# How to Defeat Relativism

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Why have doubtful theories such as the special theory of relativity (SRT) withstood criticism for over 100 years? This paper concludes that SRT and the biggest fallacies in physics began to emerge the moment elementary particles were attributed electric charge $e = const$. It further discusses the issue of so-called electromagnetic mass. In order to defeat relativism, we need a new theory of electromagnetic phenomena based on a more fundamental idea of electricity and magnetism, and the reason for interactions between elementary particles. Central to this theory is the concept of *average* charge $e = const$. This paper will show that in the case of the Kauffman experiment, mass remains constant, so that changing speed does not change mass, but rather the force which the electric and magnetic fields apply to elementary particles. This contradicts one of the most basic tenets of SRT.

## 1. Introduction

Probably most of those attending the conference have repeatedly asked themselves: Why has a controversial theory like Special Relativity Theory (SRT) become so fundamental to modern physics? It is hard to explain this phenomenon. We believe that the attraction of SRT can be explained, since it serves as a convenient screen, behind which the founders of modern physics may hide their own ignorance. In fact, complete havoc occurred in physics following the rejection of the traditional principles. New ideas were introduced, like the unity of space and time, the equivalence of mass and energy, particle-wave dualism, etc. Elementary particles were assigned dozens of features (electrical charge, baryon charge, etc.) In this way, the relativists easily adjusted themselves to a number of experimental findings and interpreted them to their liking, even resorting to distorting the interpretations given by the experimenters themselves. So the illusion was created that SRT possesses heuristic power. For example, in order to explain the results of Kaufmann experiment [1] (on the observed change of the charge to mass ratio $e/m$ with the velocity) and also of Michelson-Morley experiment, they introduced the notion of relativistic mass and Lorentz transformations. On the other hand, after developing the formula of relativistic mass into a series, [2] they arrived at the famous formula for equivalence between mass and energy, $E = mc^2$. This lucky coincidence of the law of the charge to mass ratio $e/m$, the Lorentz transformation, and the equation $E = mc^2$ played a decisive role in introducing the relativity principle. In fact, the explanation of these experimental facts has become "the strongest" feature of SRT and modern physics. Therefore, it is appropriate to ask the following question: What exactly is changed when an electron moves in electromagnetic field? Without answering that question, it is not possible to make any conclusions about which parameters vary and for what reason. Maybe it is not the mass of the electron that changes, but the force exerted by the electromagnetic field upon it.

Therefore, the issue of the interpretation of Kaufmann experiment must be put firmly. The illusion that there is physical relation between those experimental facts must be dispelled. It should be demonstrated that during the motion of elementary particles in an electric or magnetic field, the mass remains constant, and when its velocity changes, the related change is one of force acting upon the particle and not one of its mass.

## 2. Our Point of View

As mentioned in our open letter, [3] the misconceptions of modern theoretical physics are closely related to the unsatisfactory answers to the following three major questions:

1. What is an electrical charge?
2. What is the nature of electromagnetic waves?
3. What is the physical reason nuclear forces occur?

We are convinced that the answers to these questions should and will be given within the framework of a new interactions theory. It would be appropriate to give it the name "kinetic theory of interactions". It would mean that all interactions in nature must be explained only on basis of the movements of elementary particles, i.e. electricity and magnetism, the reason nuclear forces occur. All must be explained only by the motion and impact of elementary particles. And for this purpose, elementary particles must be associated only with their bodily features (mass, form, size and energy according to the principle of uniform allocation of energy between the degrees of freedom).

## 3. New Theory of Electricity and Magnetism

The crucial misconceptions in physics can be traced back to the moment elementary particles were assigned an electrical charge $e = const$ and a so-called electromagnetic mass. Hence, in order to defeat relativism and return physics back to its normal classical track first of all we need a new, more fundamental theory of the electromagnetic phenomena. We present such a theory, based on the following two hypotheses [4, 5]:

1. A model of gaseous mechanical ether
2. Elementary particles featuring oscillatory degrees of freedom, so that on oscillation they emit waves which propagate into the surrounding ether. This is the reason they interact and possess electrical charge.

