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This article summarizes one of the topics covered in my book *Prilog razumijevanju i kritici teorije relativnosti (Contributions To the Understanding and Criticism Of the Theory of Relativity)*, presenting an analysis of various interpretations of relativistic phenomena and of attempts to conceive an experiment that would make it possible to achieve supra-light velocity.

Interpretations of experience to date

Many experiments have already been carried out which have shown that a *wave* or, generally speaking, an electromagnetic impulse, can in no way exceed c , i.e. the speed of light.

At this point it is very important to stress something usually overlooked in papers like this one: those same experiments have also shown that an electromagnetic impulse is quite unable to move at a velocity that is *lower* than the speed of light.

Even if the source of the impulse moves at a velocity close to the speed of light, neither is the speed of the impulse increased if emitted in the direction the source itself is moving, nor reduced if emitted in the opposite direction; *instead, the Doppler effect appears.*

This experience demonstrates in the most direct way that the speed of light c need not be regarded as a property of light itself, or of an electromagnetic impulse, but as the property of the medium which transfers them, i.e. as its TRANSFERENCE CONSTANT. If the speed of light c were a property of electromagnetic impulses or waves of light themselves, or photons, it would be impossible for the Doppler effect to take place.

By TRANSFERENCE CONSTANT I understand the specific speed of transferring signals, information, impulses, waves, force, etc. No medium is capable of transferring electromagnetic impulses at a speed that is either *lower* or *higher* than c , since c is its TRANSFERENCE CONSTANT which could be changed only if other properties of the medium itself are changed beforehand.

The above should, I believe, suffice to demonstrate why it cannot be expected that light waves, electromagnetic impulses, or information travel at a speed *higher* or *lower* than c .

But what is the situation with mass particles?

These are not *carried by* the medium; instead, they *move through* it and are fully independent of its TRANSFERENCE CONSTANT. Consequently, they should supposedly be capable of moving both slower and faster than the value of the TRANSFERENCE CONSTANT of medium.

Effecting, observing and measuring motions at speeds below c offers no problem.

However, as far as movement at speeds greater than c is concerned, experience has demonstrated that powerful electromagnetic impulses emitted by big accelerators are unable to accelerate mass particles even close to the speed of light, even if the electromagnetic waves used possess enormously high energy values.

Why?

The answer offered by the Theory of Relativity suggests the following: with an increase in particle velocity, its inertia (mass, or impulse) also increases, and it would

take infinite amounts of energy to achieve velocity c . This quite clearly follows from the following Einstein's equation:

$$\text{Transverse mass} = \frac{m}{1 - v^2 / c^2} \quad (1)^*$$

*A. Einstein: "On the Electrodynamics of Moving Bodies", Ch. 10: Dynamics of Slowly Accelerated Electron.

The experimental proof presented in support of the assertion of mass increase is the enormous quantity of energy released when an accelerated particle collides with the target.

However, the very assertion related to mass increase, and its experimental proof, are in fact ... relative.

In order to demonstrate this, let us use the above Einstein's formula. In the text from which the equation has been taken, he suggests incorporating the "transverse mass" value into the Newton's equation: $F = m \times a$. This move is completely justifiable, since it renders the equation suitable for interpretation. Here are the results of that move:

$$m = \frac{F}{a}, \quad \frac{m}{1 - v^2 / c^2} = \frac{F}{a} \quad (2), \quad m = \frac{F(1 - c^2 / v^2)}{a} \quad (3)$$

where F = the force acting upon the particle.

In interpreting the events occurring with the acceleration of particles on the basis of equation (3), we must arrive at the conclusion that the *increase in velocity of a particle reduces its mass (inertia)*, but only the *manifested one*, F / a , while the *inherent one*, E / c^2 , remains the same. (E = energy exclusively in non-inertial form -- form of waves.)

By inherent inertia I I understand the total inertia contained by a particle, or body, even when not manifested at all.

Why, then, does the reduction of manifested inertia occur?

