

# Entropy passage through the black hole singularity in active galaxies

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## Abstract

The “big bang” hypothesis was based on three assumptions. First, Einstein in 1917 in *Cosmological considerations on the general theory of relativity* **assumed** that all mass of the world is the mass of our Galaxy, therefore unique one, since all mutual velocities in it are negligibly small compared to the speed of light. Then in 1927, Lemaître, doctor of physics and otherwise theologian, already in the title of his article **assumed** that all the mass of the world is constant, a *Homogeneous universe of constant mass and increasing radius, taking into account the radial speed of extragalactic nebulae*. And when Hubble 1929 published the article *Relation between distance and radial velocity in extragalactic nebulae*, according to which they are receding faster the farther away they are; it was enough for Lemaître to **assume** that the whole world originated from a single point, from the Primordial Atom, *The Expanding Universe*, 1931.

None of these assumptions are correct.

The paper proposes the method of a schematic representation of zero-uncertainty vacuum symmetry as proof that every active galaxy could be a “big bang.”

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## Contents

Introduction

Entropy passage through the black hole singularity

Schematic representation of zero-uncertainty vacuum symmetry

Conclusion

References and Notes

## Introduction

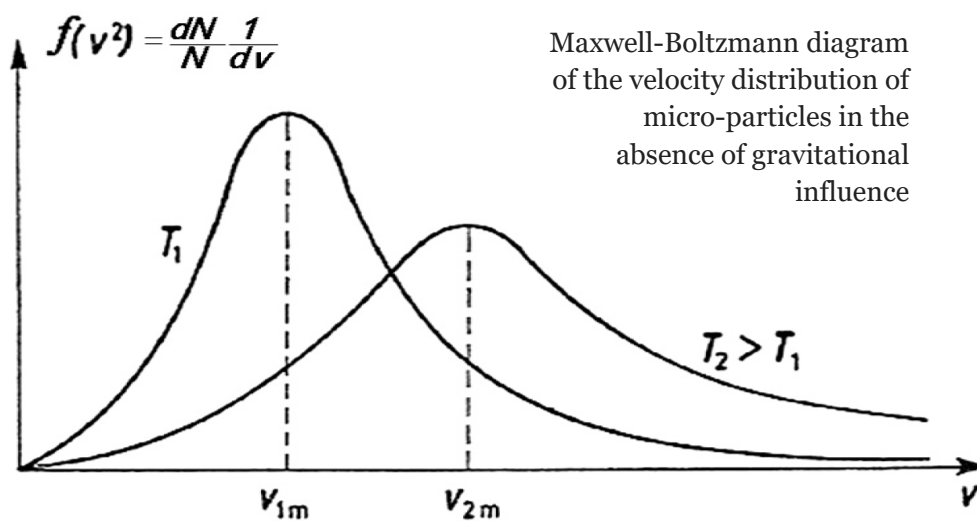
Einstein was not able to explain his  $c = \text{const}$  postulate in any other way than with mathematical symmetry, and after the EPR paradox,<sup>1</sup> Bell's inequality and the experimentally confirmed fact that there are no “hidden variables”, it could be clear that the  $c = \text{const}$  postulate cannot be explained on a macro level and that the **chance, probability** and **uncertainty** at the micro level are ontological. In cosmology, the opinion gradually matured that some kind of ether still exists, but that no state of motion or rest can be attributed to it.<sup>2</sup> And why it cannot be attributed, that can be seen definitely from Feynman's work, because of virtuality.<sup>3</sup> I characterized such an ether with  $c^2$ -inertia,  $c^2 = \text{const}$ . I characterized such an ether with  $c^2$  inertia,  $c^2 = \text{const}$ ,<sup>4</sup> where the speed of light is not a kinematical but a dynamic quantity  $c^2 = \Delta m / h\nu$ , from the virtuality of the vacuum it creates both mass (with the gravity constant) and Planck's constant.<sup>5</sup> As long as a photon is in the vacuum, it is virtual, it has no specific energy, its time does not flow, its wavelength is also virtual, and it can be anywhere with equal probability, it all depends on the atom  $m_i$  ( $i = 1, 2, 3, 4, 5 \rightarrow \infty$ ) in which it is caught. Here it adapts (by Lorentz transformations) to the coordinate system of that atom, its units of length and time — all according to the **inertia** of the entire universe. And inertia is characterized by the laws of conservation, from which, according to the Nether theorems, **symmetry** arises. The symmetry of the vacuum and its zero-indeterminacy can be illustrated by the potential gravitational energy created by the Schwarzschild black hole in the entire surrounding space: the mass  $M$  of that black hole symmetrically corresponds to the mass  $-M$  on this side of its horizon.<sup>6</sup>

