The Big Bang and its Internal Logic: The Universe as Relative Zero

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Abstract

It's about philosophy of cosmology, based finally on the right understanding of the postulate c = const as the inertia of the whole universe. Not even all the photons of the same frequency from the same light source are the same; each of them will be such, so that it arrives to its receiver with the c = const speed, what is possible precisely because of Heisenberg's uncertainty principle. That's why the Big Bang as the start of cosmos and the world in general is an illusion, though an objective one. Only with comprehensive inertia and relativity without mass limitations can one begin to understand *how come the World exists*. Not how it came to be, but how it has existed since forever and how it exists always and again. **Inertia**: not so related to the material world which the man can specifically ascertain with how ever perspicacious an experiment, but inertia without anything concrete, logically most abstract: if something is already something, whatever it is, even an uncertain possibility, why would it be different, it has no reason, whilst if it is nothing, why would it be something, it remains nothing. **Relativity**: not the homocentrically insufficient one from the theory of relativity, but an all-encompassing relativity, which must refer to itself as well precisely because it is infinite, it must make itself relative, i.e. it cannot avoid exploding into its otherness, into universal **symmetry,** by which nothing is possible only in symmetry with something. Absolute nothing is only possible with absolute everything, again only relativity. And all together still the same, **inertia**: indefinite duration of omnipotence in symmetrical balance with its nothing-cause in itself, without start and without end – like the universe from the title.

The paper specifically shows how this logic fits into scientific achievements related to the hypothesis of the Big Bang and which new explanations follow that.

The content:

Historical background instead of an introduction

Einstein published his general theory of relativity [1] in 1916. According to this theory, the four-dimensional curve of space and time due to presence of masses is the cause of gravitational movement. Actually according to inertia, there is no special force of gravity, while in the absence of mass this four-dimensional space is Euclidean, and speed of light c is the same in any inertial frame of reference and generally maximally possible because mass of a particle m, at a standstill, anyway m_0, with the increase of speed v strives towards infinity,

$$m = \frac{m_0}{\sqrt{1 - \frac{v^2}{c^2}}},$$ which is a consequence of the special theory of relativity[2] from 1905. Therefore, already in 1917 in his report for the Prussian Science Academy,[3] he tried to show how his relativistic equation of the gravity field could reflect on the universe as a whole. Since man's experience up to that time showed that fixed stars are really fixed, he added to his equation the so called cosmological constant λ which would, multiplied by the basic metric tensor, affect the space-time metric and in that way prevent the gravitational collapse of the universe.

However, in 1922, Friedmann showed in a mathematical analysis of that equation[4] that the cosmological constant is superfluous. And without it, with the identical assumption of the constant mass, the equation has a stable solution, just as the one according to which the universe would shrink to a point of the coordinate beginning, and then expand and shrink, forever fluctuating, or the one according to which it would increasingly slowly expand[5] depending on the density of total mass in the universe. At that time, the cosmos referred only to our Milky Way with a few Nebulas with red Doppler shift. It was not until 1926 that Hubble made it clear that these Nebulas are outside our galaxy.[6] For a young theology professor with a PhD in physics Lemaitre mathematical analysis of Einstein's equation like the one Friedmann made and this red shift were sufficient to ascertain[7] how the world came to be from a single primordial atom[8] already at the start of all mass and energy of the entire future world, which is, hence, expanding even today, of course under God almighty's will! When Hubble published his experimental observation in 1929, saying that the velocity of moving away of nebulae increases linearly with distance[9] and that this is not just a matter of mathematical possibility or something random for this or that nebula but that this law is more and more prominent the more distant the galaxy is, Einstein renounced his cosmological constant – *meine größte Eselei*, his biggest folly, as he commented – and little by little The Big Bang hypothesis became largely accepted in scientific circles, this really scientific semi-fairy tale about the genesis of the world.

Scientific, and at that time not a fairy tale, because behind such hypothesis lie experimentally confirmed facts: both equations of the relativity theory and Hubble's Law on expansion of galaxies and the background noise[10] But that is not all. This idea prompted numerous successful calculations with plasmatic state of matter of extremely high density and temperature, for example the ones that explain the origin of such high percentage of various light chemical elements we observe in the cosmos that we see and then with thought and experimentally we reach it.[11] [12]

And it is a fairy tale in as much that it is not possible to say in science: in the singular moment of a big bang all scientific laws fail because the world just started with that, there was nothing prior to the big bang. No, there was at least a possibility.

Does this mean indefinite possibility of potential energy with zero anywhere? However, potential energy of what?

Of that nothing?

Insufficient relativity of the relativity theory

From the beginning of time, people endeavoured to find the absolute frame of reference. For Aristotle and long after him, the Earth was this system; from Copernicus and thereon this was the Sun; and then it was no longer the Sun either, but fixed stars, unmoving cosmic Ether connected to them. All electromagnetic studies were carried out under this assumption, and electrical engineers study it today with the emphasis that this is electromagnetic study of unmoving things. And when Maxwell proved that light is actually an electromagnetic wave[13], it seemed that the Ether was also proved in this way, and that the velocity of light is to be measured in consideration of that fixed environment. In every other inertial system, it would have to be algebraically added to the speed of that moving coordinate system. However, the Michelson-Morley experiment showed that this was not the case: velocity of Earth's movement does not affect the measured velocity of light, it remains the same. Nevertheless, people have difficulty renouncing the desire for an absolute frame of reference: an interpretation that this is because the lengths in a moving system are shortened under the impact of the ether wind and that no difference can therefore be measured appeared immediately. Lorentz put forward the equation according to which this was happening, length is shortened, and time slows down—absolute system remains absolute.

And then Einstein postulated: there is no absolute system, all inertial systems are equal, and all are relative and in each of them $c = \text{const}$. And people more readily believed in the consequence of this postulate, the one that mass increases with velocity—experimentally, in any case, already observed with electrons—even that finally $E = mc^2$, than they really understood how $v \pm c = c$ is possible. And they did not understand because the general theory of relativity has not been derived to the end. Of course, Einstein generalised the relativity of inertial systems into the relativity of all coordinate systems arbitrarily mobile, in the field of electromagnetic as well. Keeping $c = \text{const}$, he claimed that numerical equality of gravitational and inertial mass means it does not matter whether a material point was enduring gravitational acceleration or its own coordinate system was moving at an accelerated pace. In its own coordinate system, it moves by inertia, along the geodesic line of the four-dimensional space and time created by the presence of large mass. From the coordinate system of that large mass, however, this is a quazi-gravitational field of the space and time metric created by that mass.

