There Is No Coordinate System without Mass

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Abstract

Even a mathematical coordinate system without any physical quality cannot be without mass because it must assume both on the abscissa and on the ordinate some measuring units (numbers), even if they have been entered by a person at random. On the other hand, science is impossible without an analytical mathematical description that would be checked by an experiment, by man and his mass too. Then how can cosmology answer the question of the origin of the cosmos, which has mass, if the mass is assumed in advance as existing?

So that by no means, nor tacitly too, will man consider his technical coordinate system as absolute; by taking into account, therefore, the coordinate systems without any measuring unit, neither of the length nor of the time.

But is this then the coordinate system and any science at all?

The article exposes the true interpretation of Einstein's postulate $c = \text{const}$ and a way of entering the philosophy of science and cosmology by which can be perhaps guessed the answer to the question:

How come the World exists?

Content:

Introduction

Hilbert used to say that physics is too heavy for physicists because they do not know enough mathematics, and they often arbitrarily model the equations, adapting them to their needs. This, of course, is true. Only one mathematician had to tell Einstein that his cosmological constant, postulated with the intention of preventing the gravitational collapse of the world – *Kosmologische Betrachtungen zur allgemeinen Relativitäts-theorie*, 1917 – is superfluous. As a mathematician, Friedmann simply took the coordinate system and, regardless of whether the world is going to collapse or not, considered the coordinates from zero farther as possible. He thus found solutions to the Einstein's relativistic equation of the gravitational field for which Einstein did not know, which show that the constant is superfluous: depending on the initial conditions and the size of the estimated mass of the world, then only known our Galaxy, the equation will have a stationary solution; the world will not collapse regardless of the cosmological constant. Of course, being a physicist or being a mathematician is not the same; a physicist needs the help of a mathematician. In the construction of the general theory of relativity, Einstein was assisted by his friend from the studies, Marcel Grossmann. In 1913, together they published a sketch of generalized theory of relativity and gravity: the first part was physical one, Einstein, the second part mathematical, Grossmann. But also vice versa is true. When a mathematician says: let us take a coordinate system in a completely empty space, without any physical quality, only spatial coordinates x, y, z and time, the physicist should then say that this is so simple and unconditionally impossible. And an interesting thing, one mathematician said this – in his own way.

Affine space and relativity

It is characteristic the lecture by Professor Bozidar Jovanovic entitled *Affine Geometry and Relativity*,[1] therefore about mathematical four-dimensional space without any metric, with infinitely many mathematical dots A, B, C and so forth, so-called events, each with its own coordinates x_i, y_i, z_i and t_i (i = 1, 2, 3, etc.), but also with its own Euclidean coordinate system, where the coordinates of different dots are mutually calculated by Lorenz transformations. It is important here to underline that the mathematician himself says that the coordinate system is not actually unconditional, but only with a certain dot-event, making by it a concession to the physical theory of relativity. And one step further, it could also be said that **this affine space is – vacuum.** Not Euclidean vacuum, but vacuum without any metric – as a real, completely indeterminate infinity, or, that is, infinite indefiniteness. Such a vacuum, for example, is described in the introduction of the article *Universe, Inertia and Universal Con-*

stants.[2]

In that affine space-time, of course, time is also undefined, and the emitted photon, having lost the base and the measure of the emitting atom, in its own coordinate system, by itself has got neither determinate energy nor certain time, as if its time is always the same, stopped. And because of the lack of frequency, photon does not really have energy other than virtual, only as possibility, when it is and if it is. Only in realization, only realized as an addition to the mass in an atom-receiver, the photon shows how much energy Δmc^2 was brought by adjusting it to units of length and time of the coordinate system of that atom. Only for the caught photon, for this addition to the mass and actually for the mass of the atoms of the receiver, we can bind the coordinate system in our earthly sense, with units of length and time. **Without this mass, there is no coordinate system.** And for the caught photon, then the time begins, in communion with other atoms and macro-mass, for example, where in this or that atom, electrons circle around the nucleus, changing their energy orbit every time: by falling to a lower orbit with a loss of mass they emit photons into this affine indeterminacy or, in the contrary, by moving to a higher orbit, they receive photons with an addition of mass, each to its atom. After all, the most accurate measurement of the time, adequate to the way it occurs, is an atomic watch, cesium 133 is taken. One second is 9 billion and exactly as much and so much of blinking (of frequency f) due to the transition of the electron from exactly that higher to the lower exactly this atomic level. Thus, the precise definition of unit of length is then the multiplying of the corresponding wavelength $^c/_f$.