There are papers that derive Newton's law of gravity, both classical and relativistic,<sup>7</sup> based on entropy, which, moreover, at greater distances (in the halos of galaxies, for example) give higher accuracy because the force of gravity, instead of  $\propto 1/r^2$ , is more accurately described with  $\propto 1/r$ , making the black mass assumption redundant. For the same reasons, the graviton has become redundant, a photon, a quantum of electromagnetic energy, is sufficient. All based on the

symmetry of the vacuum itself, which transmits real information faster than light, however, without real energy, i.e. only virtual. (If one of the entangled photons interacts with a real mass, its remote connection with its counterpart is broken and it leaves itself to the energetic fate of the environment where it is located an unknown distance away.)

From the same properties of the vacuum, Maxwell in 1859 derived the thermal distribution of gas-particle speeds in the absence of gravity, in a homogeneous and isotropic vacuum: homogeneous, that means **relativity**, in every point of space the coordinate origin can be equally taken; and isotropic, it means **symmetry**, an equal property in all directions. For linear symmetry, for example left to right, the Gaussian probability distribution applies: over time it is the same for the distance to the left as for the right, a bell-shaped diagram with a maximum at the origin of the coordinate system. However, space has three degrees of freedom, three independent velocity coordinates. For the probability function of kinetic energy distribution  $f(v^2)$ , it is necessary to take into account three independent probabilities of velocities by coordinates, and the only function that satisfies the condition  $f(v^2) = f(x^2)f(y^2)f(z^2)$  is logarithmic, so it is again a bell-shaped diagram, but with zero probability for any particle (it is quite improbable that any of them will be stationary, but only the one that man chooses to the koo-system binds to it). So, in the modern notation with the Boltzmann constant  $k$ :

$$f(v^2) = 4\pi \left( \frac{m}{2\pi kT} \right)^{\frac{3}{2}} v^2 e^{-\frac{mv^2}{2kT}} \quad (1)$$



Sixty-five years after Maxwell, Bose also derived the law of blackbody radiation from the same properties of the vacuum, treating photons as an ideal

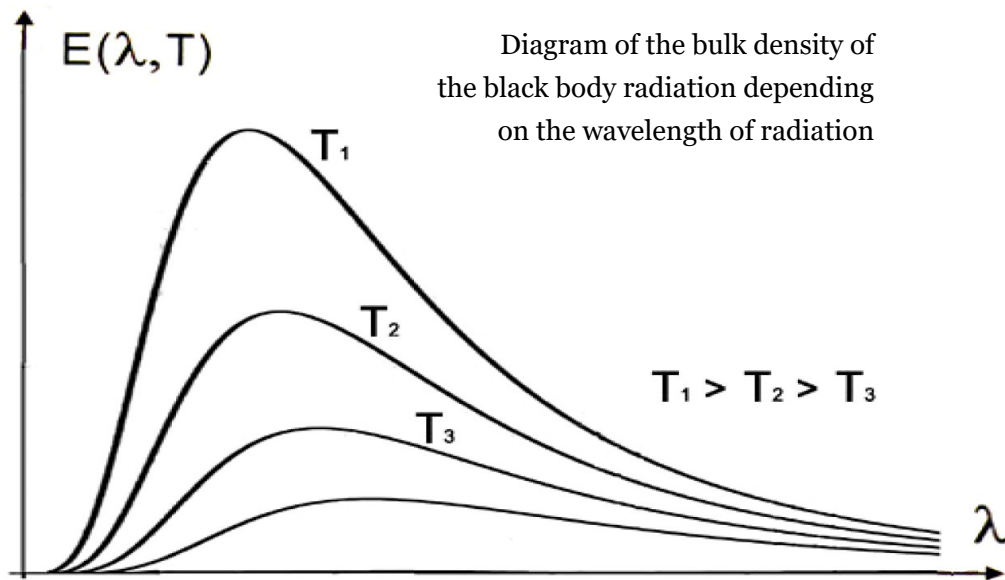
gas,<sup>8</sup> which in a given volume  $\Delta V$  has a certain energy  $E(\nu)$ . He also starts from spherical symmetry, here with the square of the photon's momentum

$$4\pi p^2 dp = 4\pi \left( \frac{h\nu}{c} \right)^2 \frac{h}{c} d\nu, \text{ where } p = h\nu/c \text{ is taken from } E = pc = h\nu.$$

In this way, we get

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

There, frequency is replaced by wavelength, more suitable for future analysis.