To sum up, of course, an absolute frame of reference can by no means be connected to Earth; it could sooner be possible for the Sun. But, there you have it, not even the Sun, but the total Mass of the cosmos, which at the moment of the genesis of the world is all in one Point, how ever obviously of infinite density. This mass, this point is absolute, and with it each man writing equations using one's own space and time coordinates, of, therefore, already materialized units of length and time—where the man who writes equations is, his frame of reference is, as well, as the centre of the world, entirely per God's face.

This is similar to the Medieval, so called ontological argument of God's existence. Definition:

God is a perfect being. Evidence: a perfect being would not be perfect if it did not exist, therefore God exists and he is the creator of the world. In other words: mass has existed from the start and it is diverging. Conclusion: It was in one Point and the world was created in its explosion.

As if the question about the creation of the World has not just been rephrased to *how it is that Mass exists*. As if it is intentionally predicted that the differential equation of Hubble's Law does not offer any start, but, on the contrary, an arbitrary distance R_o at a moment $t = 0$, a result which Lemaitre reached anyway already in his first paper: $R_o = 0$ only for $t \to -\infty$.[7]

Relativity of the relativity theory is therefore insufficient for demystifying the genesis of the World. Infinite density of mass, or all the same, even all the infinite mass of the World in one point is not the answer, relativity which led to this so called Start is incomplete, it is not all-encompassing, it needs to be symmetrically completed with zero mass, with merely a possibility to be mass, merely a possibility to become the world. And coordinate systems related to a point without mass must be taken into consideration, actually them in particular. Systems related to the possibility itself and forever as such—to inertia itself. Where time is not elapsing at all, where there is no definite space. Only that is all-encompassing inertia, only that brings relativity to its end.

Is there, therefore, a coordinate system in which time is never to start from zero, which does not have a length measurement, because it does not have a length since it can be any kind and any amount, even of unlimited extent?

Only such a frame of reference could solve our innate homocentrism and enable an idea as a response to the question *how come the World exists*.

$v \pm c = c$ on macro level

It is not possible to understand the postulate $c = \text{const}$ on the macro level. All attempts will end with a paradox: from each point of already realised macro-mass, the world will look like as if the big bang started precisely from there; all infinite integral of all infinite cosmos will be an integral in relation to that point, with always the same symbolic representation $\int_{\infty}$, always with its own horizon. This is a consequence of the fact that Maxwell's wave equation does not contain mass, not even indirectly through charge, therefore it applies in all l,t-coordinate systems even of arbitrary velocity in relation to any previously chosen, not only greater than velocity of light, but even of infinitely high velocity. And because of $c_{max} = \text{const}$ in relation to itself always with its own horizon, even if it was today a horizon of microwave background noise with a temperature of 2.7^{o}K, and tomorrow, with the increase of resolution of radio antennas and new radio nebulae, with thermal noise maybe only 2^{o}K and finally with no noise at all—it will be temperature-wise an absolute zero, eternally black horizon. The Big Bang is, therefore, an objective illusion. Not only is own mass m_o what it is in its own coordinate system, **but each event is what it is in its own coordinate system.** Well, precisely that is relativity: constantly reproducing game of chance, i. e. of chance Point and of endlessly complex symmetry of endless everything else. A case in point is the long-known, historic already, "twins' paradox" from 1911. Mind you, this is long before De Broglie postulated the wave nature of electrons (1924), and Schrödinger set up his wave equation and Borne interpreted it with probability (1926), long before Heisenberg formulated his uncertainty

principle (1927). This problem in contemporary mathematical processing, for example[14] looks like this: two massless points (in order to exclude gravity from account, i.e. the general relativity theory, for instantaneous change in direction during acceleration) and three inertial coordinate systems. One point remains still in the coordinate system number 1, and the other starts its journey through the other coordinate system at a constant speed v_2, and having changed its direction instantaneously, travels through the third coordinate system at speed v_3 to the first point. The time elapsed till the two points meet again, calculated from any coordinate system, shows that the point which was still in system 1, $v_1 = 0$, "aged" more in the meantime. Time in mobile systems elapsed more slowly. How is this possible when each point, so the other one, as well, was still in its own coordinate system? Has the symmetry, according to which length decreases in a mobile system and time slowed down measured from a still system and then it is all the same which of the inertial systems is considered to be still, disappeared? Of course, not. It only became more complex: time always elapses most quickly in the system which is even implicitly considered still, specifically: speeds v_2 and v_3 are only in relation to system 1 quasi-absolute, while in systems 2 and 3 they are inter-calculated using a relativistic formula

$\frac{v_2 + v_3}{1 + \frac{v_2 v_3}{c^2}}$. And generally: regardless of how many arbitrarily mobile inertial systems 1, 2, 3, 4 ... we have, time always elapses the fastest in a system which is considered still, but the symmetry is more and more complex: $1-2,3,4,5\ldots\ 2-1,3,4,5\ldots\ 3-1,2,4,5\ldots\ 4-1,2,3,5\ldots$ etc.

Does it then make sense to exclude coordinate systems which move in relation to each other at speeds greater than the speed of light, to exclude them just because we considered one of them still? Just because we are earthlings on Earth, or on the Moon or anywhere else in the future? Just because we have no alternative, but to write our equations homocentrically in consideration of our mass, or mass of our laboratory, i.e. with consideration of our spatial and time coordinates? As if there is really nothing outside our horizon, not even possibility!

If we want to demystify *how come the World exists,* we, of course, cannot "bench" from the game inertial coordinate systems which are mutually distancing themselves from one another at speeds greater than the speed of light even though the conclusion about the postulate $c = \text{const}$ cannot be different—but again a paradox: **photons of the same frequency emitted from the same emitter will not be the same either: each will be such that it reaches its receptor at speed of light,** as if it "knows" beforehand – there is the paradox – in which it will be caught and thus it switches to its coordinate system already at emission regardless of how mobile or immobile in relation to the emitter. If it is ever caught at all.

How can a photon "know" that?