Paradox of homocentrism, not paradox of twins

When Einstein invented the example in 1911, later called the twin paradox, it was not the general theory of relativity but the special one that does not consider gravity or any mass. It only considers Maxwell's wave equation, and this does not contain mass, even indirectly through charge, but only *l*-lengthwise expansion over *t*-time: Euclidean inertial expansion through the vacuum, through that and thus such an affine vacuum, so assuming that the reception of light should be in the micro-mass (in dot-event – as Prof. Jovanović would say), which is not subject to the influence of gravity, and moves in relation to the emitting mass at a constant velocity. That is why the example of a rocket and twin brothers is completely inadequate. The material point of an infinitely small rest mass must be observed, i.e. mathematical dot, if necessary now in one, now in other inertial coordinate system with instantaneous acceleration to any speed.

George Bernhardt in 2017, just such an article published: *Zum Zwillingsparadoxon in der Speziellen Relativitätstheorie.*[3]

In the coordinate system S there are two mathematical points in the same place. Now one of them passes instantaneously to the S' system which moves at speed v_1 in order to, after a certain period of time, pass to the system S'' which moves at speed v_2 in the opposite direction, thus it returns to its twin in the system S. Here, on a dozen pages, with the application of Lorentz transformations, the passed time up to re-encounter is calculated, especially in each coordinate system: and all three accounts show that the most tame has passed in the system S. The author of this article concludes that there is no paradox because time is really fastest in the system S. There is no logical error in the special theory, which can be proved without the application of acceleration and general theory; the paradox is imposed by the desire to preserve symmetry as in the case of two mutually moving coordinate systems, the symmetry that does not exist in this case.

In fact, symmetry has remained preserved also in this case, but it is now more complex, **cyclical**. The solution of the paradox is trivial: time will flow fastest in the system that man chooses to stand still: in **S**–S'–S'', or in **S'**–S''–S, or in **S''**–S–S'. I have already published this on several occasions, also in the article in English, *In Cosmology, C^2=Const Is the Measure of Inertia, Not Mass,*[4] or in *The Big Bang and Its Internal Logic: The Universe as Relative Zero.*[5] Regardless of how many arbitrarily moving coordinate systems there are, time will flow fastest in the system which man (homini) chooses to stand still.

And this is precisely the paradox, the homocentrism that people do not see. Why do not they see?

Technical coordinate System

The recently deceased, the famous British physicist, Hawking, will also be remembered by stating that contemporary philosophy no longer deals with the philosophy of physics, but is either positivism without any metaphysics or is reduced to the historical study of ancient thought. In other words, as Hilbert would say, because of mathematics, physics is too heavy also for philosophers. That the first. And secondly, despite its technique and the science of modern civilization, or precisely because of this, a **technical coordinate system** is sufficient for this civilization. Not only also the largest construction projects are implemented by the calculations with the technical coordinate system as the absolute one, but all the cosmic flights so far too with this actually Newtonian calculation. After all, how else would an experimental physicist act than bind a coordinate system for his instrument, at least relatively now for this quasi-absolute system, now for that one? The time dilation, for example, was confirmed in a crystal clear manner precisely from the technical coordinate system related to Earth, for the first time in 1941: by comparing the half-life time of fast and slow muons.

Muon is a negatively charged particle, about two hundred times the weight of the electron, discovered in 1936 in cosmic rays. It is moving at almost the light speed, and due to its large mass, it retains it approximately to the lowest layers of the atmosphere. In the experiment, the number of muons in the upper layer of the atmosphere was first detected, and then in the lowest. The data in the reference[6] were from the experiment 1963 (*Frisch Smith experiment*): the detected number of muons in the upper layer was 563 and in the lower 412. However, if there were no time dilation – for those 6.4 μsec, how much time is needed that muons come from the first detection to the other, according to the half-life time of slow muons of 2.2 μsec in laboratory experiments – they would be far fewer remaining, around 27. In own coordinate system of these fast mions, time was slower, so it was not enough to them to decay. How much slower? Well, as much as we need to multiply Earth time by Lorentz's root. Compared to the terrestrial, time in own coordinate system of fast muons is 8.8 times shorter: while only 0.73 μsec elapsed for muons, 6.4 passed on Earth.

