varying velocity. The interaction of this ether flow with the Coulomb fields of the electrons and nuclei causes the rod to change its length *periodically* (Wilhelm 1993a).

8. In addition, Li's (1995b) 'axiom' is false, since a rod (moving or at rest relative to the Earth) rotating relative to the stars of the universe is subject to periodically varying gravitational forces and associated length changes. *E.g.*, a rod fixed at one end to a point of the Earth's equator and pointing in radial direction experiences periodic length changes in the gravitational force field of the Moon as the Earth (with rod) rotates about its axis.

9. Li's (1995a) statement, *"The principle of the constancy of length never meant that the rod does not undergo physical interactions,"* reveals once more breakdown of his logic and physics. *E.g.*, experiments show that a rod fixed at one end to the Earth and pulled (pushed) by a large force pulse at the other end will be elongated (shortened).

10. The length of a Li-rod (alleged by Li (1995b) to be independent of all bodies present and their force fields) is necessarily the same, no matter whether it is moving uniformly with a velocity **v** or at rest in an IF. In accordance with Wilhelm's (1995) Eqs. (1)-(3): $l(t) = l(0) = l(\mathbf{v} = 0) = \xi_{Bo} - \xi_{Ao} = \ell_o$, where ξ_{Bo} and ξ_{Ao} are the *fixed* initial coordinates of the rod along the *x*-axis of S. Li's (1995a) comment to the contrary is incompetent.

11. By standard (international) notation for algebraic equations, $x_2 - x_1$ is the distance of two points $(x_2 > x_1)$ on the *x*-axis, whereas $x_1 x_2$ is the product of their coordinates. Li's (1995a) claims to the contrary reveal elementary ignorance.

12. Li's (1995b) theory of the length of the moving rod in the non-IF of the accelerated Earth is neither "correct" nor fundamental, since he did not consider the D'Alembert forces in his *accelerated* frame, and the interactions with ether and other bodies present.

13. Li's (1995a) conviction that absolute space and time and ether have been "refuted" indicates that he does not understand that he denies the very existence of the physical foundations of his attempted criticisms of Einstein in his *Apeiron* and *Physics Essays* papers. If there were no electromagnetic and gravitational field carrier (ether) and no distinguished IF s° (in which the cosmic ether excitations are isotropic), then indeed Einstein's special relativity theory would be physically acceptable.

Li's excuse that he is justified in republishing the ideas of Dingle and Essen since (allegedly!) Wilhelm did not quote Newton in his publications (which deal with applications of G-covariant electrodynamics, based on the existence of an IF s° in which the ether and cosmic microwave background are at rest) is unethical. Is it really necessary to quote Newton in Wilhelm (1993a), "Fitzgerald Contraction, Larmor Dilation, Lorentz Force, Particle Mass and Energy as Invariants of Galilean Electrodynamics"?

A literature search indicates that Li already made ample use of this self-serving excuse in 1994. *E.g.*, Li (1994), "On the Galilean Relativity of the Laws of Electrodynamics," rediscovers the electrodynamic equations for moving bodies of Lorentz (1895) under his own name without quoting Lorentz. The physical misunderstandings in this publication are so numerous that I can not comment on them here (*e.g.*, Li does not comprehend that the Lorentz/Li equations are not G-covariant; even one of his underlying Maxwell equations for resting bodies is flawed).

For reasons of space, not all errors in Li (1995a,b) could be discussed. However, it must be noted that Li (1995a) made a nearly correct statement, namely that he is "a relative unknown." The International Science Citation Index confirms this *relatively* and *absolutely.*

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The "Black Hole": Superstition of the 20th Century

The issues related to the "black holes" have been receiving ample publicity. I think it reasonable to mention two recent efforts. Robert L. Carroll [1] considers that a black hole, as an imaginary object in cosmology, does not exist in the real Universe. On the other hand, P.F. Browne [2], understanding a black hole as a reality, extends this notion to the whole Universe. Who is in the right? The question requires clarification as to the origin and the essence of the "black hole."

The Theory of Relativity is based on two principles, and one of them forbids motion at the superluminal velocity. To comply with this condition, it was assumed that the gravity action propagates at the velocity of light. The General Theory of Relativity (GTR) is based on this assumption. The interactions between bodies under GTR are considered in the form of distortions of four-dimension space-time. This method conceals the essence of the results obtained under GTR. We shall consider interactions with the help of a method of forces providing conspicuous results.