Uncertainty principle applied to the photon

Just as Maxwell's equation of the electromagnetic wave does not contain mass, energy equation of the photon, of course, does not contain it either, but the latter does not even contain length. Not by accident, because the photon can be anywhere. Once energy quantum is radiated $E = h\nu$ travels as such through cosmos how ever much. It is, actually, inertia itself. If whenever and wherever it materializes again in the same coordinate system, with the same units of length and time, it will

reveal its inertia with the same mass $\Delta m = {h\nu}/{c^2}$ from which the emission happened. Otherwise, it will forever remain indefinite energy on its own—pure inertia of only uncertain potential energy. Accordingly, it "does not know" anything, it is just:

Inertia as the deepest logic of nature. Indefinite possibility, but all the same.

However, the deepest logic of nature is also

Relativity: other inertial systems of any relative velocity are also possible, coordinate systems with their own time, however, this time t' and length l', correspond to their own mass $\Delta m'$.

In the reception coordinate system, realised energy of the photon does not have to be the same, it will adjust to the reception time, i.e. frequency ν', but in such a way that by inertia it will be ${h\nu'}/{c^2}$. By inertia of the entire universe, by inertia containing mutual relativity of the emission and reception coordinate system. It will adjust, the question is how?

It will adjust through the uncertainty principles, $\Delta p \Delta x \geq h$. If a photon is caught precisely there, with a precisely determined coordinate x, its spatial uncertainty is zero, $\Delta x = 0$, so its impulse is $p = mc$, i.e. reception velocity is infinitely uncertain, $\Delta c \rightarrow \infty$, which is sufficient for the total length travelled L' to now in this new coordinate system integrally be $L' = ct'$ for all the time travelled, as if it had joined a new coordinate system at the moment of emission itself. This is a way to understand $v \pm c = c$, based on this $c = \text{const}$ in all coordinate systems. Light velocity is actually defined by mass created by the photon at reception in the new coordinate system, $c^2 = {h\nu'}/{\Delta m'}$, so it is not a kinematic size, but rather a dynamic one. That is why on the macro level it cannot be understood through the length and time, but only on the micro level through Heisenberg's uncertainty relations.

It is, hence, integral of each photon's total travelled path from all universe in relation to a certain reception point. Each such point at that time adjusts to itself all those countless quanta of potential energy. That is why it is a continuous integral of all that open infinity—how it looks from that point:

$\int_{\infty}$, as we said. Inherently defining its relation towards the universe, its own cosmos so to speak, defining itself as well over and over again. And since there are countless numbers of such reception points, it seems that the universe is always creating itself on its own again and is always defining itself with an infinite array of possible integrals of mutual radiation and reception, symbolically represented:

$$\lim_{n \rightarrow \infty} \int_{\infty_1} \int_{\infty_2} \text{and so on} \int_{\infty_n} .$$

Coordinate system related to the photon

How Einstein himself understood his postulate $c = \text{const}$ is an interesting historic question. How ever much he was good at making his ideas generally interesting, he did not manage to popularly explain the earlier mentioned "twin paradox" for example. In his book "*About the special and general theory of relativity*" from 1916, he gives an example of a railway track and a train on it, as two inertial systems, claiming that each event happening on the track is also "in the same way" happening on the moving train, which is not true. Namely, if two simultaneous ligtnings strike the railway levy, an observer on the levy will see the lightning flash as monochrome,

while an observer from the train will not see it in "the same way": even if it is a slightest difference in the nuance of blue, he will see a flash of lightning, which he is nearing, differently. If the strikes happened in the train, then the observer on the levy will see the flash of lightning which is at least by the slightest nuance of red different—all because of Doppler's effect, i.e. different reception energy of individual photons. Or striving to prove relativity of simultaneity, he claims that the passenger from the train will see the lightning he is approaching earlier, than the one he is moving away from, though they are equally distant and on the levy simultaneously—which implicitly involves that the speeds of the train and light are added up after all. However, it is more interesting why Einstein even after Heisenberg's uncertainty principle (1927) decided to implicitly keep the idea that there is after all an absolute coordinate system. In a 1935 paper[15], which will later prove to be of historic importance, **E**instein, **P**odolsky and **R**osen concluded that quantum mechanics is an incomplete theory because, according to it, the mutual "spooky action at a distance"—Einstein's expression—of two particles can be explained only through the still unknown "hidden variables", which already at the start define the behaviour of both particles, behaviour which, according to this, does not depend on chance.[16]

EPR-paradox

The mentioned particles are initially in the same place and in mutual interaction. But then they separate and going apart in opposite directions, they no longer have the possibility for mutual effect, especially when taking into account that c_{max} is max velocity of action. Quantum mechanics, however, describe this two-particle system with wave functions where the principle of superposition applies: after parting, each particle has its own wave function, but they are in superposition, i.e. these two particles remain wave "entangled." If one defines through measurement, for example, the position of one particle, let us say at a distance $\boldsymbol{l}$ from the start, the speed remains unknown; this is according to Heisenberg's uncertainty principle. But, due to the superposition the position of the other particle is instantaneously determined as well, $-\boldsymbol{l}$, regardless of how far it is. Or if measurements determine the speed of one particle, v, the speed of the other particle with opposite mark is determined at the same time, – v.

Einstein thought that this undermines his c_{max}-relativity. Physicists are anyway prone to relate their coordinate systems to mass, even if it is just for a material point as a coordinate start, and in terms of action they refer only to energetic action. This is why this is a paradox; a paradox compared to the implicitly assumed coordinate system with laboratory mass, where man is, where we are. Anyway, this is not a paradox, but it is precisely what confirms the relativity: measuring certain mutual distance $2\boldsymbol{l}$ in any coordinate system, or speed of mutual distancing 2v is determined, again in any coordinate system. Exactly in line with the fact that relativity cannot be without symmetry, exactly in line with Maxwell's wave equation which can be in a coordinate system of any speed in relation to any other since it does not contain mass, which is indirectly the characteristic of Schrödinger's equation too, simply set by analogy with Maxwell's, and not derived from experimental and material experience. One measurement, one measurement result: mutual distance or mutual velocity—nature, of course, does not care where we homocentrically place our coordinate system!

