

SRT reveals $E=mc^2$ is flawed

The three equations below are all supposedly simultaneously true according to Special Relativity. The first equation implies that mass increases with energy and this is what Einstein believed in his article, “Does the Inertia of a Body Depend on its Energy Content?”. Recent physics seems to try to ignore this “relativistic mass” m and concentrate on Relativistic energy and momentum.

$$E = mc^2$$

$$E_0 = m_0 c^2$$

$$E^2 = (pc)^2 + (m_0 c^2)^2$$

In the same sense, the kinetic energy of Newtonian Mechanics could be said to be $E = \frac{1}{2} m v^2$, in which case the ‘ m ’ mass would change with changes in kinetic energy. Of course this ‘ m ’ equals $m_0 v^2$. Likewise, the ‘ m ’ in $E = mc^2$ should read: *gamma* times m_0 , i.e., γm_0 . There is no ‘ m ’ which varies with E . There is m_0 , which is constant, and *gamma*, which is a function only of SRT velocity, and causes the changes in E . In the following, u is the Relativistic velocity which is always less than c , the speed of light. The proof follows:

$$E^2 = (m_0 \gamma u c)^2 + (m_0 c^2)^2$$

$$\frac{E^2}{(m_0 c^2)^2} = \frac{(m_0 \gamma u c)^2}{(m_0 c^2)^2} + \frac{(m_0 c^2)^2}{(m_0 c^2)^2}$$

$$\frac{E^2}{(m_0 c^2)^2} = \gamma^2 (u / c)^2 + 1$$

$$\frac{E^2}{(m_0 c^2)^2} = \frac{(u / c)^2}{1 - (u / c)^2} + \frac{1 - (u / c)^2}{1 - (u / c)^2}$$

$$\frac{E^2}{(m_0 c^2)^2} = \frac{1}{1 - (u / c)^2} = \gamma^2$$

$$E = \gamma m_0 c^2$$

This precise equation resolves the confusion of Relativistic mass. The mass ‘ m ’ does not change due to velocity. If it did, then, since everything has various velocities relative to most everything else, everything would have an immense number of different ‘masses’! The change in γ accounts for the change in ‘total energy’ E with velocity. *This does not preclude mass and energy from interchanging*, but speed *per se* does not change mass.