For the purpose of this article, it is good to keep also this in mind: the symmetry of the vacuum itself explains the action at a distance in the EPR-paradox, as well as the entropic transfer of information faster than light.

### Entropy passage through the black hole singularity

If I know how something is now if I know how fast it is changing, I know the speed of that change and so on, I know it and in general, then I can predict what it will be like, in all likelihood, in some future time. The math says Taylor's series. However, it is not appropriate to expect constant analytical insight, nor is it easy to follow more and more derivatives, which can suddenly go wild, not to mention violent interruptions by violent people or a meteor suddenly falls and kills almost

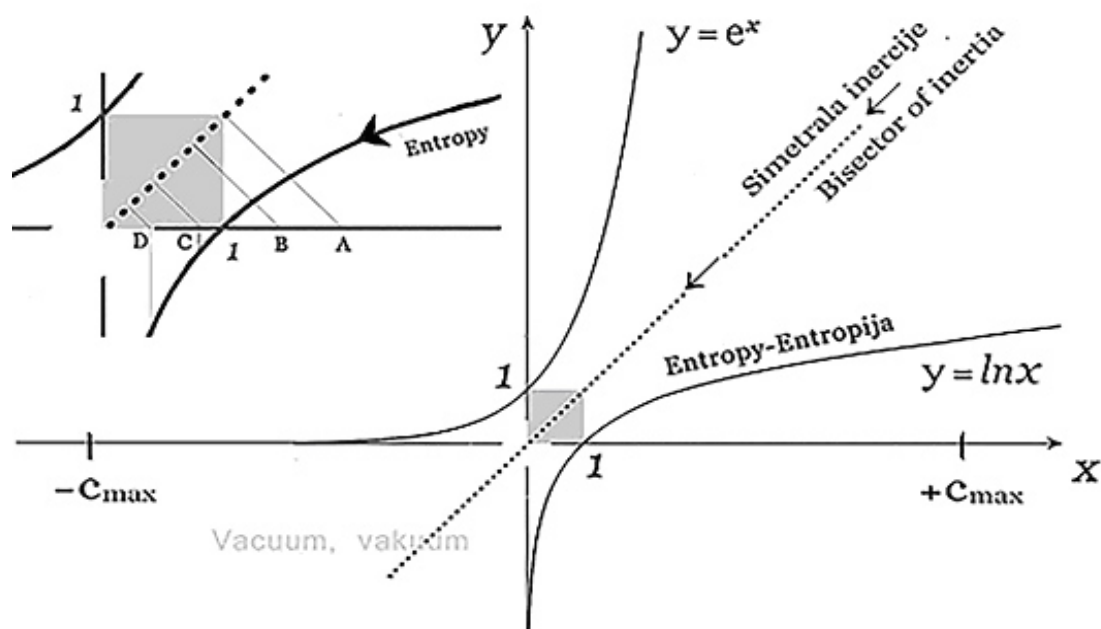
all life on Earth. But there is one special function whose derivatives are all equal, you are completely sure that they will be the same also at infinity—as if by inertia. And no matter where you are on the x coordinate, you can be the one 1 from whom everything begins—as Descartes would say: *I think, therefore I am*—both up to the sky and down to the tiniest tiny thing in the infinite. It is the exponential function with the base of the natural logarithm of the transcendental number e, it transcends both rational and irrational, everything. Everything can fail, even entire star worlds collapse, but the LOGIC of that function cannot, always, forever, eternal and unchanged like the vacuum itself,  $y = e^x$ . And behold miracles, its inverse function  $x = \ln y$  is the Boltzmann function of entropy that is constantly increasing, always anew from zero—as Nietzsche would say: *eternal repetition of the same*. And that function—as if by inertia.