D. Borne rephrased this theoretical situation with the position and speed of particles as the situation of two "entangled" photons with this or that kind of spin, adjusting them through "spooky action at a distance" when one is accidentally +1, the other is necessarily –1, and vice versa, which

enabled J. Bell in 1964 to formulate his famous inequality.[17] He observed three random events, three different angles of two polarizers, sufficiently distant to enable a change of angle while the photons are still flying, mathematically describing whether they will pass through the polarizer or not, and when and which one will pass. If there are hidden variables, this is a classic case of each individual event disappearing when all causes-variables up to the last micro-cause are taken into account when calculating. Then the probability becomes 1, certain event. In other cases, it is always smaller than 1 which is the same as in Bell's inequality with the mentioned accidental events. But statistically, the found probability has proven to be higher than 1. Experiments have shown that there are no hidden variables.[18] Have they, how? An experiment may be insufficiently technically prepared, probability is just a bit higher, or the number of statistic repetition is insufficient? Until A. Aspect definitely published: "*Test with Bell's inequation, being more ideal than ever, experimentally confirms that a pair of entangled photons hundreds of meters apart must be considered as* ***unique inseparable*** *object, it is impossible to attribute a local physical reality to any of them.*"[19]

The quantum mechanical case, therefore, cannot be eliminated. This is really the case, particular, absolute, and yet relative, as half a case: if here accidental is +1, there is instantaneously necessarily –1 even if indefinitely apart.

How is this possible?

Coordinate system related to photon

Because a photon is inherently inertia without mass, its movement can be of arbitrarily high speed and acceleration, in any direction, even zig-zag changing direction, this is why it does not have a defined trajectory. Quant electro-dynamics is precisely because of this so exact because it calculates the electromagnetic interaction of elementary particles as integral action from point to point of phase adding of all possible trajectories of the photon. As if it was everywhere at all times, that is why its own wave length is infinite, and there is no time elapse, it is always zero—from whichever material point to be viewed.

Can one tie a coordinate system for such a timeless inertia without mass? A coordinate system which would not even have units of length and time for inertia which does not maintain constant speed of direction, but only square speed, and only integrally, $c^2 = {}^{h\nu}/_{\Delta m}$. Integrally, only in relation to the coordinate system of material-mass point with already realised length and time. What would one get in this way? In a coordinate system of that material point, however, length unit is determined, for example, with wave length λ, and therefore own wave length of the photon, before it is caught in the coordinate system of that point, is also mathematically infinite, $\lambda_o \to \infty$, because this is the only possible way to be $\lambda = \lambda_o \cdot 0 = \infty \cdot 0$ at reception, otherwise every finite length from the coordinate system which is moving at light velocity would be 0, due to Lorentz-Einstein root, $\sqrt{1-\frac{v^2}{c^2}}$. Because of the same root, photon's own time is mathematically 0, $t_o = 0$, because this is the only way one can calculate finite time $\Delta t = {}^{t_o}/_{0} = {}^{0}/_{0}$ as a unit of already realised world of time and length. So, can one tie, is it possible?

Results of the experiment with "entangled" photons have shown that it is possible, that it makes sense to connect a coordinate system to a photon. In that way one reaches an explanation for the **EPR paradox;** in a coordinate system of photons themselves, this is not a paradox:

Experimentally, we first have γ-quant of high energy, which can be anywhere, not having a definite wave length in its own coordinate system. Having hit the nonlinear crystal slab, for example without to be caught, this inertia of course remains the same on its own: one possible relativity, relativity which inherently precisely because of this it cannot be without symmetry which precisely because of this contains in itself a duality of both affirming and negating, whether it is up-down, left-right, or whatever. But in its coordinate system it still does not have a defined length, as if it can again be everywhere. These "entangled" photons are still a unique possibility in itself without time and definite length, and still in 0,∞-symmetry. Only in the collision with our material-mass world their length and time will be determined—as "**unique inseparable** object" as Aspect would say—this is $+\boldsymbol{l}$ and $-\boldsymbol{l}$ and this is "now." Their time starts from now, only after that formerly "**unique inseparable**" possibility has materialised, now as an object of revealed relativity-symmetry: +1 and −1, with its own 0-centre. Otherwise, it would not be relativity, a second ago the bare possibility itself, **for our entire material world** it is nothing, zero, however, there it is **relative zero.**

Only with this has relativity been brought to its end:

Not only do we have to take into account all rectilinear coordinate systems of constant speed and independent absolute time (classic, Galileo's definition), and curvilinear systems of constant acceleration and relative own time (Einstein's definition), but also all coordinate systems in general: of arbitrary speed, and acceleration, and direction, as timeless unique and inseparable (to us people) nothing-object.

Vacuum—virtual cosmos ether

For us people, this nothing-object is vacuum. Infinite set of all possible coordinate systems related to massless particle. According to present scientific understanding, experimentally proven one, only photons are certainly massless. Therefore, an infinite set of all possible coordinate systems is related to a virtual photon. Virtual because photon in itself has no energy because zero time elapsed so there is no frequency, mathematically this is represented as $\nu_o\lambda_o = 0\cdot\infty = c = \text{const}$. It only has the option to be energy in relation to something else. And just as relativity cannot be without its otherness—symmetry, photon cannot be without the other photon—otherwise relativity would not be relativity. And further, all virtual photons. Infinite set of all possible virtual photons, this is vacuum. Thus, this is an infinite set of merely possible coordinate systems mutually moving at arbitrarily high velocities and accelerations, in any or even zigzag changing direction, being everywhere at all times.

Vacuum is therefore an indefinite possibility of energy with zero anywhere, this is relative **zero.** And that possible vacuum-energy is considered by Bose in his historic paper from 1924, saying it is closed inside volume V, *"Let the radiation be enclosed in a volume V and its total energy be E".*[20]

Passing through singularity

In the manner of statistical physics, Bose therein derives the formula of Planck's law of blackbody's radiation starting, hence, from a definite coordinate system, where the total radiation energy E is in the volume V. This is, of course, photon energy in an $\boldsymbol{l,t}$–coordinate system, which has its zero andi its infinity, its linear over-and-over-again infinity. Accordingly, it has 0,∞-symmetry of singularity in which energy is zero whatever otherwise its distribution E(ν) depending on the

frequency turned out. Relating to a relative coordinate system, energy itself E is relative, E/V, if we are, moreover, in a massless world, in the domain of special theory, where we are yet to demystify how that mass even exists—hoping to start to perceive the answer to the question *how come the World exists*. Because it does not contain mass, Maxwell's wave equation in whatever the coordinate l,t–system, of any unlimited velocity compared to any pre-selected one, is the same anywhere and for any l-direction. Massless cosmic space is homogenous and isotropic. It is, therefore, all the same not only of which direction the possible impulse is, but also whether it is of + or − orientation, mathematically therefore p^2 times 4π due to spherical symmetry, therefore **law of inertia of empty cosmic space,** put bluntly, though indefinitely, $4\pi p^2 = \text{const}$. It is indefinite because it is indefinite with a constant in relation to zero of any l,t–sistems. Only in relation to a definite l,t–system, speed of light is determined as well c_{max} and inherently impulse of the photon and its energy $p = h\nu/c$ and $E = pc$. Bose starts from there, only because of the double possibility of spin orientation not 4, but $8\pi p^2 dp = 8\pi\left(\frac{h\nu}{c}\right)^2 \frac{h}{c} d\nu$, and having found the maximum probability for (stationary) distribution $E(\nu)$ puts it in correlation with temperature T through $\frac{\partial S}{\partial E} = \frac{1}{T}$, where S is entropy, also then at maximum.