The first cosmic velocity to send a satellite into orbit around Earth is 7.9 km/sec; the second, to get out of that orbit and go to the moon is 11.2 km/sec; the third, to send anything out of the solar system, depending on the current arrangement of the planets, is from 16.6 to 72.8 km/sec. Let's say Voyager 1 and 2 were launched at a speed of 30 km/sec, certainly not under the most adverse conditions... The speed of 30 km/sec is 10,000 times less than the speed of light, this ratio squared is 10^{-8}, and Lorentz's root is quite Newtonian 1, as for $c \to \infty$. Neither should nor can we give up our technical coordinate system. No matter if the man is alone wherever in the universe with nothing else but his own eye as an instrument, he will see the whole universe as if a “big bang” had just come from him. He is himself a technical coordinate system, as the absolute one.

Virtuality, eternal by inertia. But the time Δt always again together with c^2 = const

That the technical coordinate system is not absolute must be reached by thought. It cannot be said: starting with the mass of my eye, there is no greater speed than c_{max}. It cannot be said that for three inertial coordinate systems there is no symmetry, symmetry is only desire. No, on the contrary, symmetry is disturbed by homocentric desire. As neither the technical coordinate system, nor this desire, however, cannot be abolished, but it can be overcome by rethinking relativity, by comprehending that symmetry has become more complex, at last **by understanding that c = const is not kinematical quality, but**

that it is created from the virtuality of the vacuum, from that almighty inertia, symmetry and relativity.

Einstein was not able to overcome his homocentrism, he went far ahead with his postulate $c = const$, science was neither theoretically nor experimentally ripe for a true explanation, de Broglie hypothesis on the wave nature of electrons and Heisenberg uncertainty relations only later came. Einstein's misinterpretation with the train and the lightning was nevertheless useful, if it hadn't been, the question is, would Eddington raise such funds and erect a whole temporary observatory on the island in Guinea Gulf to observe the solar eclipse 1919. Einstein's prediction of gravitational deflection of light was confirmed, Einstein became famous, it was hard for him to believe in uncertainty. But this disbelief also made a major contribution to science, a famous article from 1935 and because of it a series of experiments to check the so-called the paradox of the EPR – the major contribution despite the fact that he failed to unite electromagnetism and relativistic theory of gravity. For this cannot be done without the true understanding of $c = const$, that the relation $h\nu = mc^2$ creates not only mass but also the speed of light as a constant.

Today we know that of all theories quantum electrodynamics provides the most accurate experimental predictions. **Because it also counts with virtuality.** Some experiments that were initially confusing – those for which the location of a photon cannot be determined until it is finally realized, cannot even so much whether it went through a semi-mirror or was declined – have been used as the fact in the computational method, which gives quantum electrodynamics that accuracy. When Feynman,[7] calculates the photon behavior by applying the least-action principle to the functional path-integral, he first specifies own coordinate system of the receiver, without a fixed coordinate system there is no quantum electrodynamics or any quantization. And then from a light source, for a predetermined receiving frequency, he takes into account all possible paths of photons, not only close to the minimum as in classical physics, than like the diffraction grating: it seems that the photon can pass to a certain point on the indicator through any aperture and not just in straight line, as if, moreover, **it passes through all apertures at the same time**, whatever the interference at the selected point of the indicator, more or less a bright spot. The paths are different, the path lengths to the same atom-receiver are different – yet at the same moment to that point. This will say that the photon until its realization did not have a certain speed, that only at reception, determined by the unit of length and time of that receiving coordinate system, it determines not only the energy, i.e. mass he brought, but also constant c, i.e. c^2 as a measure of inertia. **The speed of light was being created as a constant**

only by reception.

I find no other metaphor for this kind of photon behavior than a sponge of a certain capacity and a vessel with a layer of liquid without any specific properties, except that when the sponge is placed, the liquid comes into the sponge from all sides at the same speed, only then it is seen how much speed, what is the capacity of the sponge, etc. Without this m_o-sponge, the liquid itself has no measuring properties, and no part of it has a determined (certain) place. But wherever any sponge-event A_i or B_i or C_i (x_i, y_i, z_i, t_i), i = 1, 2, 3, etc, then by its measure.