And if one and the other function are drawn in the Oxy coordinate system, mutual **symmetry** with a common bisector  $y = x$  will appear, which is a feature of all mutually inverse functions because they actually describe the same phenomenon, once with x as an independent variable, the second time with y, no longer classical action and reaction, but interaction—concretely, it is *the bisector of inertia*. The coordinate x is the radial distance from the O-coordinate origin as a possible singularity, which extends to infinity on both sides when it comes to a vacuum, although the gaze of the observer which stands in the singularity reaches  $c_{\max}$  and  $-c_{\max}$  at most. For people who do not believe in the “big bang” as a beginning, the **virtual vacuum** is the same both before and behind that  $c_{\max}$ -limitation, and for people who believe in the “big bang” as a beginning there is nothing behind that limitation because only there as far as did the primordial light come as cosmic microwave background so far metrics were formed, i.e. defined space—there is nothing further. For those people, the beginning is absolute, and for these others, that point is also relative, like every possible point  $m_i$  in the Universe.<sup>9</sup>

All university textbooks on astronomy, exposition on the evolution of stars, begin with the formation of a protostar from cosmic dust in the expanses without galaxies, micro particles  $m_i$  ( $i = 1, 2, 3, \text{etc} \rightarrow \infty$ ) without the influence of gravity. If there is an accidental exchange of photons between two particles, their wavelength itself maintains a constant distance by its constancy, so whether it is how much, whether they mutually rotate or not, there is no reference, the only reference is the conservation of energy,  $c^2 = \text{const}$ . If the third gets tangled up, the triangle already appears with the  $\pi$ -sum of the angles, and with a multitude of particles,  $\pi$  may no longer be exactly true, gravity, compression and smaller space began to act, the temperature increased—we can already observe a further

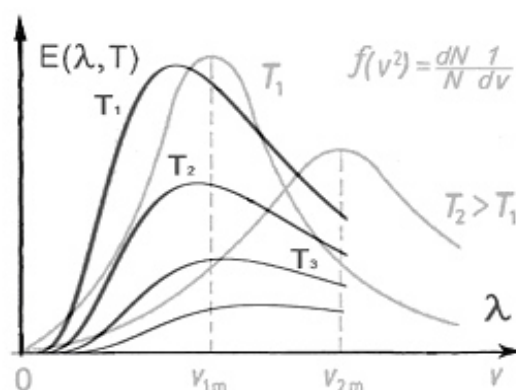
decrease in entropy parallel to the increasing temperatures on the *Planck radiation diagram*, in the picture:

## Passage diagram of entropy through singularity



### Schemantic representation of zero-uncertainty simetry of the vacuum

(above, in the second quadrant)



The numerical values of the constants  $h$ ,  $c$ , and  $k$  are such that already at the wavelengths of visible photons, the emissive power of the blackbody can be written without the unit in the denominator, so formulas (1) and (2) are practically of the same form, and due to the small constant  $b$  in Wien's law displacement, all the energy  $E(\lambda, T)$  is already with the Compton wavelength for the electron before the singularity  $(0, T)$ . In the case of a vacuum implosion together with the collapse of incidental masses, there are no definite particles<sup>10</sup>, so the energy  $E(\lambda, T)$  is also undetermined and the  $x$ -coordinate is determined by the relative ratio of wavelengths.

In the picture, passing through the singularity (0,1) it is shown graphically by diagrams, where  $x_1 = x$  and  $x_2 = y$ . In the construction of the diagram,  $k_1 k_2 k_3 \dots e^{x_1 x_2 x_3 \dots} = e^{k_1 k_2 k_3 \dots x_1 x_2 x_3 \dots}$  ... was used, i.e. from the countless parameters that influence the calculation, for qualitative analysis it is irrelevant what will be taken as the constant  $k_i$  ( $i=1, 2, 3, \dots \rightarrow \infty$ ) and what about variable quantity ( $x_1, x_2, x_3, \dots \rightarrow \infty$ ).

The implosion of the vacuum goes along the x-axis in the direction of the coordinate origin: from an infinitely large value, the entropy decreases logarithmically to the point (0, 1), compressing the energy into the singularity of a single state – infinitely large, as Gamow writes, of both temperature and density.<sup>11</sup> The thermal energy Q is therefore opaque, all particles that would be created in it are instantly annihilated, and it is like a black body or exactly a black hole.