The interaction mechanism is quite simple. It can be demonstrated using two tuning forks. When we strike one of the forks (an exciter), soon after that the second fork (resonator) will begin to sound also. This is the phenomenon of acoustic resonance. At this both forks exchange energy and the exchange process is accompanied by the origination of mechanical forces.

This theory is based on the solid experimental and theoretical research made by Bjorkness and Lebedev. [6] They established that the force of interaction between two still oscillators depends on the amplitude of oscillation, the ratio of the two frequencies, and the distance between them. We further develop the Bjorkness and Lebedev theory for the case of moving oscillators [4, 7]. In this case, taking into account that atoms, molecules and elementary particles are always in continuous motion and taking into account the Doppler Effect, it is clear that there will always be a difference between the frequency emitted by the exciting fork and the frequency of the resonating fork, even when they have the same natural oscillations. Consequently, the ratio of the two frequencies $b/a$ of the exciter fork and resonating fork is related to the velocities of the interacting particles.

$$\frac{b}{a}=\frac{b_0}{a_0}f\left(s\right) \tag{1}$$

where $a_0$ and $b_0$ are the natural frequencies of the exciter and resonator at rest, and $s$ is the parameter of relative motion of the exciter and resonator introduced to account for the Doppler frequency shift

$$s=\frac{1-\beta\cos\theta'}{1\text{-}\beta_{\text{p}}\cos\delta'} \tag{2}$$

Here $\beta=v/c$ and $\beta_{\text{p}}=\text{v}_{\text{p}}/\text{c}$ are the relative velocities of the exciter and resonator, $v$ and $v_p$ are their respective velocities in the moving medium, $c$ is the speed of propagation of the oscillations in the medium and $\cos\theta'$ and $\cos\delta'$ are the so called "retarding" cosines.

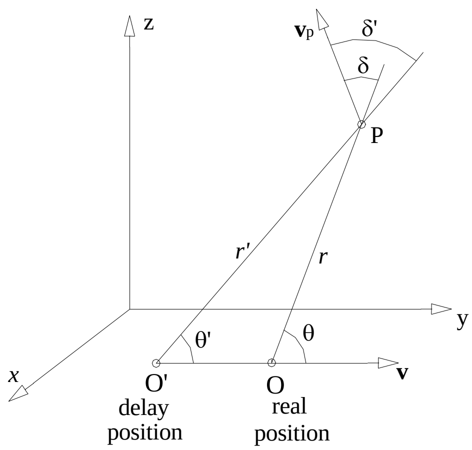


**Fig. 1.** The Doppler Effect at a limited waves propagation speed: At the moment the exciter is at point *O*, the "real" position, waves emitted in point *O'*, the "delay" position, reach the resonator in point *P*.

In order to define the retarding cosines, consider Figure 1. Suppose the particle-exciter, moving through the medium with velocity $\boldsymbol{v}$ reached point *O* in moment *t*. In the same moment, the particle-resonator is at point *P*, at a distance *r* from the particle-exciter, and moving with velocity $\boldsymbol{v}_{\text{p}}$. Now consider the triangle $\Delta OPO'$. From the cosine rule it follows that radius $r'$ obeys

$$r'^2=r^2+\left[v\left(t-t'\right)\right]^2-2r\left[v\left(t-t'\right)\right]\cos\left(180°-\theta\right)$$

where side $OO'=v(t-t')$, and delay $t-t'$ is defined as the time needed for the waves to travel distance $O'P=r'$. I.e. it is required that $t-t'=r'/c$.

Taking into account that $\cos\left(180°-\theta\right)=-\cos\theta$ and substituting $t-t'$ with its equal we come to the equation

$$\left(1-v^2/c^2\right)r'^2-\left(2rv\cos\theta/c\right)r'-r^2=0$$

having one positive root:

$$r'=r\frac{\left(\sqrt{1-\beta^2\sin^2\theta}+\beta\cos\theta\right)}{1-\beta^2} \tag{3}$$

Further, it follows from the sine rule that the ratio $r'/r=\sin\theta/\sin\theta'$. Plugging this into (3) allows one to exclude $r$ and $r'$ and calculate the angle

$$\sin\theta'=\frac{\left(1-\beta^2\right)\sin\theta}{\sqrt{1-\beta^2\sin^2\theta}+\beta\cos\theta}$$