Einstein was unable to separate his technical coordinate system from the absolute. But why don't people today see? When they say that vacuum is an affine space where there are infinitely many points-events A, B, C, etc, each with its coordinate system and between them Lorentz transformations, why don't they see that a single c_{max} is then impossible, is it just because a man (homini) wants it to be that way? Is it just because the physicist does not know enough mathematics and the mathematician did not remember to mark his A_i, B_i, C_i points with m_{oi}, where m_o would be not exactly a mathematical dot but an atom-receiver with its quantum-energy levels? If anything, that it is not the end of the world that for $v > c_{max}$ the Lorentz root is imaginary in relation to a given m_o, at least this, both physicists and mathematicians alike should know so well. With the imaginary, the solution of a linear second-order differential equation with constant coefficients, for example, becomes a new quality: from an exponentially decreasing one it becomes an oscillatory function. Einstein feared singularity at the starting point of the coordinate system of his relativistic gravitational field equation. In the 1970s Hawking and Penrose proved that there were singularities independent of coordinate origin. There's a new quality to it. Or, should both mathematicians and physicists really need one philosopher to say: and yet, what is on the other side of each individual c_{max} when, obviously, that is relativity: there is no reason in the Universe for any single m_o even if we label it with a big M because is mine.

No, none M, nobody's God can be the beginning of the world. And that's exactly what the dark energy problem solves. With each newly created mass, Maxwell-Newton's postulate: *No mass can be created anywhere, if the same amount of mass in the form of a diamass vacuum-displacement does not come out from that space*. Is it being created in the cores of the active galaxies and their black holes? Gravitational waves were finally observed when recently two giant black holes in a spiral collision lost 3 Sun masses. But where the mass is being created, how?[8,9]

References and notes

[1] May 31, 2017 at Mathematical Institute of the Serbian Academy of Sciences and Arts.

[2] http://vixra.org/pdf/1907.0112v1.pdf

[3] http://www.thaleskreis.de/materialien/zwillingsparadoxon.pdf

[4] http://vixra.org/pdf/1812.0230v1.pdf

[5] http://vixra.org/pdf/1811.0497v1.pdf

[6] *Experimental Testing of Time Dilation*, June 3, 2019 downloaded from the Internet https://en.wikipedia.org/wiki/Experimental_testing_of_time_dilation

[7] In his article *Space-Time Approach to Quantum Electrodynamics*, Physical Review, 76, 1949 Richard Feynman mentions *virtual quanta* fifteen times, and *virtual electrons*, *mesons*, *nucleons*, *particles*, or *processes*, *emissions*, *transformations* more than twenty times ...

[8] What's in black holes, maybe it's plasma?

My lecture *Paradox C_{max} and the Big Bang Hypothesis* at the Mathematical Institute of Serbian Academy of science and Arts – on which I presented my book on April 10, 2019, **WAS GIORDANO BRUNO BURNED IN VAIN**? – I ended up wondering if the "black holes" could possibly be described from inside, combined with the mathematical descriptions on this side of our horizon:

— How do we get through that singularity, mathematically?

Professor Dejan Stojković from University at Buffalo was kind to answer me:

"Black holes can also be described from inside; all we have to do is the transformation from Schwarzchild's co-ordinates to some that are not singular on the horizon, such as Kruskal's or Eddington-Finkelstein's. But that automatically means that we have changed the observer, from the outside (where we belong) to the one that falls freely towards the black hole and crosses the horizon. I have several published articles on the subject. And the transformations are given in the article

https://arxiv.org/pdf/0806.0628.pdf.

Inside the black hole is empty space-time, not plasma. All matter is compacted into one point – singularity. This is why the event horizon is not a physical barrier. A free-falling observer can cross the horizon for a finite time without noticing anything locally.

The only thing he would notice is that he cannot turn spaceship even if he pairs the engines backwards; he must propagate towards the singularity.

It's not easy to create a picture of it, but so do the equations.