From the mathematically infinite thermal energy that cools adiabatically according to Boyle-Mariot's hyperbolic law, and compensates its losses in the creation of nuclei from that infinity, it is not particularly difficult to calculate, when which and how big atomic weights—according to Compton's wavelength. It is incomparably more difficult to reach that singularity from the opposite direction, when the implosion of the vacuum has yet to reach that singularity, a singularity of infinite temperature and density, but with an uncertain amount of energy-mass - and only after passing through it the adiabatic expansion of the radius of the Big Bang at the speed of light up to the current interval  $-c_{\max}, +c_{\max}$ . Until such a singularity was reached, namely, there had been already realized particles with mass that always represented a part of the energy of that Big Bang—the ascending line to the singularity must be interrupted by a drop in energy with each new creation of each new type of particle. Just as Gamow's hyperbole of cooling is punctuated by “teeth” with each trip, a new release of a type of particles.

The coordinate axes have changed places. In the Maxwell-Boltzmann diagram, the kinetic energy of each individual mass (thus the total energy) is determined because the length (velocity) is determined, now on the x-axis. And the relative probability distribution of the number of particles with mass is on the y-axis.

### **Schematic representation of the zero-uncertainty symmetry of the vacuum**

The logarithmic function of entropy, decreasing from infinity according to the logic of bisector inertia, for  $x = A$  comes to a black hole, the perpendicular line

from the point (1, 1) falls to the point A of the Ox-axis. (See the diagram above in the second quadrant). All particle-wave material orbits around the center of the black hole, gradually approaching it, at what speed it is shown by the perpendicular lines from the series of points A, B, C, D on the bisector of inertia. For  $x = 1$ , a “big bang” occurs, graphically the point (1, 0) passes through the point (0, 0) into the symmetric point (0, 1). The axes Ox and Oy change places,  $-\infty$  when the points C, D  $\rightarrow$  O becomes  $+\infty$  on the new Oy-axis, it is now an infinitely large density of heat energy whose cooling Gamow followed by calculating the percentage of chemical elements in the universe...

Mathematical derivations in the paper<sup>10</sup> predict non-thermal radiation of a black hole during gravitational collapse and thermal radiation after the collapse. This schematic representation and mathematical analysis in the paper<sup>10</sup> should be kept in mind when observing active galaxies, which non-thermally radio-radiate and eject a stream of matter outside the galaxy and up to a million light-years away.<sup>12</sup> When passing through the space-time indeterminacy of a black hole and an explosive of the transition from the point (1, 0) to the symmetric point (0, 1), a frequency shift is possible, it is possible that the counter-teeth in the spectrum of the ejected jet again into distant space without the influence of gravity do not correspond to the counter-teeth calculated by Gamow. *But if several counter-teeth*, with the eventual correction of the scheme proposed here, *coincide symmetrically* with the teeth that Gamow found, then, firstly, we proved to the doubting Tomas (what was LOGICAL even without proof) that there was not just one so-called “big bang” and, secondly, we have at least shown that an ordinary galaxy with thermal radiation is probably the next evolutionary stage of active galaxies.

## Conclusion

*But if several counter-teeth coincide symmetrically...*

The *Passage diagram of entropy through singularity* shows the origin of the *Planck black body radiation* diagram parallel with the origin of the *Maxwell-Boltzmann thermal distribution*: it tends to zero,  $\lambda \rightarrow 0$ , several times faster than the Maxwell-Boltzmann distribution at the highest temperatures, and faster with increasing wavelength tends to its maximum by cutting the Maxwell-Boltzmann upward line because due to the inertia of mass particles it is less steep. The non-thermal spectrum of active galaxies is continuously ascending with different cut-off teeth of the emission radiation. This is the reason that the observation tables should be made by checking each calculated counter-tooth of an active



galaxy: according to the scheme, the frequency shift found should be compared with the recorded teeth—without the prejudice that we came from the same “big bang” as that spectrum of the active galaxy. Otherwise, we will dismiss fine differences in frequencies as random artefacts. Only with the awareness that there was not just one big bang, can one properly see the cosmos and understand the Universe.

