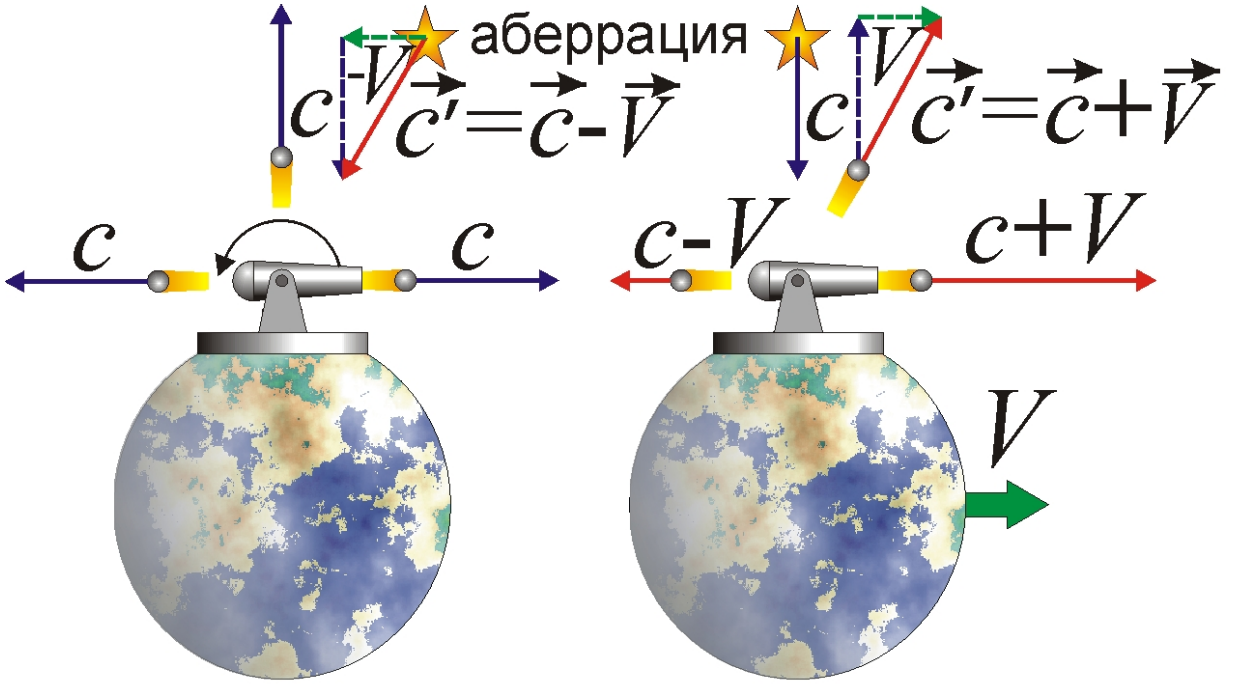
AND EVERYTHING IT IS CHANGING ...

Recently, Academician E. Aleksandrov considered an experimental test of the ballistic hypothesis about the effect of the speed of a source on the speed of light (see Science and Life, No. 8, 2011 ["Наука и жизнь" №8, 2011 г.]). As a translator of the works of Walter Ritz, who put forward this hypothesis in 1908, I would like to add a little about it. The goal here is not to belittle someone's merits, but to remind about the merits of Ritz, who, by the way, studied with Einstein at the Zurich Polytechnic, co-wrote an article with him and made a great contribution to spectroscopy (combination principle), mathematics (variational method) , the theory of elasticity (analysis of Chladni figures), electrodynamics (Ritz's ballistic theory - BTR), atomic physics (magnetic model of the atom). And only the early death of the scientist in 1909, at the age of 31, led to the early oblivion of many of his ideas.

Вальтер Ритц (1878-1909)
швейцарский физик и математик,
создатель баллистической теории.

Walter Ritz (1878-1909) Swiss physicist and mathematician, the creator of the ballistic theory.

The ballistic hypothesis itself, which likened the flight of light particles from a moving source to the flight of nuclei from a moving gun, was just the tip of the iceberg, as noted in 1995 in "Uspekhi fizicheskikh nauk" ["Успехах физических наук"] by Academician M.A. Elyashevich. Ritz explained the Michelson-Morley experiment following the example of Galileo, who proved the equality of the velocities of the emission of nuclei from the gun in all directions. According to the ballistic hypothesis, like nuclei acquiring the movement of a cannon, light in Michelson's experiment receives the movement of a source flying at the speed of the Earth. Therefore, relative to it, shells or light move in all directions in the same way: according to Galileo's principle of relativity, the movement of the Earth cannot be noticed. Thus, Ritz explained Michelson's experiment in a simpler way than the special theory of relativity (SRT). No wonder the Ritz hypothesis was supported by such physicists as J.J. Thomson, R. Tolman, P. Ehrenfest. However, back in 1729, for the first accurate determination of the speed of light by the magnitude of stellar aberration, astronomer J. Bradley applied ballistic kinematics of light, relying on the idea of Democritus, Galileo and Newton about light particles coming from stars.



