On the Increase of Particle Mass with Velocity

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The "associated mass" effect of hydrodynamics is equivalent to Einstein's relativistic mass effect, as exemplified by a simple fishnet. Mass increases found in particle accelerators are due to particle motions relative to neutrinos. According to the Special Theory of Relativity, the weight of a particle increases beyond all bounds with increased speed up to the velocity of light in vacuum. It thus remains unclear from whence in the vacuum this additional weight arises. The Special Theory of Relativity does not answer this question. The author considers that in accelerators of elementary particles, there is a well-know effect in hydrodynamics of the attached weight, whereas so-called vacuum is filled with neutrinos.

According to the Special Theory of Relativity, the mass m of a particle moving with the velocity v equals:

$$m = \frac{m_0}{\sqrt{1 - \frac{v^2}{c^2}}} \qquad (1)$$

where c = velocity of light in vacuum and m_0 = particle rest mass.

It means that the particle mass increases with its velocity from m_0 to m. The source of additional mass in vacuum, however, is not known, and special relativity does not answer this question. Experiments conducted on particle accelerators show that particle masses increase with velocity in spite of the fact that the particles move in almost complete vacuum.

Consider a relevant example. Install a fishnet in the still water of a lake. Practically no effort will be needed to hold the fishnet in equilibrium. But the situation changes completely if we install the fishnet inside moving river water. In that case, it will be necessary to apply a force to keep the fishnet in equilibrium. This force will increase with increased river flow velocity. Obviously, the same force would be required to hold the lake fishnet in equilibrium if the lake water flowed with the same velocity as the river water.

In the above example, we encounter the "associated mass" effect, well-known in hydrodynamics. This effect is due to a resisting force applied to a moving body by a medium (either water or gas) surrounding the body. Apparently the same phenomenon takes place in the particle accelerators.

In fact, a so-called "perfect vacuum" contains about 500 neutrinos and antineutrinos per cubic centimeter, with mass about 10,000 times less than the electron rest mass. These neutrinos and antineutrinos move with the velocity of light c. Thus, inside a particle accelerator, the accelerated particles have masses much greater than the neutrino mass. Because of their great penetrability the neutrinos sense the accelerated particles as a fishnet. The mean free path of neutrinos is approximately 4000 parsec, or about 20 times less than the diameter of our galaxy. They move in a "perfect vacuum", accelerating in all directions with equal probability.

We are interested in neutrinos moving in the opposite direction of accelerated particles. The "associated mass" effect here is equivalent to the mass increase of the fishnet in the river. To verify this proposed idea, we need experimental data from various accelerators, showing how the masses of accelerated particles (including electrons, protons and mesons) increase with speed.