The function  $y=e^x$  keeps all the mentioned properties if the point  $x=0$  moves up or down along the bisector of inertia. The change in the horizontal “absolute” zero temperature  $T$  (which is normally over the gas constant in relation to Planck's uncertainty constant) together with the symmetric distances  $-c_{\max}$  and  $+c_{\max}$  nothing changes except the dioptré with which we look at that symmetry: from the micro-world we are in the macro-world or perhaps already in the imaginary world of Riemannian complex infinity behind our  $c_{\max}$  and the cosmic background microwave. Universal constants are always just cosmological constants (in the ancient Greek sense, what they could see was called the cosmos).

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## References and Notes

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- 4 Milan Nešić: *In Cosmology,  $c^2 = \text{const}$  Is the Measure of Inertia, Not Mass*, <https://vixra.org/pdf/1812.0230v1.pdf>
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- 6 Kentaro Shimizu: *Gravitational energy of a Schwarzschild black hole*, <https://arxiv.org/abs/1608.05264v3>
- 7 Erik Verlinde: *On the origin of gravity and the laws of Newton*. In: *Journal of High*, <https://arxiv.org/pdf/1001.0785.pdf>
- 8 Although of a wave nature, that light is emitted in quanta, Planck showed it

in 1900, Einstein in 1905 that it is also absorbed in quanta, Bohr postulated in 1913 that the electronic levels in atoms are quantized, which was confirmed experimentally in the same year, but that this quantum  $h\nu$ , although the photon has no mass, in a collision with a free electron still behaves as if it has mass, as if its momentum is  $p = mc$ , this was experimentally demonstrated and theoretically explained only by Compton in 1922: in a collision with an electron, the photon not only loses its frequency, but also the electron and that quantum of light change direction, just like in the collision of two billiard balls. And all calculations are confirmed by experiments. And Bose's extremely beautiful derivation of Planck's law of blackbody radiation.

However, all experiments by earthlings on Earth, Earth in our Galaxy where all mutual velocities are perfectly negligible compared to the speed of light. Therefore, both the photon and the electron that are colliding here are practical in the same coordinate system.

Only at high cosmic velocities is it shown that Heisenberg's indeterminacy is a matter of the zero-indeterminate symmetry of the vacuum itself, without which there could be no interaction at all between atoms with cosmically large differences in velocities. Zero-uncertainty in the strict Heisenberg sense occurs only in the mutual relation of coo-systems in which both the emitter and the receiver are practically in the same coo-system, so then  $\Delta E = c\Delta p = h/c \Delta v$ . Otherwise, in cosmological terms  $\Delta p = \Delta(mc) = c\Delta m + m\Delta c$ , so when a photon from relativistic large distances finally reaches this or that, by chance, which one, but finally that very specific atom-receiver, the indeterminacy of the spatial coordinate of the reception is zero,  $\Delta x = 0$ . Heisenberg's uncertainty relation dictates, however, that  $\Delta p \Delta x \geq h$ : with countless different speeds  $v < c$  up to the speed of light, it is completely uncertain in which atom the photon will be caught. Heisenberg's inequality is an objective condition:

$$(c\Delta m + m\Delta c)\Delta x \geq h \rightarrow (c\Delta m + m\Delta c) \rightarrow \infty \quad (3)$$

Since  $\Delta m$  is an insufficient micro size, it remains that the entire possible macroscopic difference in the speeds of the coordinate systems of the emitter and a particular receiver is covered by the uncertainty  $\Delta c$  according to

$$c^2 = \frac{hv'}{\Delta m'} = \frac{hv''}{\Delta m''} = \frac{hv''' }{\Delta m'''} = \text{itd...} = \text{const} \quad (4)$$

The speed of light is adjusted to the measures of length and time of any receiving atom. The vacuum itself, in unity with all hitherto mass-realized particles, integrates all the space around the receiving atom in order to maintain its  $c^2$ -inertia with the principle of least action. This immeasurably

infinite and eternal vacuum shows its  $c^2$ -inertia over and over again only through a precisely defined realization of the  $\Delta m$ -mass in the receiving atom.