Equation (3) suggests the following answer:

The closer particle velocity approaches velocity c , the lower (in relation to the particle) is the relative velocity at which force F -- the force which accelerates the particle -- affects it, and at which force F is transferred by the medium (from source to a particle), not at infinite velocity but at the TRANSFERENCE CONSTANT, i.e. at velocity c .

A motionless particle is acted upon by force at velocity c , which (in the time, t zero) makes

the manifested inertia of the particle total and equal to the inherent inertia, E / c^2 .

However, the expansion velocity of force supposed to accelerate a particle, if the particle already moves at velocity $v = c$, equals zero. Therefore force, as great as it may be, cannot act upon the particle, which in turn, for that precise reason, cannot "respond" with inertia to its "acting". Newton's law: $F = -F$. And if $F = 0$, then $-F = 0$. Force $-F$ is manifestation of inertia.

Consequently, the suggestion made by equation (3), i.e. the inability of a particle to

*A. Einstein: “*On the Electrodynamics of Moving Bodies*”, Ch. 10: Dynamics of Slowly Accelerated Electron.

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accelerate to velocity c , and above, does not result from the enormous increase of its inertia (mass),

but rather from the fact that impulses emitted by the accelerator are unable to catch up with it and transfer their energy (supposed to accelerate it) onto it. This manifests in the same way as an illusion that the mass of the particle were, $m = \infty$, infinite.

For the same reason, a magnetic field deflects, to a slighter degree, the motion direction of very fast particles.

But if the above assertion is correct, there is a question to be answered: why does a particle, at colliding with a target, manifest a much larger quantity of energy than should correspond to its velocity?

This increased quantity of energy may also be the result of the very electromagnetic impulses, emitted in order to accelerate the particle, hitting the target practically simultaneously with the particles they were supposed to accelerate. For that matter, the value of that energy corresponds to the energy invested in particle acceleration. However, the Theory of Relativity has interpreted this phenomenon, as we have already said, as the consequence of the increased mass of the particle.

Both equations, (1) and (3), suggest clearly and non-relatively that a particle can never be accelerated to velocity c .

Is that suggestion well founded?

The physical logic of these phenomena enables us to speculate in the following manner: If a particle cannot be accelerated even to velocity c by means of impulses emitted from somewhere *outside the particle* and directed at it, it is not illogical to suppose that one could accelerate it to a velocity *exceeding* velocity c by impulses emitted *from the particle itself*.

How could this be achieved?

Proposal

Let a heavy nucleus be accelerated to a velocity close to velocity c , and let at this speed a nuclear reaction be generated within it, which will break it apart. The energy released by nuclear reaction will be sufficient to provide some particle with an initial velocity of $1.3 c$ in relation both to the target and the space of the accelerator tube.

On what hypotheses this proposal is based?

The *space* “enclosed” within the mass of the accelerated nucleus is *physically separated* from the surrounding motionless space of the accelerator tube, and is moving *together with the nucleus* in relation to the motionless evacuated space of the tube. Before the nucleus breaks up its inner “enclosed” space retains the unchanged TRANSFERENCE CONSTANT and transports, at velocity c , all the electromagnetic impulses resulting from the nuclear reaction within the nucleus in exactly the same way as if the nucleus were motionless. The relative velocity (in relation to the motionless evacuated space of the accelerator tube

and in relation to the motionless target) of those electromagnetic impulses that travel from the centre of the nucleus out in the direction the nucleus is moving will be $2c$. The contraction of lengths in the direction the nucleus is moving can have no influence on the velocity value of those impulses.

Before the break up of the nucleus the electromagnetic impulses which break it up can lend some of the particles a velocity exceeding velocity c in relation to the motionless tube space and the motionless target. Once the nucleus does break up this is no longer possible, because the inner space of the nucleus has merged with the motionless surrounding space of the tube, and the transfer speed of electromagnetic impulse, in relation to the tube and the target, has become equal to value of TRANSFERENCE CONSTANT c in all directions regardless of the fact that the nucleus from which the impulses emanated had been moving at a velocity very close to velocity c . This is something that has already been confirmed by experiments many times.