Next, if we take into account that $\cos\theta'=\sqrt{1-\sin^2\theta'}$ and rearrange the expression, we receive for the value of the retarding cosine:

$$\cos\theta'=\frac{\cos\theta+\beta\sqrt{1-\beta^2\sin^2\theta}}{\sqrt{1-\beta^2\sin^2\theta}+\beta\cos\theta}$$

In the general case, vector $\boldsymbol{v}_{\text{p}}$ is not in the same plane as the vectors $\boldsymbol{v}$, $\boldsymbol{r}$ and $\boldsymbol{r}'$, and therefore the calculation of retarding angle δ′ is more complicated. However, in the particular case when it is within the same plane, the value of $\cos\delta'$ will be $\cos\delta'=\cos\left[\delta+\left(\theta-\theta'\right)\right]$. In this particular case the force of interaction between the two moving particles will be [4, 5, 7]

$$F=\frac{A_0^2}{2\mu}\frac{k}{r^2}\frac{\left(1-\beta^2\right)^2}{\left(\sqrt{1-\beta^2\sin^2\theta}+\beta\cos\theta\right)^2} \tag{4}$$

Here $A_0$ and μ denote respectively the amplitude and the damping coefficient of the oscillations of the exciter, and $k$ is called interaction coefficient. For the case of particles of opposite nature (like proton-electron) [5, 7] it will equal

$$k^+=\sum_{n=1}^{\infty}\frac{(n^2s^2-1)\left[\eta^2(1-\psi)^2+(ns-1)^2\right]}{\left[4\eta^2(1-\psi)^2+(n^2s^2-1)^2\right]\left[\eta^2(1+\psi)^2+(ns-1^2\right]} \tag{5}$$

where η and ψ are constants ($\eta=\mu/a_0$, $\psi=\gamma/\mu$), μ and γ are the damping coefficients of the exciter and resonator respectively, the parameter $s$ is defined in (2), and $n$=1,2,3,...N are positive integers.

Particles of same nature (like electron-electron) have the same natural frequencies $a_0=b_0$, and their damping coefficients are equal $\left(\mu=\gamma\right)$. In this case $b/a=s$ and $\psi=1$. Therefore, after substitution of the relevant values in (5), we receive the following result for the interaction coefficient:

$$k^- = \frac{(s-1)}{(s+1)\left[4\eta^2 + (s - 1^2)\right]} \quad (6)$$

## 4. Coulomb's Law

Theoretically, the relation (4) seems to enable us to calculate the microscopic force of interaction between two elementary particles. However, this is not practically feasible, because it is not possible to know either the amplitude of oscillations of the exciter $A_0$ or the parameter of the relative motions, which depends on the velocities and the directions of movement of the interacting particles. Obviously both $A_0$ and $s$ are also probabilistic quantities by nature. Hence, in order to calculate the force (4) it is necessary to resort to statistical methods. As already shown in [4, 5], in the case of large number of particles (statistical ensemble) we can work with average values and can represent (4) in the form

$$F = \left( A_{av} \sqrt{\frac{k_{av}}{2\mu}} \right)^2 \frac{1}{r^2} \left( \frac{1-\beta^2}{\sqrt{1-\beta^2 \sin^2\theta} + \beta\cos\theta} \right)^2 \quad (7)$$

where the current values of $A_0$ and $k$ have been replaced with the average values $A_{av}$ and $k_{av}$. Doing this, we can assume

$$e_0 = A_{av} \sqrt{\frac{k_{av}}{2\mu}} = const$$

and

$$e = e_0 \frac{1-\beta^2}{\sqrt{1-\beta^2 \sin^2\theta} + \beta\cos\theta} \quad (8)$$

Taking into account the fact, that when the velocities are low (thermal velocities) the last terms of (7) and (8) are negligible, we can write

$$F = \frac{e^2}{r^2} \quad (9)$$

and we arrive at Coulomb's Law. Of course, in the general case the law (9) is valid only then, when the interaction involves many particles. However, there is one particular case when the interaction takes place only between limited numbers of particles, but it is still valid. Probably this fact explains how the notion of the unit electrical charge $e = const$ originated. For example, the law (9) is valid when a proton (one or few of them) interacts with an electron, and when they move in such manner that the distance between them remains constant (this is the case of interaction between the atomic nucleus and the electrons from the shell).