The fact that Einstein could not accept randomness in physics (the EPR-paradox and the search for *hidden variables*) is the special contribution to science (Bell's inequality and experiments until the end of the 20th century), more about this in my article *Relativistic Ether and Heisenberg's Uncertainty Principle*:

<https://vixra.org/abs/2101.0183>

**9** In 2017, in the lecture Affine geometry and relativity at the Mathematics Institute SANU in Belgrade, prof Božidar Jovanović spoke about the mathematical four-space  $m_i$  ( $i = 1, 2, 3$ , etc) in the Euclidean coo-system where Lorentz transformations apply between the event-points – there is no better description of the vacuum in itself than this.

**10** Dr Eric Greenwood, dr Dejan Stojkovic: *Hawking radiation as seen by an infalling observer*, HEPCOS, Department of Physics, SUNY at Buffalo, Buffalo, NY 14260-1500, U.S.A.

<http://arxiv.org/abs/0806.0628v2>)

„It is extremely difficult to include any form of backreaction in the realistic models. (see [2, 3, 4, 5, 6, 7] for some attempts).“ That's why also in this paper the outcome of gravitational collapse is presupposed: a Schwarzschild black hole, without considering how its mass could affect the entire parent star that is gravitationally collapsing.

**11** Expanding Universe and Origin of Elements, 1946. The Origin of Chemical Elements, 1948, together with Bete and Alfer.

In the articles, a neutron gas of infinitely high density at an infinitely high temperature is observed, which is allowed to cool itself by expanding, and its thermal energy  $Q$  is treated by the Boltzmann entropy  $S$ . But unlike Bose's statistical proof of Planck's law of blackbody radiation with the energy of the photon gas  $\Delta E$  in volume  $\Delta V$ , the volume of the primordial gas thus imagined expands at the speed of light. That's why the abscissa axis starts from the moment of approximately 20 s “prior to that time the temperature of the neutron gas was so high that no aggregation was taking place.”

The abscissa shows the atomic weights of hydrogen 1,  $\log_1=0$ , then helium 4, lithium 7, beryllium 9, etc., and on the ordinate shows “the relative abundance of different types of nucleons (which – M.N.) decreases rapidly for light elements and remains approximately constant for elements heavier than silver.”