Those familiar with experimental evidence proving that the Theory of Relativity is correct will oppose the presented assertion with the results of the Fizeau experiment, stating that it was expected that the space “enclosed” within a fast jet of water would transfer light at a relative velocity exceeding velocity c by the value of the water jet velocity. However, since that did not happen, and that exactly the opposite did happen, it is logical to conclude that the space “enclosed” within a fast nucleus will not be able to transfer the electromagnetic impulse at a relative velocity exceeding velocity c .

The above objection need not be soundly based and its error, as well as the error of the Fizeau experiment itself, may lie in the following:

The *space* within the fast jet of water is not “bonded” to the water molecules of the jet and does not move along with them. It is, in fact, motionless since it is “bonded” to a mass of *much higher density*, i.e. to the wall of the glass or metal tube through which the water jet is travelling. Although the ray of light moves through the very fast jet, it is transferred by a space (medium) that is motionless in relation to the walls of the tube. Consequently, the measured speed of light equalled velocity c – just as the Theory of Relativity assumed.

However, if such a jet of water were to move freely through the hard vacuum of interstellar space, far distant from any solid mass, the space within the jet and in its immediate vicinity could be “bonded” to the water molecules of the jet and could therefore move together with them. And if a ray of light were to be released through such a jet, then the relative velocity of that light, within the jet, would be $c + v$ (v being the velocity of the water jet).

This possibility is suggested by the theories of “pulling the ether along”, suggested by some interpretations of the Michelson-Morley experiment. In accordance with those theories, and results of the M&M interference experiment, Earth can be regarded as *motionless* within a large shell or disc of empty space (“ether”) *revolving around the Sun* -- just as Copernicus believed.

Scientific experience proved Maxwell’s theory on existence of “luminiferous ether” to be correct.. His error in regard to understanding of this phenomenon laid only in the claim that Earth *is moving* through *motionless* “ether”. I have stated above that it is *motionless* in *moving* “ether”, or space, or field.

However, experiments carried out by Fizeau, Zeeman and others, were, it can be quite safely assumed, performed in inadequate physical conditions.

The mass of a nucleus possesses a much higher density than the mass of water and is capable of separating its inner space and isolating it physically from the space of the accelerator tube, and creating physical conditions that would exist in that hypothetical jet of water that is moving freely through interstellar space.

Let us now go back to our problem of methodology.

It is not difficult to accelerate a nucleus to a velocity close to c . The problem lies in causing its break-up at a desired time and at a desired place. Modern methods of provoking the break-up of a nucleus, i.e. a nuclear reaction, guarantee a certain degree of exactness only statistically in a large number of unstable nuclei. The only method that can satisfy us, however, is the one which ensures a nuclear reaction at the exactly defined place and at the exactly defined and known time. In other words, we not only have to use a different method of provoking a nuclear reaction, but also to do it in a different type of nuclei.

How, then, can we deliver energy to a very fast nucleus which would cause its controlled fission or spallation?

We can immediately discard neutron bombardment, since it does not enable us to know sufficiently precisely when, in such circumstances, shall a neutron strike a nucleus, or if a nucleus would absorb its impulse.

We could, however, use the following method:

An accelerated nucleus is directed through a tube supplied with a revolving electromagnetic field of a very high frequency. While the nucleus is travelling through the tube, the revolving field will continue to increase its spin to a value at which the nucleofugal force provokes its break up. Device increasing the spin of heavy nucleus I have called nucleospinal reactor.

When talking about a nucleofugal force, I actually mean the centrifugal force which results from the rotation of the nucleus mass, in which nuclear force has the function of centripetal force.

If, for the sake of this experiment, we use any one of the heavy, but stable, nuclei such as lead, bismuth or mercury, and if we know the velocity of the nucleus, and the density and frequency of the revolving electromagnetic field, we shall be able to determine both the place and time of the break-up of every individual nucleus with to a great degree of precision.