## 5. What is the Nature of Electric Charge?

Based on the above arguments, we are led to the conclusion that we must interpret the symbol $e$ as the average interaction force between the elementary particles. The real question is whether it is reasonable to assign an electrical charge $e = const$ to any elementary particle. We will give an example from statistical physics. There, in order to describe the state of any gas, certain characteristics as temperature, pressure, entropy, etc. are introduced. However, this is not at all considered as a reason to assign the same parameters to any single gas molecule. Therefore, we claim that one of the gross misconceptions in physics stems from assigning electrical charge to elementary particles. In this way, the physical reasoning behind elementary particles interactions sunk into oblivion.

It should be understood clearly, that there exists a prime difference in the way interaction forces change when the number of particles is limited and when a large number of them is involved. As we tend not to assign a temperature to a single molecule, in the same way we should not attempt to assign an electrical charge to a single elementary particle. We maintain that the expression $e = const$ has statistical meaning as an average value. In the case of limited number of particles, the microscopic force (4) is subject to changes in magnitude as well as in direction, while in the case of large number of particles, the average interaction force (9) remains constant within wide range of velocities of the individual moving particles. Research shows that there is a complete agreement of this finding with the experimental results [4, 5]. When a large number of particles are involved in the interaction, the force (9) will be repulsive, if the particles are of same nature, and attractive if they are of opposite nature.

We must stress here that all laws of electromagnetism (the laws of Coulomb, Ampere, Biot-Savart and Faraday) were derived from experiments involving large numbers of particles. Therefore, it is not correct to use those laws as justification for the assignment of electrical charge to a single elementary particle. This is true also for Maxwell theory of electromagnetism because it was built upon those laws and contains them.

## 6. On the Kaufmann Experiment

When electrons travel in a transverse magnetic or electric field, with some degree of approximation we can assume that angle $\theta \approx \pi/2$, so that by replacing $\sin\theta = 1$ and $\cos\theta = 0$ in (8) we obtain

$$e = e_0 \sqrt{1-\beta^2} \quad (10)$$

In other words, when the electrons travel with large velocities, taking into account the impact of the term $\sqrt{1-\beta^2}$, the force $F = Ee_0\sqrt{1-\beta^2}$ exerted by the field upon the moving electrons will decrease. At this, if we replace $e$ with its equal from (10) in the ratio $e/m$, for $m = const$ we would obtain the same result as, at $e = const$ according to SRT, we would have, after replacing $m$ with the relativistic mass $m = m_0 \big/ \sqrt{1-\beta^2}$. It appears that from a point of view of our theory it is possible to give classical explanation of Kaufmann experiment on the change of the charge to mass ratio $e/m$ with velocity, or this means that the law of conservation of mass remains valid! The advantage of our theory is that in a natural and physically clear way (by defining the final velocity of wave propagation and accounting for the retarding location), we derived the expression $\sqrt{1-\beta^2}$, introduced artificially in SRT by the Lorentz transformations.

It is interesting that for angle $\theta \approx \pi/2$ the law (7) is reduced to

$$F = \frac{e^2}{r^2}\left(1 - \frac{v^2}{c^2}\right)$$

which is in compliance with Weber's Law.

## 7. Conclusion

It is true that modern theoretical physics gives extensive grounds for criticism. However, instead of concentrating in the criticism, the proponents of relativism keep persisting and inventing ever newer theories and introducing new notions (quarks, dark matter, etc.). This creates even more confusion and results in waste of effort by the dissidents. It is natural for individual experts to have different opinions. But keeping in mind that the relativism has rooted deeply in the minds of several generations, we need united efforts in order to defeat it. We consider that a revival in physics and unification of physics community can be pursued only from a common platform. Understanding the nature of electrical charge and of electricity and magnetism may become such platform. Only in this way can the fallacy be exploded and one of the greatest dogmas of modern physics exposed – namely that mass can change and mass and energy are equivalent. The question of electricity and magnetism is related as well to other important areas in physics as quantum mechanics, the theory of elementary particles, the nature of electromagnetic waves and others.

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