Furthermore for the needs of this article, let us first write the number of quanta of radiated energy just from the energy scope $\varepsilon \in (h\nu, h\nu + h\,d\nu) = E(\nu,T)d\nu$, i.e. with a frequency from ν to $\nu + d\nu$. Though it is incomprehensibly large, this number, in correlation with the total number n of radiated photons of the blackbody is merely its differential, therefore, it will be

$$\frac{dn}{dE} = \frac{8\pi}{h^3c^3} \frac{\varepsilon^2}{e^{\frac{\varepsilon}{kT}} - 1}, \qquad (1)$$

where $\varepsilon = h\nu$ and $d\varepsilon = h\,d\nu = dE$. Formula shows that the bulk density of the number of photons changes given the differential scope of total radiated energy. Bulk density, without ever using explicitly volume or any length? This is why Planck's law of radiation will be written in the form which explicitly contains wave length:

$$E(\lambda,T) = \frac{8\pi hc^2}{\lambda^5} \frac{1}{e^{\frac{hc}{\lambda kT}} - 1}. \qquad (2)$$

This is now a formula of density of the strength of radiation depending on the wave length. It shows what happens with the same total energy of radiation from decreasing volume: similarly as with ideal gas which is why due to increasingly frequent collision, the temperature increases, and with it the velocity of micro-particles which decreases DeBroglie's wave length, with which maximum of kinetic energy appears. From the E,λ-diagram one can see that with the increase of temperature, an increasing part of radiated strength moves in the domain of smaller wave lengths with maximal radiation at a decreasing wave length, increasingly close to one another, increasingly closer to o-singular point. Well, can they finally be joined and overlapped with the vertical of infinite temperature and zero wave length, what happens then?

Numerical values of h, c and k constants are such that, e.g. at room temperature $hc/\lambda kT$ is

much higher than 1 even with the biggest wave length of still visible light, so instead of the function $e^x - 1$ it is appropriate to write simply e^x. Due to Wien's displacement law $\lambda_{max}T = b$, i.e. due to $hc/kb = 4.98$, this approximation is appropriate generally for any temperature. With the decrease of volume, however, how fast will the wave length be decreased, whether it will happen faster than the increase of temperature? Under the same law, the relation of frequency and temperature is equal to the relation of enormous velocity of light and tiny Wien's b-constant: frequency will increased and the wave length decrease incomparably faster compared to the temperature rise. The decreasing volume will, therefore, undoubtedly lead the entire diagram towards one line: in o-singularity.

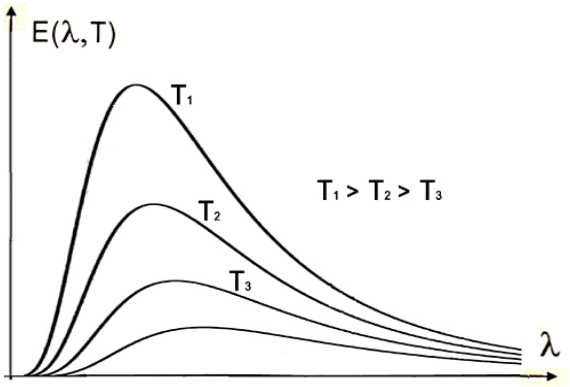


Diagram of bulk density strength of radiation of the blackbody depending on the wave length of raadiation

$$E(\lambda,T) = \frac{8\pi hc^2}{\lambda^5}\frac{1}{e^{\frac{hc}{\lambda kT}} - 1}$$

At the same time, when certain temperature T_o and frequency ν_o energy of the photon $h\nu_o$ reach values sufficient for the forming of mass (with Compton's wave length for each type of particles), the particle will trap that part of energy with its mass, which is why the temperature will fall down to

$$T = T_0 \frac{1}{2}\frac{v^2}{c^2}, \qquad (3)$$

as it is derived from the transformation:

$$\frac{h\nu_0}{kT_0} = \frac{mc^2}{kT_0} \rightarrow \frac{1}{2}\frac{mv^2}{kT}, \qquad (4)$$

where v is residual speed of the newly-formed mass: exponential element from Planck's law of radiation is transformed into an exponential element with classic kinetic energy of a particle. Based on that, it can now be written:

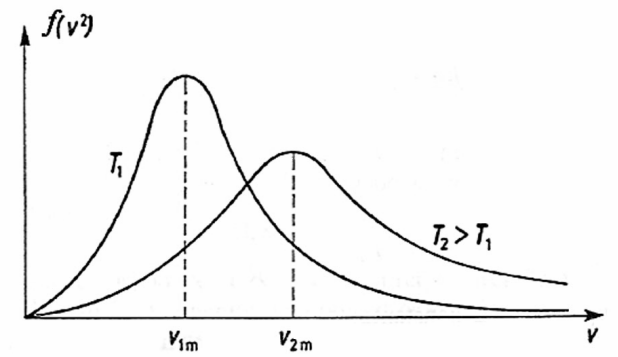
$$\frac{dn}{dE} = \frac{8\pi}{h^3c^3}\varepsilon^2 e^{-\frac{1}{2}\frac{mv^2}{kT}}, \qquad (5)$$

going back to the formula with bulk density of the photon again. Because creating of the mass just started, with that from general indefiniteness (internal logic of natural all)possibility specific (external) time and length, accordingly, volume is created. With its further decrease down to zero, $V \rightarrow 0$, what happens, except for energy density of the vacuum striving towards infinite? Not only according to the diagram, but under the Stefan-Boltzmann law, temperature also strives towards infinite, $T \rightarrow \infty$. However, how come when in singularity all laws of physics fail, when mathematics looks for a new coordinate system there? The last additional thing we can observe before we plunge into this singularity is possible transformation