Слева - движение снарядов и света для земного наблюдателя (при аберрации света звёзд, в опытах Галилея и Майкельсона), справа - их движение для внешнего неподвижного наблюдателя по БТР.

Observer (with aberration of the light of stars, in experiments Galileo and Michelson), on the right - their movement for an external stationary observer on the BTR

If the ballistic hypothesis is the visible tip of the iceberg, then the ballistic theory of optics and electrodynamics crystallized from it by Ritz is its main, hidden part. He explained the electrical and magnetic effects of charges by classical particle mechanics. Ritz considered the charges to be the sources of hypothetical elementary particles-rheons *R* (from the Greek Rheos - "flow", "flow"), escaping from electrons at the speed of light *c*. The impact of these particles on other electrons and give rise to electrical repulsion. And the mutual movement of charges changes, according to the ballistic principle, the speed and frequency of impacts, leading to a change in the electrical force, which is felt as an additional magnetic effect. As Ritz noted, "This is a kind of mechanical theory of electricity." Ritz also explained the anomalous behavior of rapidly flying electrons by changing the force of action *F* on a moving charge. If in SRT the reason for the decrease in their acceleration $a=F/m$ is considered to be the increase in the mass *m* of the electron with a constant force *F*, then according to Ritz the reason is in the decrease in the force at a constant mass.

In the ballistic theory, Ritz also considered gravity, explaining in 1908 the displacement of the perihelion of Mercury and correctly predicting the displacement of perihelion for other planets 7 years before Einstein, who had to come up with the general theory of relativity. Ritz reduced not only magnetism with gravity to electricity, but also nuclear interactions that cause the decay of radium, simultaneously putting forward the idea of the electron's axis and the presence of a standard magnetic moment. So, Ritz was decades ahead of the development of science and began to successfully build a unified field theory on the basis of classical particle mechanics - a visual atomistic approach, following the line of Democritus. Finally, a formula derived by Ritz in 1908 from the ballistic principle predicted the redshift effect in galaxies, proportional to their distance. That is, the ballistic theory immediately implies the Hubble redshift law and even the correct value of the Hubble constant. Moreover, the Ritz effect, in contrast to the Doppler effect, leads to reddening of the light of galaxies even without a hypothesis about their removal and the expansion of the Universe. According to the Ritz effect, the redshift also occurs in stationary galaxies, as both Hubble himself and our astrophysicist A.A. Belopolsky, and even K.E. Tsiolkovsky. Thus, the Ritz effect allows us to consider the Universe stationary, eternal, and eliminates a number of redshift paradoxes, such as abnormally high redshifts of quasars and connected, equally distant galaxies with different redshifts discovered by H. Arp (the successor of Hubble). Finally, there is no need for hypothetical dark matter and dark energy, invented solely to eliminate the paradoxes that have arisen from the Doppler interpretation of redshifts (see S. Semikov "Ritz's ballistic theory and the picture of the universe", N. Novgorod, 2009) [Семиков С.А. "Баллистическая теория Ритца и картина мироздания", Н. Новгород, 2009].

