As they traverse an area of space they temporarily compress and stretch distances within the area of space. This can be viewed as the compression and stretching of space itself. Since changes in the sources of the gravitational field affect the entire space without delay in the Newton´s theory of gravitation, it knows no gravitational waves. On February 11, 2016, researchers from the LIGO collaboration reported the first successful direct measurement in September 2015 of gravitational waves produced by the collision of two BH. It is considered a milestone in the history of astronomy.

In differential geometry, the Einstein tensor known as the trace-reversed Ricci tensor used to express the curvature of a pseudo-Riemannian manifold. In general relativity it occurs in the Einstein field equations for gravitation describing space-time curvature in a manner consistent with conservation of energy and momentum. In theoretical physics, the Einstein–Cartan theory, also known as the Einstein–Cartan–Sciama–Kibble, ECSK theory, is a classical fact of gravitation similar to general relativity. The theory was first proposed from Cartan [82] and Carbal *et. al.* [83, 84].

The special challenge in the current paper is an explicit representation of transformed Maxwell's equations, which establish the relationship to gravity (instead of electrodynamics, for which a certain but clear transformation is necessary. So Latin $\vec{H}$ , $\vec{E}$ symbols replaced into Greek ones $\vec{\xi}$ and $\vec{\eta}$ (see above). In contrast to the Einstein tensor [85] based on some assumptions, the goal here was to tell a real disclosure of the relationships enabling to display numerical values.

The Standard Model is a generalization of the QED work to include all the known elementary particles and their interactions (except gravity). Quantum chromodynamics (or QCD) is the portion of the Standard Model that deals with strong interactions, and QCD vacuum is the vacuum of quantum chromodynamics. It is the object of study in the Large Hadron Collider and the Relativistic Heavy Ion Collider, and is related to the so-called vacuum structure of strong interactions.

The acceleration a in the expansion of the positive universe (posi-verse) or respective the "negative" universe (nega-verse) supplies the same constant with a negative sign, of course, in exactly the same absolute value $\vec{a}$ universe . In the current theory this result automatically leaves the Hubble constant [64].

Even with its huge and massive stars and galaxies in the perhaps infinite vastness of the practically empty universe there is no Nothing.

## III. CONCLUSION

The main results are the reversal of the time interval with the shortest t, propagation of the gas entire real and posit universe, just as with an anti-universe "squeezing in on itself", with acceleration throughout the universe, positive and negative. Due to the theory being faster than the speed of light the basis results in a Graviton located outside the chamber and presses the fictitious time-plates together, where time reversal together with the origin of matter occur.

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FIGURE LEGENDS

Fig.1
Two interacting parallel and adjacent beams running in opposite directions to each other

Fig. 2
Illustration to the angle $\vartheta(g,e)$ disclosure between gravitation and electrostatics exemplifying the ratio of the two vectors perpendicular to each other

Fig. 3
Exposition to the angle $\vartheta(g,e)$ including the coordinates

Fig. 4
A gravitational tube showing a gravitational current $I_g$ running in positive x-direction similar to an electrical current $I_e$

Fig.5
A hollow conductor of $I_g(x,\vartheta)$ for the gravitation beam

Fig.6

Compare the beams of gravitational and electrostatic in their mutual angles $I_{gr}(x,\vartheta)$ and $I_{el}(z,\vartheta)$

Fig.7
Propagation of a gravitational beam in direction x in relation to the perpendicular "rings" around similar and based on the Maxwell´s equations

Fig.8
The light chamber describes the transition from positive to negative energy as well as time changes from a positive into negative time interval. It reveals the energy for the birth of mass from the Nothing and effekt of quantum vacuum

Fig.9
The electromagnetic half-wave $\lambda_e/2$ trapped within the light chamber with the energy $E(½\lambda_e)$ described from the positive and negative electric elementary charges **e** limited within the two limit speeds $v_B$ and $v_T$

Fig.9
The behavior of a gravitoelectrodynamic wave inside the chamber

Fig. 10
The relations among the three classical dimensions and he chamber viewed from outside distorted via the effects of gravity

Fig.11
A chamber distorted due to gravity, inside view from the effects of gravity

Fig.12
Comparison of the space outside and inside a space of Casimir and Polder

Fig.13
Disturbances in the chamber of Casimir and Polder

Fig.14
Simple representation of the influence of external pressure from the Graviton on the inside of the chamber and the effect