Relativistic Time Dilation Illustrated in Delta-c Mechanics

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## *Abstract*

This paper shows the $\Delta$ c Mechanics model of the electron, by virtue of its structure, demonstrates time for mass in a moving frame exists at a slower rate, than time for the electron in the stationary frame.

The electron as shown in $\Delta$ c mechanics is a pair of self-bound photons rotating around the center of momentum [1], [2]. All electrons have the same mass and Compton frequency which is twice the Compton frequency of the individual rotating photons.


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The electron has spin so for simplicity the rotation axis can be aligned along its direction of travel. This configuration is useful in demonstrating the difference in the rate of the passage of time.

The time of rotation, or period, for an observer in the moving frame is:

$$\Delta t_M = \frac{2\pi r}{c_M} \tag{1}$$

The time of rotation in the stationary observer's frame in which the velocity of light, $c_0$ is:

$$\Delta t_0 = \frac{2\pi r}{c_0} \tag{2}$$

A sketch of the motion of photons in the electron, illustrates the spiral structure of the trajectory in the stationary frame, Fig 1.

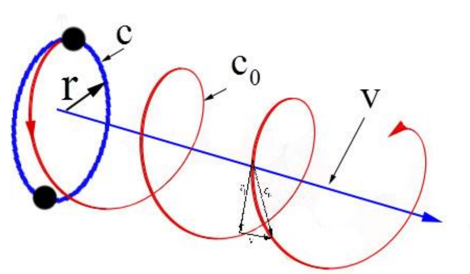
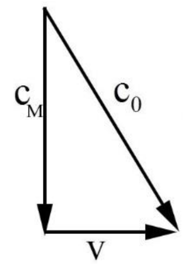



Figure 1

For the photon to make a revolution around the center of mass for an observer in the rest frame, the photon travels at $c_0$, but the distance is further than for an observer of the photon in the moving frame. Pictography this is:




And from the Pythagorean Theorem:

$$c_M = c_0\sqrt{1-\frac{v^2}{c_0^2}} \tag{3}$$

This yields from Eq.(1), Eq.(2), and Eq.(3), the ratio of the familiar time dilation for the passage of time in the moving frame to be:

$$\Delta t_M = \frac{\Delta t_0}{\sqrt{1-\frac{v^2}{c_0^2}}} \tag{4}$$

This expresses the fact that the moving electron's period, is greater in the moving frame than for the stationary frame, in agreement with the Einstein relativistic time dilation for moving mass.

Ref:


1. DT Froedge, The Dirac Equation and the Two Photon Model of the Electron revised, April 2021, DOI:10.13140/RG.2.2.19095.70564, https://www.researchgate.net/publication/350922403

2. DT Froedge, The Electron as a Composition of Two Vacuum Polarization Confined Photons, April 2021, DOI: 10.13140/RG.2.2.18971.18722 , https://www.researchgate.net/publication/350740864