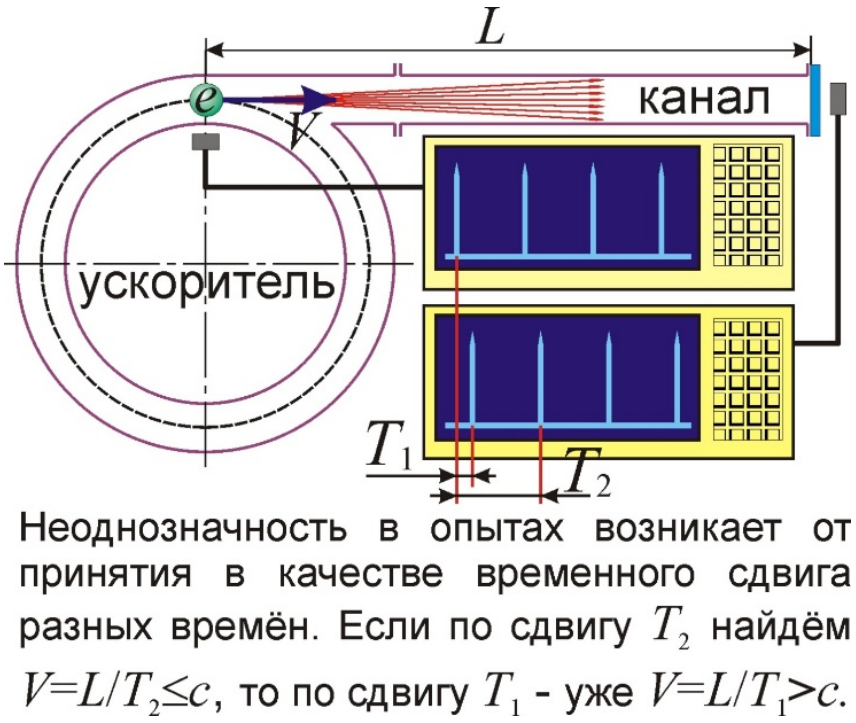
It is the facts and contradictions that have accumulated in physics and cosmology that prompt the search for a replacement for the theory of relativity. Alternative theories, based on the classical mechanics of Galileo-Newton, remove contradictions and open up promising ways for the development of physics, technology, ways of conquering space and a deep understanding of phenomena. The facts cast doubt on the second postulate of the theory of relativity. For a whole century, all textbooks included a "refutation" of the ballistic theory from observations of binary stars. And then it turned out that it was worth nothing, as physicists, including A.M. Bonch-Bruevich and E.B. Alexandrova. As a result, the "refutation" of Ritz's theory by the absence of distortions in stars from the variable speed of light resembles the "refutation" of Copernicus' theory by the absence of displacements of stars from the variable position of the Earth (parallax). In both cases, the distortions could not be noticed at first only because of their smallness (from the great remoteness of the stars) and the weakness of astronomical instruments. Accurate observations revealed both parallaxes and distortions.

Thus, the effects predicted by Ritz's theory in binary stars were actually observed, as shown by the astronomer E. Freundlich. This manifested itself in the form of the Barr effect, according to which the orbits of most stars are distorted and seem elongated towards the Earth (see A. Batten, "Binary and multiple stars", Moscow: Mir, 1976 [Бэттен А., "Двойные и кратные звёзды", М.: Мир, 1976]). This is what Ritz's theory predicted: a star flying in a circular orbit appears to be moving in an ellipse elongated towards the Earth. That is, the ballistic theory does not contradict the observations of binary stars, but just explains their anomalies and, possibly, the anomalous elongation of the exoplanet's orbits (see Science and Life, No. 12, 2006). Also, De Sitter and P. Bergman showed that Ritz's theory predicts the multiplication of images of stars, and the absence of such a phenomenon has long been considered a refutation of the ballistic theory. But since 1979, these extra double, triple and multiple images began to be detected in galaxies and quasars, which they try to explain with gravitational lenses, although they are not able to give more than two images. It turns out that this argument of De Sitter speaks in favor of the ballistic theory, where the number of images can be arbitrarily large.

Another fact that casts doubt on the constancy of the speed of light is radar measurements in space. In 1969 the American physicist B. Wallace drew attention to the systematic discrepancies between the distances to Venus, known from astronomy and found from the delay time of the radio signal reflected by the planet. The distances to Venus, measured simultaneously by radar stations in the USA and the USSR, differed by an amount exceeding the possible errors. Overestimated distances were obtained at stations that, due to the rotation of the Earth, moved from Venus, which is why, according to ballistic theory, the speed of the radio signal decreased,