In my works, for example in [3], it is shown that the finite velocity of action in case of interaction between two charges q_1 and q_2 in Gauss's system of units will provide the following expression for force:

$$\vec{F} = \frac{q_1 q_2 \left(1-\beta^2\right)\vec{r}}{\varepsilon\left\{r^2 - \left[\vec{\beta}\times\vec{r}\right]^2\right\}^{3/2}}, \qquad (1)$$

where $\vec{\beta} = \vec{v}/c_1$ is standardized velocity, $\vec{v}$ is a motion velocity of one object relative to the other; $\vec{r}$ is a distance between the objects; $c_1 = c/\sqrt{\varepsilon\mu}$ is a velocity of action propagation in a medium; c is velocity of light in the vacuum; ε and μ are dielectric and magnetic permeabilities of the media. In the vacuum $\varepsilon = \mu = 1$ and $c1 = c$.

With small charge velocity v the force (1) coincides with Coulomb's law but as the velocity increases the force decreases and as it approaches the velocity of electromagnetic action propagation ($\beta \to 1$) the force tends to zero, *i.e.* no action is exerted on such a body and it is not accelerated.

These two limit cases for the force are determined by the finite velocity of action. According to the method of forces the mass of a body is independent on the velocity, *i.e.* is constant. It is the force that depends on the velocity. Under this method space and time are also independent on the velocity, so Lorentz transformations of coordinates and time are not used. All forms of interaction are considered on the basis of classical mechanics, the force alone depends not only on the distance between interacting objects, but on the relative velocity as well. Other researchers have also come to this opinion. For example, Xu Shaozhi and Xu Xiangqun [4] suggested that expression for the force be written in the following form:

$$\vec{F} = \vec{F}_o f(\beta), \qquad (2)$$

where $\vec{F}_o$ is the force at interaction of motionless objects, as is the case of the charges interaction under the Coulomb's law; $f(\beta)$ is the coefficient dependent on the standardized velocity β that has limit values of $f(0) = 1$ and $f(1) = 0$. In our case the coefficient is

$$f(\beta) = \frac{\left(1-\beta^2\right)}{\left\{1 - \left[\vec{\beta}\times\vec{r}/r\right]^2\right\}^{3/2}}, \qquad (3)$$

If we consider the gravitation action to propagate with the final velocity c_1, as is assumed under the General Theory of Relativity, expressions (2) and (3) present the force of the gravitation action, where

$$\vec{F}_0 = -G\frac{m_1 m_2 \vec{r}}{r^3} \qquad (4)$$

is Newton's law of universal gravitation.

If force in (1) or in (2)-(4) is applied to each of two interacting bodies, then, in accordance with the second law of mechanics $m\frac{\mathrm{d}^2\vec{r}}{\mathrm{d}t^2} = \vec{F}$, after transformations we obtain:

$$\frac{d^2\vec{r}}{\mathrm{d}t^2} = \mu_1 \frac{\vec{r}\left(1-\beta^2\right)}{\left[r^2 - \left(\vec{r}\times\vec{\beta}\right)^2\right]^{3/2}}, \qquad (5)$$

where interaction constant μ_1 in the case of two charges is

$$\mu_1 = \frac{q_1 q_2 \left(m_1 + m_2\right)}{\varepsilon m_1 m_2}, \qquad (6)$$

and in the case of two interacting masses is

$$\mu_1 = -G\left(m_1 + m_2\right). \qquad (7)$$

As a result of the solution of Eq.(5) I obtained [5] a trajectory in the polar system of coordinates (φ,r) as follows

$$\varphi = \int \frac{h\mathrm{d}r}{r^2 v_r}, \qquad (8)$$

$$v_r = c_1\sqrt{1 - \frac{h^2}{c_1^2 r^2} - A\left[1 - \frac{v_{ro}^2}{c_1^2} - \frac{h^2}{c_1^2 r_o^2}\right]}$$

$$A = \exp\left[\frac{2\cdot\mu_1}{c_1^2}\left(\frac{1}{\sqrt{r^2 - \frac{h^2}{c_1^2}}} - \frac{1}{\sqrt{r_o^2 - \frac{h^2}{c_1^2}}}\right)\right], \qquad (9)$$

where v_r is the radial velocity; v_{to}, v_{ro} are the transversal and radial velocities at the radius ro; $h = v_{to}\cdot r_o = v_t \cdot r = \text{const.}$ is the kinematic angular momentum which is constant for all points of the trajectory.

