1)

161(6): Curvature in the Case of General Compton Scattering.

In this case the electron mass is m_2 and the photon mass is m_1. The two are related by:

$$m_2 = \frac{\hbar}{c^2}\left(\frac{\omega\omega'}{\omega-\omega'} - \frac{\left(x_1^2 + \left(\omega^2 - x_1^2\right)^{1/2}\left(\omega'^2 - x_1^2\right)^{1/2}\cos\theta\right)}{\omega-\omega'}\right) - (1)$$

where

$$x_1 = m_1 c^2 / \hbar. \quad - (2)$$

The curvature is therefore defined as:

$$R = \left(\frac{m_2 c}{\hbar}\right)^2 = \frac{1}{c^2}\left(\frac{\omega\omega'}{\omega-\omega'} - \frac{\left(x_1^2 + \left(\omega^2 - x_1^2\right)^{1/2}\left(\omega'^2 - x_1^2\right)\cos\theta\right)}{\omega-\omega'}\right)^2 - (3)$$

$$= x R_0$$

where

$$R_0 = \left(\frac{mc}{\hbar}\right)^2. \quad - (4)$$

By definition:

$$R = \tilde{V}_a \partial^\mu \left(\omega^a_{\mu\nu} - \Gamma^a_{\mu\nu}\right) - (5)$$

In the limit:

$$x_1 \to 0 \quad - (6)$$

then

$$\frac{1}{\omega'} - \frac{1}{\omega} = \frac{1}{c R_0^{1/2}}\left(1 - \cos\theta\right), \quad - (7)$$

$$\lambda' - \lambda = \frac{2\pi}{R_0^{1/2}}\left(1 - \cos\theta\right). \quad - (8)$$

In this case the wave equation of relativistic

2) quantum mechanics is

$$(\Box + R)\, \psi^a_\mu = 0 \quad -(9)$$

and the electron mass as measured in the standards laboratories is m. Thus:

$$m_2^2 = x\, m^2 \quad -(10)$$

i.e.

$$\left(\frac{m_2}{m}\right)^2 = \frac{R}{R_0} = \frac{\hbar^2}{c^4 m^2}\left[\frac{\omega\omega'}{\omega-\omega'} - \frac{\left(x_1^2 + (\omega^2 - x_1^2)^{1/2}(\omega'^2 - x_1^2)^{1/2}\cos\theta\right)}{\omega-\omega'}\right]^2 \quad -(11)$$

$$\boxed{\frac{m_2}{m} = \frac{\hbar}{mc^2}\left(\frac{\omega\omega'}{\omega-\omega'} - \frac{\left(x_1^2 + (\omega^2 - x_1^2)^{1/2}(\omega'^2 - x_1^2)^{1/2}\cos\theta\right)}{\omega-\omega'}\right)} \quad -(12)$$

The basic equation is:

$$\frac{R}{R_0} = \left(\frac{m_2}{m}\right)^2 \quad -(13)$$

where

$$R_0 = \frac{mc^2}{\hbar} \quad -(14)$$

The apparently varying mass m_2 is therefore defined by

$$\boxed{m_2^2 = \left(\frac{R}{R_0}\right) m^2 \quad -(15)}$$

where

$$\boxed{\left.\begin{aligned} E &= \hbar\omega = \gamma m_2 c^2 \\ \underline{p} &= \hbar \underline{\kappa} = \gamma m_2 \underline{v} \end{aligned}\right\} -(16)}$$

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