$$\varepsilon^{1/2} = (h\nu_0)^{1/2} = cm^{1/2} = \sqrt{\frac{T_0}{T}}\sqrt{\frac{1}{2}mv^2} = \sqrt{\frac{T_0}{T}}\sqrt{E_k}\,, \qquad (6)$$

on that occasion all wave lengths are reduced to (exactly?) zero, i.e. (not exactly) to infinite frequency (depending on quant effects). Photons join into particles with mass, each with residual speed v, i.e. kinetic energy $E_k = ½mv^2$. And the remaining of the multiplier $8\pi\varepsilon^{3/2}/h^3c^3$ either as $8\pi m^{3/2}/h^3$ or in any other way related to $\sqrt{T_0/T}$ turns into $2/(\pi kT)^{3/2}$. This is no longer bulk density of the photon dn; now this is probability dN/N of kinetic energy to be in the domain $dE_k = mvdv$. Because we have finally passed through the singularity, through the 0-vertical of the diagram $O_{\lambda,E}$. Singularity-point exploded, now we are in $f(v^2)$-diagram of Maxwell's distribution of probability,[21] with a formula adjusted for this purpose in the form $dN/N, E_k$:

$$\frac{dN}{N}\frac{1}{dE_k} = \frac{2\sqrt{E_k}}{(\pi kT)^{\frac{3}{2}}}e^{-\frac{E_k}{kT}}$$



By passing through the singularity, the coordinate system of linear l,t– defined again-and-again infinity had to undergo a change:[22] these are no longer micro-particles without mass, it is now the probability of finding a larger or smaller number of micro-particles with mass in certain scope of classically kinetic energy E_k, now the coordinate system is of definite $dN/N, E_k$-infinity. Singularity burst (banged) and the World with mass was created, mass which is scattering under the same internal logic of homogeneity and isotropicity (relativity and symmetry) of empty cosmic space. Thus, under inertia, each particle is now moving at its constant, greater or lesser, velocity depending on its mass, i.e. on residual velocity v_{1m}, v_{2m} etc. The big bang happened under the very internal logic of omnipotence $4\pi p^2 = \text{const}$, equal to the same regardless of how much *const* is. Due to universal inertia inherently $c^2 = h\nu/\Delta m$, limited on its own only by equality for each external otherness: for each newly-created mass particle. All part starting from zero. However, from which zero? From any zero, again this is **relative zero**. Whichever mass particle is taken for the coordinate start, it will have its own again-and-again definited cosmos because of c_{max}

$\int_{\infty}$ with its own horizon of otherwise infinite universe, infinite in the sense of true, undefined infinity:

$\lim_{n\to\infty} \int_{\infty_1}\int_{\infty_2} \text{and so on} \int_{\infty_n}$, which keeps all its infinities in balance over and over again by the symmetry with its relative zero. **True, undefined infinity is always equal to its infinitely indefinite zero**:

$$\text{NOTHING} \overset{\text{BANG!}}{=} \lim_{n\to\infty} \int_{\infty_1}\int_{\infty_2} \text{and so on} \int_{\infty_n} \text{everything}. \qquad (7)$$

Based on that, one all-compassing exact physical theory is impossible, let alone definite latter equation, but becoming more and more abstract, theory can have only true and experimentally verified, more or less general, and still individual equations, which correspond one with the other, passing from one definite coordinate infinity into another. Mathematics itself has its limitations in the coordinate 0,∞-singularity, mathematics itself powerlessly end in a paradox unless it changes the coordinate system.

Vacuum is not only virtual. Vacuum is real too: all infinite multitudes of the so called subatomic particles, with mass or without mass, charged or without charge, energy relevant or just virtual is, however, the only way for vacuum to exist.

Experimental facts

However, the question remains: how is it that Bose's volume decreases maintaining the same energy, how does this energy density increase all the way to singularity?

Before attempting to answer this question, one should remember the experimental facts. After Anderson's discovery of the positron in 1932, the presupposition that it was realised as a counterpart to the electron in the collision of γ-quant from cosmic radiation with some molecules in the atmosphere was experimentally proven. A pair of electrons-positrons was produced in a laboratory through the collision of high-energy γ-quant with lead foil, confirming this possibility theoretically presumed already in the first steps of quant electrodynamics: since the symmetrical impulses of the electron-positron partially cancel themselves out, a retreating impulse of heavy core, for example, lead, is needed in order to fulfil the law on impulse maintenance – since there is no experimental possibility for the collision of two γ-quants of opposite impulses. In 1997, such experiment was carried out: in the collision of γ-quanta with photons in laser beam, a positron paired up with an electron was born. [23] But an intermediary was needed: first, a special electron which would create that γ-quant with the entering of the laser jet. One electron flies into the jet, and beside it, via Compton's scattering, one goes out of the jet, a positron also comes out with the new electron. In 2010, a similar experiment was repeated with much higher energy density of the laser beam. [24] Swarms of scattering new electrons and positrons were created. But an electron as an intermediary was needed there as well, and calculations show that about ten times higher density of energy is needed in order to create mass without electron's mediation. This density will be achieved as well, but this will still be energy from a laboratory, energy of the photon in relation to already existing mass.

Per contra, what happens when there is no mass, when any mass is merely a possibility, therefore virtual, and virtual energy of the photon is even indefinite, zero in itself with possible energy only in relation to another photon, which again has virtual energy, multiple virtuality, infinite indefiniteness, what then? Why is the density of virtuality condensed all the way to singularity becoming mass as it passes through it? This is not even considered by the Big Bang theory. The answer is, anyway, not in this or that cosmological model. Cosmology deals with models. And the question *how come the World exists* can only be discussed and the answer reached only in philosophy, but not any philosophy, but philosophy based on an exact science, based on physics,

physical chemistry, astronomy, and precisely on – cosmology.