In my book [5] it is shown that at $c_1 \to \infty$ the expression for the radial velocity (9) converts to the classical:

$$v_r = \sqrt{v_{ro}^2 + 2\cdot\mu_1\left[\frac{1}{r_o} - \frac{1}{r}\right] + h^2\left[\frac{1}{r_o^2} - \frac{1}{r^2}\right]} \qquad (10)$$

In GTR, the gravitational field equation is solved approximately by way of expansion with retained terms in c, with order no higher than c^2. Then retaining the same terms in equation (9) and substituting (9) in equation (8) we obtain the equation of motion for the symmetrical, central force field of gravity, which is used in GTR :

$$\varphi = \int \frac{h\mathrm{d}r}{r^2\sqrt{c_1^2 + v_o^2 - \left(c_1^2 + h^2/r^2\right)\left(1 - r_g/r\right)}} \qquad (11)$$

where $r_g = 2\cdot\mu_1/c_1^2$ is the gravitational radius.

Equation (11) and similar results describe the effects of GTR: the precessions of planetary perihelia, deflection of star light by a gravitational mass, and the existence of gravitational waves.

GTR describes the gravitational interaction as space distortion. I describe these interactions in terms of force (2)–(4). I would like to remind my readers that Nature is one, but the ways to describe it are numerous.

These two ways are based on one and the same assumption that gravity propagates with the finite velocity c_1. The difference lies in the fact that my solution (8)–(9) is precise, and solution (11) is approximate.

Now let us look at "black holes" with the help of the precise description. If a particle moves along the radius, *i.e.* $h = 0$, its radial velocity, according to (9), will be

$$v_r = c_1\sqrt{1-\left[1-\frac{v_{ro}^2}{c_1^2}\right]\exp\left[r_g\left(\frac{1}{r_o}-\frac{1}{r}\right)\right]} \quad . \qquad (12)$$

Let a particle, for example photon, have a velocity $v_r = c_1$ at the point $r = r_o$. Then as follows from (12) its velocity at any other point is equal to:

$$v_r = c_1, \qquad (13)$$

i.e. the particle goes on moving with the velocity of light. That should happen just so! If the action generated by an object propagates with the finite velocity, the object cannot produce any action on another object moving with the same velocity.

So, if the gravitation action propagates with the velocity of light, light will be freely radiated by a star regardless its mass. The star will shine brightly on the sky, and no "black hole" exists.

We come back to the question "Who is in the right?" My positive judgment is definitely with R.L. Carroll. There are no "black holes" at all. "Black holes" are a superstition of the 20th century.

A lot of questions arise in this respect. Which researcher was the first to invent this superstition? Is it harmless? Should a researcher be called to account for his mistakes?

The state of science determines the state of society. Contemporary physical sciences have given man an imaginary world. Men live in it and operate on unreal images. So in everyday life, men also dwell on imaginary, unreal values. This presents the worst conceivable danger for man, barring separate threats such as nuclear war, AIDS, ecological catastrophe and others.

Science is whatever provides knowledge. The history of science should discriminate between those who give knowledge and those who create superstition. To each according to his merits!

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Correction:

In the October 1995 @ *issue* section (*Apeiron* 2:124), the reply by G. Galeczki to H.E. Wilhelm was inadvertently truncated. Below we reproduce the portion of Dr. Galeczki's letter omitted earlier.

The "Aarau Question" and the de Broglie Wave: reply to Dr. Wilhelm

Dr. Wilhelm qualifies as "banality" the following quotation from the late Petr Beckmann's book *Einstein Plus Two*. "The recognizable velocities in electrodynamics are: the velocity of a charge in a magnetic field, which occurs in the Lorentz force, and the velocity of charges forming a current...." He ignored, I suppose deliberately, the following sentence: "These velocities do not produce physical effects simply by virtue of their definition with respect to an 'observer,' just as a windmill will not start to rotate because an observer starts running with velocity v relative to the mill...."This very sentence sheds light on a basic error of special relativity, namely, the dependence of "relativistic effects" on observer-referred velocities. (*N.B.* the "observers" are by no means interacting with the physical systems under study.) Honourable textbook writers such as J.D. Jackson, W.K.H. Panofsky and M. Phillips do not state explicitly what the velocity "v" in $\vec{F} = q\left(\vec{E} + \vec{v} \times \vec{B}\right)$ is relative to, so the problem is far from being trivial.

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