The velocity of particles created by the break-up of the accelerated nucleus will remain to be measured or calculated. I believe this can be done through one of the classic methods. A possible positive result would not refute the Theory of Relativity but would clarify it, eliminate faulty interpretations and unfounded speculations, and limit its significance to one specific area in which it is indispensable. Speed of light, c will remain a constant, but as the TRANSFERENCE CONSTANT of "luminiferous ether" or medium in general.

Nucleo spinal reactor can serve as a reactive propulsion engine of supraluminal space ship too. This, nuclear engine gives sufficient energy for continual acceleration durring the first half of journey, and deceleration durring another half.

If the value of the acceleration and deceleration would be just like here on Earth - 1g - crew of space ship would have the same conditions for life (artificial gravitation) like here on the Earth. Time of journey would be in accordance with equation

$t = \sqrt{\frac{4l}{a}}$ t is a time and l is a distance. If the distance, l to star or planet at which we

want to arrive is thousand years of light, time of journey will be $t = \sqrt{\frac{4 \cdot 1000}{1g}}$,

$t = \sqrt{4000}$, $t = 63,2 \text{ years}$.

More precise calculation shows that journey will be 59 i.e. a particle less than 60 years, but now it is not so important. Average velocity of supraluminal space ship would be cca 16 times larger than velocity of light.

Supraluminal space ships without living crew, i.e. space ships for transport of informations etc could accelerated itself, with acceleration of 100 g and larger. Time of journey of this kind of space ships, for the same distance - thousand years of light - would

be $t = \sqrt{\frac{4 \cdot 1000}{100}}$, $t = 6,3 \text{ years}$, and less. Only nucleospinal reactor could provide

sufficient amounts of energy for such journey, or transport.

Above calculations shows that it is not impossible to colonize all planets inner the radius of 1000 years of light around the Earth, and organize empire or federation of many hundred thousand planets.

Reader have to bear in mind that some moments of Einsteins theory are radically wrong, and that the stars we are watching are not so far from us. Waves can travel only by velocity c , particles, however, much faster, but also much slower than light.

Supraluminal space ships could be made only in Earth's orbit, or orbit of the Sun. Main means of transport of material and people for building those ships will be gravifugal flying craft. The next part of this book is talking about it. With this flying craft, future people will be visiting the surfaces of new discovered planets, and come back at orbit where will be situated supraluminal spaceships.

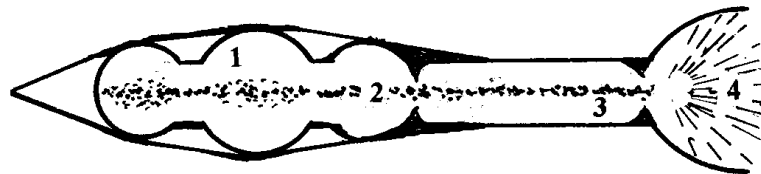
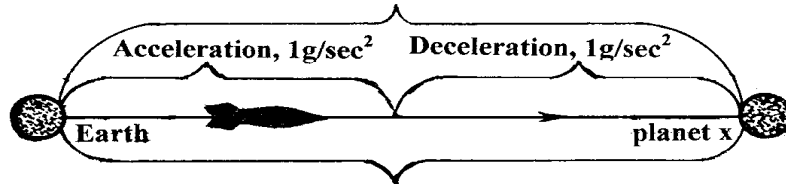


Fig I

Figure I Supralumine space ship based in nucleospinal reactor. 1 Ionizer and accelerator of heavy nuclei; 2 jet of very fast heavy nuclei; Tube of nucleospinal reactor; 4 jet of particles of ex, i.e. former heavy nucleus moving with velocity 1,1 c.

Time of journey, cca 60 years



Distance, 1000 years of light

Fig II

Figure II Interstellar journey of several millions of people. Aim of journey is colonisation of thousand years of light distant planet. At the acceleration of 1g passengers would have the same vital conditions as a people on the Earth, i.e. equal (artificial) gravity.