THE THEORY OF RELATIVITY COMING OUT IN TRUE COLOURS

The special theory of relativity and attempts at its derelativisation

V. N. Matveev and O. V. Matvejev
matwad@mail.ru
www.theoryrelativity.com

"Dad, is it really so that mass depends on energy?", C. Adler, an American physicist was asked by his son.

"No! Or rather - yes. Actually it doesn't, but don't tell your teacher about it", C. Adler answered.

The next day the physicist's son stopped studying physics.

From the article by L.B. Okun, published in the "Advances in Physical Sciences", vol. 158, issue 3, 1989, pp. 511-530

Einstein's special theory of relativity has never given a moment's peace to sceptics casting their doubts on it. One of the reasons for such non-acceptance of the special theory of relativity is that the sizes of physical quantities as inherent properties of an object may depend on its relative velocity, which, in its turn, is dependent on an arbitrary selection of reference frames. The same length of the same extensive object, for instance, may be different within different reference frames. This dependence is appropriately called the physical relativity, and the theory assigning a major part to the physical relativity is therefore called the physical relativism.

The opponents of physical relativism cannot reconcile themselves with the fact that the sizes of physical quantities inherent in an object depend not only on composition, structure and physical state of this object, but also on the velocity of the given object and the measuring devices relative to each other.

It is a widely spread opinion that physical relativism is only denied by the critics of the theory of relativity. In reality, attempts at derelativisation of the special theory of relativity, including rather successful ones, have been made not only by critics, but by supporters of the special theory of relativity as well. One of the first attempts of this kind was Minkowski's proposition to substitute the term "the principle of relativity" with the term "the postulate of the absolute world". Minkowski understood the absolute world as a four-dimensional mathematical formulation where four-dimensional similarities of relative sizes of physical quantities acquired the absolute (mathematically invariant) nature and were not dependent on an arbitrary selection of a reference frame. Despite Minkowski's proposition, the special theory of relativity retained its name, even though many physics do not consider this name as representing term's physical content. The four-dimensional formalism failed to crush physical relativism and prevent further growth of its popularity. This occurred due to the following. Firstly, in order to discard the physical relativity one has to accept objective reality of the theoretically introduced four-dimensional quantities and the imperceptible four-dimensional space. Secondly, and it is radical indeed, one has to treat dimensions of practical physical quantities as non-

real, with space and time as such also belonging here. Minkowski declared them "shadows" of the four-dimensional space. However, such radicalism turned unacceptable to many of the physicists, with no other methods of derelativisation found for a long time.

Another attack on physical relativity took place at the end of the 20^{th} century with the promotion of non-relativistic nature of mass. Because of this promotion initiated, among others, by the American physicist C. Adler and the Russian physicist L.B. Okun the concept of relativistic mass was found faulty and substituted with the concept of invariant (absolute) mass. Likewise, the "world's most famous formula" $E=mc^2$ was found faulty and replaced by the formula $E_0=mc^2$. The appearance of a small zero subscripting the letter E in the formula $E=mc^2$, though attracting little attention of non-experts, produced a noticeable effect. Since 2006 the concept of relativistic mass and the formula $E=mc^2$ in its original interpretation have been excluded from the curricula of the Russian school.

Thus, a good hundred years after the appearance of the concept of relativistic mass, the absolute (invariant) mass was officially rehabilitated. Then what is to be done with other relativistic magnitudes? Shall we give another hundred years to each of them?

There is no need doing so as the solution to the problem of physical relativity is already in place. One may find it in V.N. Matveev's book "Entering the Third Millennium without Physical Relativity?" The book gives cogent arguments that physical relativity is uncertainty caused by incomplete (partial) concretization of an object. The "same" partially concretized extensive object possessing, let us say, different lengths in different reference frames is approached here as a magnitude of concrete sub-objects (objects of a higher degree of concretization) of different lengths, with each of concrete sub-objects possessing a certain length. V. N. Matveev's approach completely frees the special theory of "relativity" from physical relativism, preserving the picture of an ether-less world. It was this approach that enabled V.N. Matveev and O.V. Matveev to reveal the existence of a direct relationship between Lorentz transformations and the quanto-mechanical correlations of uncertainties (Heisenberg's uncertainty principle), presented in the article "The Correlations of Uncertainties in General Physics as an Implication of Lorentz Transformations".

Some years ago V.N. Matveev and O.V. Matveev developed a simulation model of the special theory of relativity, which by means of simple methods of Newtonian mechanics reproduced all "relativistic" effects in fluids – the length contraction of an object in the direction of its movement, the relativity of simultaneity, time dilation, the twin paradox, Doppler's relativistic effect. This model makes us repeatedly address the ideas of derelativisation of the special theory of relativity and the reasons for the derelativisation process being so problematic. The model is presented on this site in the article "The Complete Simulation of the Special theory of Relativity by means of Newtonian Mechanics".