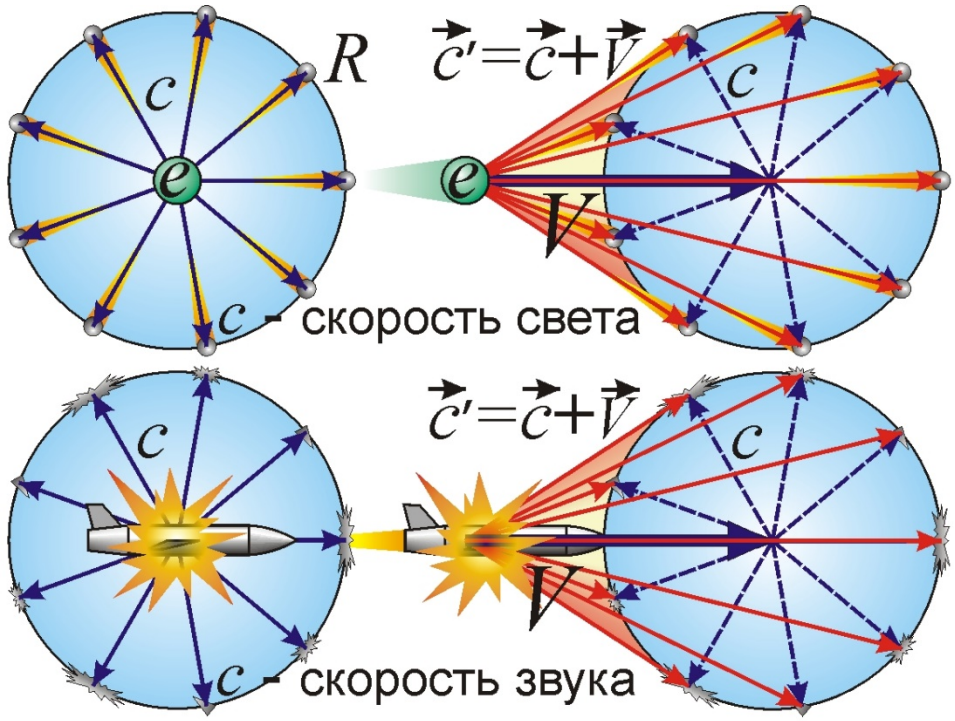
and its delay and calculated distance increased. Pioneer of space navigation, Ph.D. V.P. Seleznev, who taught the first cosmonaut teams, noted that the use of SRT in space leads to errors and accidents, for example, in the Phobos vehicles. From incorrect estimates of distances, the devices sometimes miss the target or collide with it. So, radar and astronomical calculations of Venus's positions differed by hundreds of kilometers, and the planet was simply "displaced" with a stroke of the pen forward in orbit by this distance, even without any fulcrum. But the calculation of the distances, taking into account the dependence of the speed of the radio signal on the speed of the source, eliminated the discrepancies. Systematic discrepancies between the celestial-mechanical and radar distances were also found by the Pioneer vehicles (see In the World of Science, No. 2, 2006). And in the GPS system, which measures the coordinates of the receiver on Earth by the delay of the radio signal, discrepancies with the predictions of the theory of relativity were revealed, which can only be eliminated by a formal corrective procedure, as shown by the specialist in radar and cosmonavigation R. Hatch, the founder of NAVSTAR.

As you can see, the grounds for criticizing the second postulate of the SRT are quite serious, and its experimental verification is by no means idle interest, given the cost of space programs and GPS, GLONASS systems. These experiments and the relatively low cost of them cannot be considered useless in practical terms. They need to be clarified, repeated in new versions, since, as E.B. Alexandrov, A.M. Bonch-Bruevich, S.I. Vavilov, there has not yet been an unambiguous and direct experimental verification of the second postulate. The measurement of the speed of synchrotron radiation, proposed as a direct experiment, turned out to be indirect, too, since the speed of emitting relativistic electrons was not measured directly, but was found from the formulas of the theory of relativity, which limited the speed of electrons to the limit of the speed of light *c*. But in ballistic theory, according to Ritz, for electrons "*c* can in no way be the limiting velocity." And if the speed of electrons is noticeably lower or higher than the accepted value of *c*, then when transmitting it to radiation, the signal delay time will be very different from the expected 9 nanoseconds.



Ambiguity in experiments arises from acceptance as a time shift different times. If by the shift T_2 we find $V=L/T_2 \le c$, then according to the shift T_1 - already $V=L/T_1 > c$.

According to classical mechanics, the enormous energy of electrons just speaks of their superluminal speed. This is also confirmed by the large ranges of high-energy particles: if the decaying particles-mesons were moving with subluminal speed, they would not have time to travel a long way during the decay, and long ranges $L=VT$ are easier to interpret not by the extension of the lifetime T according to STR, but by the superluminal speed of particles $V>c$. And the narrow directivity of synchrotron radiation speaks of the superluminal motion of electrons. If the emitter is stationary, according to Ritz's idea, it scatters light in the form of a spherical wave in all directions with the same speed c, like a bomb throwing out fragments symmetrically in all directions with a spherical blast wave. But a superluminal electron, imparting its speed to light, throws it only forward within a narrow cone (which is sharper the higher the speed and energy of the electron), just as fragments of a supersonic cruise missile, exploded in flight, fly by inertia only forward. According to Ritz, the sharp directivity of synchrotron radiation collected in a narrow cone is more understandable than in SRT, where light travels in all directions and at the same speed c, regardless of the source speed.