All the best,

Dejan"

And in the above article, *Hawking Radiation as Seen by an Infalling Observer*, of course, it is not said what kinds of particles the collapsing mass emits, even though it is radiation due to a change in the gravitational metric. Because not only are gravitons hypothetical but also "*the notion of particles is well defined only in asymptotically flat regions, e.g. Minkowski or Schwarzschild*", and this is "*the non-trivial metric*" of collapsing, whose end result is a point of infinitely dense mass and infinite temperature – mathematically.

And physically, which would be particularly interesting to the philosophy of cosmology, that could only be a new quality: not exactly plasma in the classical sense, but perhaps plasma of virtual quanta like photons, which then, plasma, energy, would pass **through entropy $ln 1 = 0$** and explode into this new quality. Approximately as Planck's law of radiation would go through the singularity and move into Maxwell's probability distribution.

After all, what did Hawking mean when he wrote that "*gravitational collapse converts the baryons and leptons in the collapsing body into entropy."?* (*Particle Creation by Black Holes*, 1975). What can perhaps lead to an explosion: *Black hole explosions?* 1974.

At any rate, however, I followed my idea that the metric of the cosmos is changing not only because of the radiation of the stars, which gradually lose mass, and not only because of the compressing of black holes in the collision, but especially because there cannot be one single c_{max} horizon of all world masses, of all masses suddenly created for ever. So I have come across an article that kind of points to Maxwell-Newton's postulate:

K. Shimizu: *Gravitational Energy of a Schwarzschild Black Hole*, arXiv 2016

That article also argues that there is an empty space-time inside the black hole because behind its horizon is all the energy at the singularity point as + M mass. And all gravitational energy is on our side of the horizon and is exactly –M. Such an end result of mathematical collapse of a mass is hardly to interpret physically in a literal way. This really is a mathematical description of the interior of a black hole, but physical interpretation unlikely can come from our side of the horizon. One has to go from the other side, from the inside, so to go through this singularity. But ...

9 The question remains, how?

Under the influence of gravity, massive stars finally collapse, but since *all the infinite multitude of the so called elementary particles – charged or uncharged, with or without mass, energy relevant or virtual etc – is only, but the only mode in which vacuum can exist*, that is actually a vacuum implosion. By implosion and then by explosion of vacuum, new masses are being created: Take, for example, by implosion of wavelengths in the diagram of Planck's law of radiation down to the point (0, ∞), and then by explosion, passing through this singularity into the Maxwell distribution of velocities of now mass particles. However, how?

The following article is indicative: S. H. Sohrab, *Continuum Versus Quantum Fields Viewed through a Scale Invariant Model of Statistical Mechanics*, 2014, Northwestern University, SAD. Although the article does not treat the transition of one diagram to the other, it does establish correspondence with one another by viewing the vacuum as a photon swirl. At least that. However, a description of the passage through the singularity is required, the description how the universal constants of Planck's law transfer into which constants of Maxwell's law and under what conditions of Compton wavelength for which mass-particle with how much temporary drop of temperature at the limes $\lambda \to 0$, etc.

What I have published so far on it is quite insufficient, hardly a hint. Although, for example, the diagram of Planck's law of radiation is analytically completely defined, so that both Wien's **b**-constant and Stefan-Boltzmann's **σ** are computable, it was not sensible for me to insist on it. Apart from the reasons given for why the velocity of light, or its square, should be considered as an immediately universal constant, just like Plank's, the Boltzmann constant **k** is statistical, so it is difficult to say to what extent it is universal and, in the contrary, to what extent depends on all other constants, charge and mass of an electron, for example, mass of a neutron, proton, etc. After all, the theory of relativity assumes that the speed of light in the absence of gravitational masses is the same everywhere. All science, and astronomy in particular, starts from the fact that the atoms were the same also in the farthest quasars too, those that move away from us at speeds close to the speed of light, which is another way of expressing relativity: with the rest mass, wherever it is and whatever it is moving relative to other masses, red, for example, is always red $m_0 = \nu_{red}/c^2$. But there are no formed atoms in black holes, there is abundant energy and nothing more, one might even say: indeterminate virtual energy that is getting real only in relation to the outside world in that we attribute to it the equivalent of mass $M = E/c^2$ along with the speed of light, which we say cannot be realized other than merely as the virtuality of a quantum coincidence on the surface of a black hole horizon.

So why not try that passage through the singularity of Planck's law of radiation to Maxwell's velocity distribution, especially since there is no gravitational disturbance here yet?