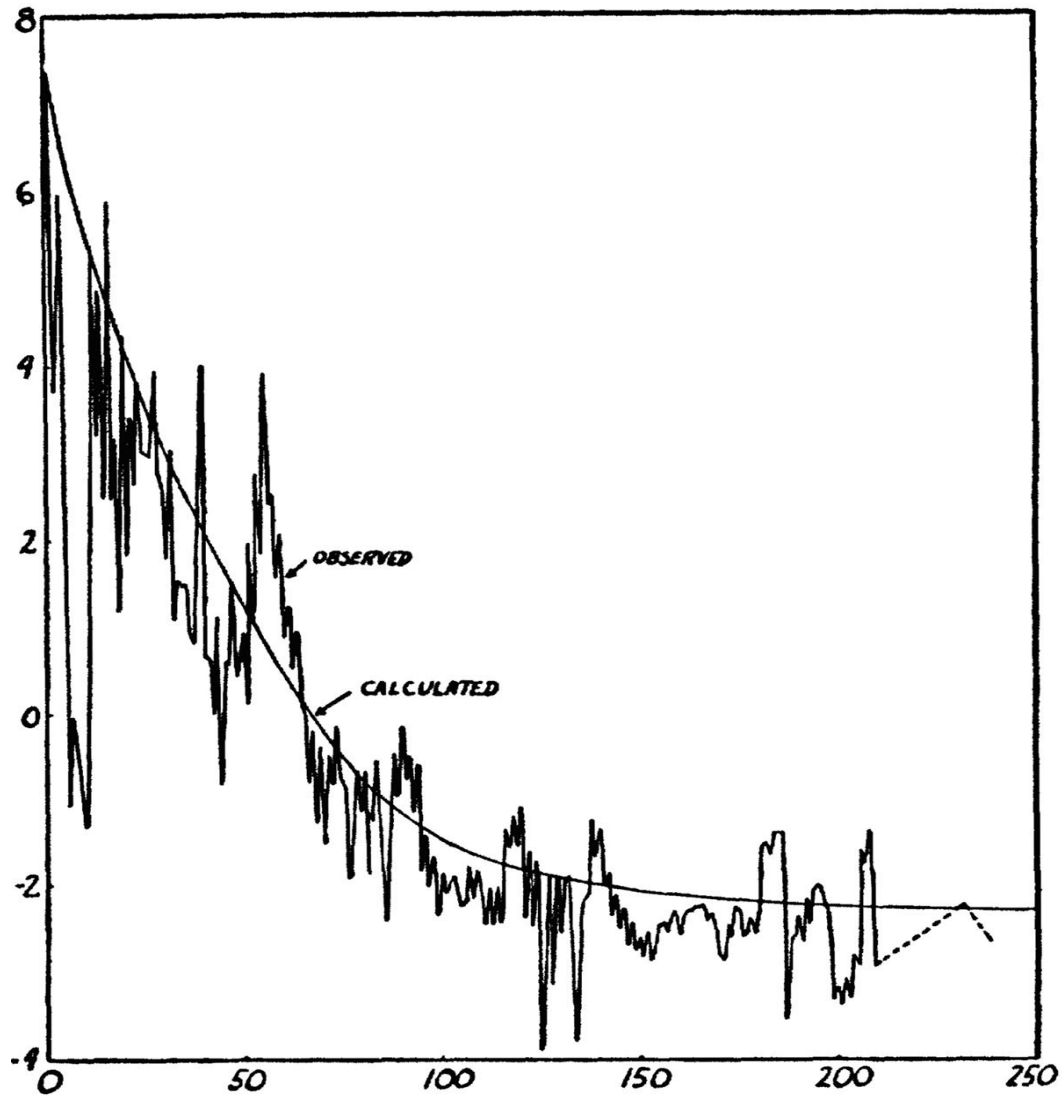


FIG. 1.  
 Log of relative abundance  
 Atomic weight

12 That stream of matter in the direction of the axis of rotation, symmetrically on one side and on the other, is as a rule asymmetric, one is smaller. This is a sign that it is antimatter compared to the one that fell into the black hole through accretion, which cannot be of a dual nature. Only by passing through the singularity is antimatter created, and only in this way do those two opposing jets create a magnetic field. And so on. With a million shades and variations of maybe even different so-called universal constants that would be redefined in every active black hole...

13 For such an understanding of the Infinite, such a Universe devoid of all ho-

mo-centricity and such worlds,\* each with its interval  $(-c_{\max}, +c_{\max})$ —the cosmic microwave background has a somewhat different meaning than as the already classical relic of only one big bang, precisely the meaning that would enable **Re-inventig Physics From The Bottom Down** of a **DIFFERENT UNIVERSE**. “*But we do not call it this because it is taboo.*” (Laughlin Robert).

If you compare the present view of the starry sky with the ancient Greek sky maps, you will nonetheless see that the entire constellations of fixed stars have moved somewhat—in those few thousand years. In the era of A- and H- bombs, it is not appropriate to wait another few thousand years to make sure that thinking about a **different universe** is necessary. It is necessary to free science from the homocentric view of the universe as soon as possible, at least so that science does not prefer God as the first mover, which otherwise provides an excuse for the imposition of various selfish interests in the name of this homocentric view.

I don't know how powerful telescopes are today and whether they can register the shift of the spectral frequency of the nucleus in the jet of matter that was created by passing through the singularity compared to the jet on the side of the accretion disk. But if a systematic shift is found per the proposed method of zero relative symmetry of the vacuum, it will be proof, I know, that by passing through the singularity antimatter was created, that would have to be enough for us earthlings to be more modest: that for the sake of the survival of our common civilization, we keep under control our otherwise natural homocentrism. Isn't it enough for us that we can use the coordinate system related at least to the cosmic background microwave as an absolute one, that we can really solve all practical problems by that just **technical coordinate system**?

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\* Paraphrase of the treatise title by Giordano Bruno (1542–1600): DE L'INFINITO, UNIVERSO E MONDI. On this occasion, I recommend the book: WAS GIORDANO BRUNO BURNED IN VAIN? Belgrade, 2018. ISBN 978-86-900622-0-1.

It is dedicated to the idea that science and religion do not have to contradict each other, if religion allows a metaphorical interpretation of the holy books, no matter how rigidly each of them insists on its ritual customs, and if science sees that even the theory of relativity is insufficiently relative, i.e. that coordinate systems related to virtuality should also be taken into consideration if one wants to guess the answer to the question:

**How come the world exists?**