Неподвижный электрон разбрасывает во всех направлениях реоны *R* со скоростью света *c*. По баллистическому принципу сверхсветовой электрон выбрасывает реоны и свет лишь вперёд. Так и осколки сверхзвуковой крылатой ракеты вылетают вперёд.

A stationary electron scatters in all directions rheons R at the speed of light c. Ballistic superluminal electrons throws out rheons and light only forward. So, like the fragments of a supersonic cruise missile fly forward.

So, when testing ballistic theory, it is useful to first familiarize yourself with the writings of Ritz. In the meantime, the defenders of the theory of relativity are testing only the ballistic hypothesis, otherwise being guided by SRT, they remind the defenders of the geocentric theory of Aristotle-Ptolemy, who rejected the movement of the Earth on the grounds that, according to Aristotle's mechanics, abandoned bodies would lag behind the moving Earth, which does not happen. According to Galileo, this proved not the constancy of the position of the Earth, but the fallacy of Aristotle's mechanics, since the movement of bodies is relative. Likewise, the experience of Aleksandrov's group proved not the constancy of the speed of light, but only the illegality of Einstein's mechanics, since in Ritz's theory the motion of particles and light obeys Galileo's mechanics.

That is, the experiment has no legal force until the speed of the emitting electrons is measured directly, from the analysis of the time of flight of a given distance outside the accelerator. And since the arrival of electrons and light is recorded in the form of a sequence of pulses, then you should make sure that the time

of flight is found for the same pulse, otherwise the delay time may take an interval until the next pulse or the previous one, which will give an erroneous value for the speed of light and electrons. This can be easily verified by measuring the delay time for electrons and light with a smooth increase in flight length. Finally, the experiment cannot completely exclude the effect of re-radiation: there is no guarantee that the initial radiation goes through the channel, and not the secondary one - reflected by the stationary walls of the accelerating chamber, the channel and the edges of its diaphragms. It is the re-radiation by the atmosphere and elements of optical systems, the influence of which cannot be neglected even in vacuum, that negates the results of all experiments on checking the ballistic principle under terrestrial conditions. Only in space, where light travels in emptiness, does the effect of the speed of the source on the speed of light become clearly visible.

It turns out that the second postulate of the theory of relativity remained a postulate, a hypothesis accepted without proof. In this capacity, it should be presented in textbooks, mentioning that the results of its verification are ambiguous, and many facts (including the Barr effect, experiments on radar, the experiments of Kantor, the experiments of Doctor of Technical Sciences M.I. reject the constancy of the speed of light. As it is rightly noted, now the results of such experiments and criticism of SRT cannot get into scientific publications, even when they come from famous scientists. That is why these data overwhelm the media with the Internet, and textbooks, mentioning only experiments-confirmation, without experiments-refutations of the second postulate, create the illusion of its indisputability in the reader. And if the supporters of SRT are really interested in objective verification of the second postulate, they should discard the preconceived uncritical (and therefore unscientific) opinion about the infallibility of the theory of relativity and open the pages of scientific journals for works criticizing the second postulate. In the meantime, the priests of science remind the priests of the cult who denied the teachings of Copernicus on the grounds that it contradicts the scriptures and the theory of Aristotle-Ptolemy (which for a long time gave correct predictions, like SRT), but depressed when Galileo published his "Dialogue" in an accessible popular language , carrying a dangerous "heresy" to the masses. So modern scientific reviewing, prohibiting "heretical theories", repeats the mistakes of the inquisitorial censorship, which banned "Dialogue".

In any case, the experiments of Aleksandrov's group and any other new experiments to verify the second postulate of SRT are very useful and relevant. Only experiments will finally bring clarity to the long-standing and still unresolved issue of the influence of the speed of the source on the speed of light. As for the pood, it has never been equal to 16 kg, and now it is, by definition, approximately 16.38 kg (40 Russian pounds). And only the forced abolition by decree of 1920 of this Russian

non-metric unit (akin, as they say, to the ancient Greek talent) allows nowadays to round up poods in kettlebells to a standard convenient weight of 16 kg, forgetting about its real meaning. So is the speed of light, after the recognition in 1919-1920. the theory of relativity, began to always arbitrarily "round off" to a standard convenient value equal to the constant *c*, regardless of the movement of the source and experimental data.

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