A sketch of one philosophy of cosmology

The universe is not only a vacuum-infinity with any point, anywhere and no matter how virtual, nor is it just linear again-and-again infinity always in the same way from any point, but infinity of all points at the same time starting from every new quality even random, as well. [25] The universe, this is real Infinity in all, infinite indefiniteness—something that as Nothing (definite) does not need a cause (definite) at all. The universe is, therefore, on its own since forever and forever—this is general, all-encompassing **inertia.** This is where **relativity** lies, general, all-encompassing, in the basis of all driving force, each originating from the universe itself precisely because of inertia: the same, all the same, just in place of virtual however small plus along with it and tiny minus, instead of virtual up, virtual down, instead of left right—unity of relativity and **symmetry:** minus intermediates for plus, plus for minus, up for down, left for right and so on. Because in the Universe there is no cause for plus, for example, without cause for minus, for up without down, etc. There is no reason for anything special and definite in the Universe, for any particular—let alone reason for any separate coordinate system related to any indefinitely large mass, or any more to, on the other hand, for massless static ether. Whatever it is, even if it is just an announcement or merely a possibility, this or that particularity can come and go, or it cannot happen at all—but the universe remained the Universe. That is the reason behind more and more particulars over and over again, multiplying ways of differing particulars among other things. That is why everything is moving.

Existence itself is movement.

Does this mean that due to infinite relativity, entropy constantly increases? [26] Infinite relativity, however, would not be infinite if it did not apply to itself as well, if it did not relativize itself as well, if it was to cancel itself even for a second with one particularity, one point, singularity as a quasi-beginning. This is again symmetry, reciprocity of infinity—zero. Of course, **relative zero.** This relativity re-confirms itself over and over again. Anyway, that is the only case when entropy is zero as well—only to increase all over again.

The answer to the question *how come the world exists* is thus hidden in the inkling of this contradictory logic of the possibility that anything exists. That there is even the tiniest particular even only virtually: merely one quant of indefinite energy as opposed to all other infinite indefiniteness of real Infinity. If there was, after all, even a single virtual quant of energy, definite in any way at any time, however always again now, to be in any way—other than by inertia (if in any way) then it would be relative and symmetrical in relation to another similar virtuality. Second, third, infinitely other of the infinitely complex symmetry. Always with relative zero as the only law (of inertia). According to current scientific facts, a virtual photon matches to this. Photon itself is without energy and without time, but with a possibility to be energy and to be definite at any time. As such, it is eternal and unchanged, wherever and in whatever way everywhere. But it is relative. It is not one and only. On the contrary, there are infinite numbers of them, each in its (virtual) coordinate system, and each with the possibility to collide with another photon and objectify (virtual) energy as (actual) mass. Which one, how big?

Since coordinate systems of virtual photons are mutually moving at any or even infinitely high

velocity in all different or even opposite directions, the mutually possible impulse Δp can happen to be infinitely large, and mutual virtual energy $\Delta E = c\Delta p$ sufficient to create not only a real pair of electron-positron in their mutual collision, but also proton-antiproton, neutron-antineutron and countless pairs of particles and antiparticles of all kinds. In terms of potential of all that versatile virtual chaos entropy of which—of all different possibilities, even of currently not definite $\boldsymbol{l,t}$-quality—strives towards infinity, it necessarily must happen how ever randomly and anywhere though always over and over again: that the infinite entropy of all these quanta of energy possibilities turns into their symmetrical opposite, to zero entropy, therefore to one point—to the point of collision of this omnipotence, potential of which will objectify and then continue its relativity and symmetry in a new coordinate system, no longer virtual, but now that of realised space and time, where particles and antiparticles are swarming in opposite directions. Why do they not annihilate again? Why not all, why have we not ascertained numerous antiparticles in our cosmos? Surely again because of symmetry – which under theory of relativity, also has not been brought to its end, just as the theory relativity itself. Symmetry only with already existing mass, even if infinitely large, is not sufficient. One must take into account, on the other hand, the reciprocal massless symmetry as well, finally with zero-mass. That is why, analogue to Maxwell's postulate with dielectric vacuum-displacement dq for charge $Q - \int dq = 0$, a postulate with mass dm vacuum-displacement for mass $M - \int dm = 0$ is necessary, let us call it the

Maxwell-Newton postulate

Mass cannot happen (be created) to any space, without the same amount of mass coming out of such space, everywhere spherically around it in the mass displacement of vacuum itself, in its differential tension so to speak.

In other words: space-time metrics enlarge with every newly created mass, and that enlargement is obviously independent of the velocity of light, if masses have been generated independently. This enlargement is therefore additive and exceeds the speed of light itself by far. That is where inflating expansion of the cosmos originated after the "Big Bang" (if we keep that name). This enabled some particles not to be annihilated by antiparticles. That is wherein lies dark energy which makes the expansion of our cosmos faster than it is under Hubble's law [27], sign that new masses are still created somewhere in the universe, and not only that the stars lose mass by radiation and finally explosion (supernovas). That is what causes the dark matter effect.

Well, can philosophy of cosmology be of use to exact scientists?

Certainly at least in as much, I hope, that they do not have to pick their brains about whether the Big Bang was an act of God or, on the contrary, whether God is an eternal inherent logic of nature.[28]

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[15] A. Einstein, B. Podolsky, N. Rosen: **Can Quantum-Mechanical Description of Physical Reality Be Considered Complete?** PHYSAL REVIEW, **47**, May 15 (1935)

[16] "God does not play dice", they say that Einstein argued once with Bohr."Dear Einstein, stop defining what God is supposed to be doing," was Bohr's answer.

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[20] Satyendra Bose: **Plancks Gesetz und Lichtquantenhypothese.** ZEITSCHRIFT FÜR PHYSIK, **26** (1924), Seite 178–181

[21] James Maxwell: Illustrations of the dynamical theory of gases, Part 1, **On the motions and collisions of perfectly elastic spheres**. PHILSOPHICAL MAGASINE, XIX 1860, pp 19-32

[22] **It had to collapse**, as quantum physicists of the Copenhagen school would say. Which is understandable if one bears in mind that Schrödinger did not derive his equation from experimental experience, but he set it up by analogy with Maxwell's wave equation which is applicable in l,t–coordinate systems regardless of mass, and DeBroglie's wave length of the mass particle refers also in a postulate to a particle after the collapsing of a massless wave when energy of the photon is already materialised in the specific l,t–coordinate system now related to mass, **when energy hν has passed through singularity and become mc²**.

