Relativity without Einstein

It's true! The concept of 4-dimensional space-time is by no means necessary in order to explain relativistic effects!

Special relativity predicts three phenomena that occur at high velocities:

(1) Physical objects contract
(2) The speed of clocks changes (and hence the time indicated)
(3) Mass increases

And: Every measurement of the speed of light 'c' produces the same result. This can be taken as the origin of the above phenomena (Einstein). Or else, conversely, the measured constancy of the speed of light may be the consequence of these phenomena (Lorentz).

In the world of Einstein, relativistic phenomena are the consequence of the intrinsic properties of space and time. This is an inevitable consequence of Einstein's assumption – his "principle" – that 'c' is constant, also as a one-way speed, in every direction. However, this "principle" is not supported by any experiments in the way used (see the additional remarks at the bottom of this page).

In view of other physical facts, a much simpler explanation is in fact available.

1. **The contraction is simply a consequence of the fact that the fields which hold together the constituents of physical objects contract. The reason for this is the finite speed of light at which the binding fields propagate when in motion.**

   This consequence was noted very soon after the Michelson-Morley experiment by several physicists (e.g. Heaviside, Fitzgerald, Lorentz), who drew on Maxwell's recently developed theory of electromagnetism.

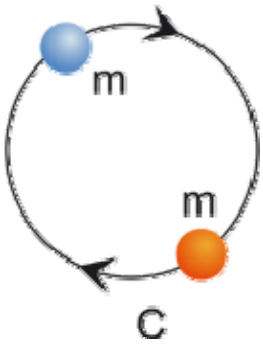
2. **The dilation of every periodic process (such as a clock function) in motion is an immediate consequence of the internal oscillation of elementary particles. The constituents of elementary particles are massless and orbit each other at the speed of light.**

   This behaviour of elementary particles was basically found by Louis de Broglie in 1923 when he detected the wave properties of elementary particles. A quantitative description was given by Paul Dirac in 1928 when he developed the famous Dirac equation for the electron. Erwin Schrödinger called this motion as "Zitterbewegung".

3. **The mass of elementary particles is itself also a consequence of the finite speed of light at which the fields binding the constituents of the elementary particles propagate.**

   This mechanism also causes the increase in mass when an object is in motion, which is a direct consequence of the contraction. And this in turn leads directly to Einstein's famous mass-energy equivalence equation.

The following figure shows the general structure of an elementary particle.



Mass, m= 0

Orbiting at de Broglie frequency

The explanation of contraction and dilation as properties of fields and of matter conforms to the so-called ”Neo-Lorentzian Interpretation of Relativity“, so named after the Dutch physicist Hendrik Antoon Lorentz. Lorentz provided the foundations for the well-known “Lorentz transformation“, on which special relativity is based. Lorentz received the Nobel Prize in 1902 in recognition of his work on electromagnetism, which in turn provided certain fundamental facts on the way to the understanding of relativity.

A physical deduction of the Lorentz transformation as a consequence of the structure of fields and matter can be found here.

General relativity without Einstein is discussed in the context of gravity.

The origin of mass as well the deduction of how it increases in motion can be found here.

Additional remarks: Why is Einstein different?

Einstein based his theory of relativity on the assumption that the one-way speed of light is a universal constant [1]. However, this speed cannot be measured independently.

Einstein called his assumption a “principle”.

The philosopher Hans Reichenbach, who was in the early days a strong promoter of Einstein, said about the assumption of a constant one-way speed of light [2]:

"This definition is essential for the special theory of relativity, but it is not epistemologically necessary."

Plainly stated, this means: Einstein’s understanding of relativity has no basis without this assumption. But the one-way speed cannot be measured in an experiment. Why not? Such a measurement requires 2 clocks, one at the point where the signal is transmitted, and one at the point where it is received. The two clocks have to be synchronized. Einstein suggested that this synchronization could
to be done in such a way that a light signal is sent from one clock to the other. The delay in the signal is then calculated using the same assumption that the speed of light is constant in every direction. - So this measurement uses circular reasoning.

The only way to measure the speed of light independently is using a two-way measurement: A light signal is sent to a mirror and returns, and the total time is measured using a single

clock. This is the principle used in the Michelson-Morley experiment. However, the result of this measurement is not sufficient to support Einstein's understanding of relativity.

Consequently, if we accept Einstein's principle about the constancy of the one-way speed of light, we have no choice but to assume such a 4-dimensional space-time, which is even curved in the general case.

If we do not follow Einstein, we can stick to our conventional understanding of space and of time, and we can achieve the same results in a much simpler way.

Demonstrating this is the intention of this web site.

[1] A. Einstein, Zur Elektrodynamik bewegter Körper, Annalen der Physik, IV. Jg. 17, S. 891–921 (1905)

[2] H.R. Reichenbach, The Philosophy of Space and Time, Dover, New York (1958)

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