

"An Elementary Fact Worth Remembering" - Discussion

Post by "Martin" of January 26, 2025 at 5:51 AM

Quote

The idea that light is massless will be thrown away eventually along with the rest of Einstein's magic tricks.

According to the model which is the most consistent with observations, light has mass while the elementary particle which makes up light, the photon, has a nominal rest mass of zero. While we can carry out experiments in which it appears that light is slowed down or photons are trapped, a single photon cannot actually be at rest. In every frame of reference except for its own, it moves with the speed of light throughout its existence.

It might happen that in future, a photon rest mass of more than zero is discovered. The current model can accommodate this by separating the speed of light from the maximum speed of information transport, which would then be slightly higher than the speed of light, and which would then be used instead of the speed of light in the Lorentz transforms and some other formulas. However, a photon rest mass of more than zero would certainly motivate the search for a superior model.

Although from a theoretical perspective, Einstein's theories and quantum mechanics have replaced Newton's theory of gravity/mechanics, in actual practice, Newton's theory is still far more often applied than the newer theories because Newton's mechanics is accurate enough and more efficient to use for problems which are within its limits. Therefore, Newton's mechanics has never been thrown away. Similarly, it appears unlikely, that Einstein's "magic tricks" will be thrown away, because they do work well. We just do not know whether they have a range beyond which they become inadequate.