[23] D. L. Burke et al: **Positron production in multiphoton light-by-light scattering**, Physical Review Letters, 79, 1626 (1997)

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[25] Strictly causal thinking from certain thing to certain thing as from consequence to cause leads to an infinite chain of questions, what is older chicken or the egg. If this chain is closed in itself as in a circle, the question remains: Where did this vicious circle come from? Common sense of dogmatic materialists answers: Well, this is matter, we can directly see it. If such chain ends in an invisible place in cosmos, as the last cause, then this is God, then this is the so-called cosmological proof of God, as attempted to be proven by the scientifically educated religious forefathers in the Middle Ages.

According to quantum physics, however, there is no exclusive causality, but together with it, case is considered as the transition from realised and current through maybe possible to nothing as completely incredible, always again in new context of **relative zero.** This is where philosophy of cosmology finds its place, in symmetrical opposite order, schematic for example like this: **a)** 0-infinity of vacuum with any point anywhere and anyhow virtual. Free point is, namely, according to Schrödinger's wave equation without any ripple, equally probable anywhere at any time, and if it is massless, then not only arbitrarily or even zigzag in relation to the fixed frame of reference of the already realised l and t but also at any high speed—which is virtual photon **b)** l,t–again-and-then-again infinity always in the same way from any starting point. This is now conditionally (indefinite even 0-potential) real quant of energy **c)** m-infinity as a new quality: view of the universe from already realised mass, one possible view, one face of the universe, one cosmos in motion and passing (because if we make even one step, let alone fly a rocket, with that comes new speed, new view). Conclution:

$\sum_{\infty}$ m - infinity = Real infinity = Infinite indefiniteness,

i.e. $\lim_{n\to\infty} \int_{\infty_1}\int_{\infty_2}$ and so on $\int_{\infty_n}$ = NOTHING.

[26] Entropy S is a notion from macro physics, defined differentially in 1865 instead of the quantity of heat dQ = TdS, which could not be caught as the mysterious "phlogiston" neither for head or tail (R. Klausius: *Über verschiedene für die Anwendung bequeme Formen der Hauptgleichungen der*

mechanischen Wärmetheorie—About different application-convenient forms of basic equations of the mechanical heat theory). But it fit perfectly even after its statistical micro definition $S = k\ln\Omega$ (L. Boltzmann, 1896: *Vorlesungen über Gastheorie—Lecture on gas theory*), where Ω is number of various micro-conditions in this case gas particles. According to Boyle-Mariotte Law $PV = \text{const}$, in case volume is condensed to zero, pressure increases to infinity if the temperature T is constant. Then all gas is in one point, in one condition, so entropy S=0. But entropy defined in this way fits in the herein sketched philosophy of cosmology. Namely, the only possible coordinate system would have to be tied to that one state, and as such it would be absolute. And this is against the basic drive force of the Universe—relativity. This point must explode and allow each particle of gas the possibility to tie a coordinate system to it. These are various states of position and speed, with increase of volume, entropy increases to infinity. This corresponds to the hypothesis of the big bang. If, namely, all particles are in one point, then the density of mass is infinite. It is important for temperature not to be zero. But it is interesting, in another point, in the black hole, temperature is precisely zero if mass is infinite, Steven Hawking gives such a pattern $MT = \text{const} \cdot \frac{hc^3}{k\gamma}$. After the completion of the evolution of the giant star—and surely all infinite masses of the world as the Big Bang hypothesis suggests—due to gravitation, the star or all mass collapsed into a black hole. As per the mentioned pattern, temperature would have to be zero, again one condition, again zero entropy—again an absolute coordinate system would have to be tied to such a point. And this is impossible under the laws of relativity. And the black hole must explode, too. S. Hawking, 1974: *Black holes explosions*?

Conclusion: All universe is an incidental-causal interconnected play of different singular points and adequate linear again-and-then-again infinities, it is impossible to find one single equation for all of Universe. Mathematics itself teaches us: I am powerless, I end in paradox unless you change the coordinate system, find other variables, other constants and parameters, that is, after all, why it is Universe, because it offers an endless array of possibilities, it is up to you to be a worthy Point of these possibilities or even Zero, after all.

Questions: It is often said that prior to kinetic gas theory, we did not know what temperature was, when really we do not know now either. Is temperature relativity of inertial coordinate systems massless, in all that infinite multitude? Is it not the absolute temperature zero behind the borders of horizon again and again of each individual mass, therefore, actually relative, as well as all so-called universal constants? Etc.

[27] For this discovery through analysis of the spectre of supernovas from the furthest galaxies (that the universe is expanding faster than under Hubble's law) Saul Perlmutter, Brian Schmidt and Adam Riess got the Nobel's prize in 2011.

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THE UNIVERSE AS RELATIVE ZERO, How Come the World Exists?

Summary

The main part of the book is written as a conversation with a journalist. More detailed

explanation and (mathematical) proofs are given in annexes. However, it has been shown first of all in the "*Historical essay instead of a gnoseological introduction*" that ultimate issues cannot be discussed even in the exact sciences otherwise than metaphorically. A computer metaphor in the previous introduction should serve to illustrate how the Universe exists by itself, based on **universal relativity** and **endlessly complex symmetry**. In the last part "*On temperature and singularity instead of ontological conclusion*" on the example of again-and-then-again-infinity is shown this interactive play of relativity and symmetry in the Universe as a real all-nothing-infinity. The cause of temperature is relativity of coordinate systems linked to inertia without mass.

The main thesis of the book is that the Big Bang is an illusion, though an objective one. Namely, it cannot be supposed that all the mass has been created at once—in that case God is indispensable. Proof that the mass is still being made is recent discovery that the visible part of Universe is being enlarged in an accelerating way. The cause of that, according to the Author of the book, is the Maxwell-Newton postulate according to which analogically to the Maxwell dielectric vacuum displacement exists also diamass vacuum-displacement (as the compensation to the new created mass) by which spatial metrics is being enlarged in spite the space-time curve arround the mass—what was postulated already in the part "*First about the Title*" of the book. That enlargement is namely additive (the dark energy?) without velocity of light c_{max} playing any role.

The main problem of relativity theory is that in it is not understood that there is nothing in relation with what could that limit be determined of c_{max}. The theory itself does not have its basic postulate: all coordinate systems are equal. The limitation due to the Lorenz-Einstein root is valid only to the interaction of masses of the same origin. Why should this limitation be valid for the coordinate system of photons? It is not, because there is total uncertainty, exactly as without of the (receiving) mass energy of photons is uncertain too, due to the fact that its (receiving) frequency is not determined...