164(2): Mass Ratio at Ninety Degree Scattering.

The result for ninety degree scattering of a mass m_1 colliding with an initially stationary mass m_2 is:

$$\omega' = \frac{\omega x_2 + x_1^2}{\omega + x_2} \quad -(1)$$

In note 164(1) it was found that:

$$x_1^2 = (\omega' - \omega)(\omega' + \omega'') + \omega^2 \quad -(2)$$

$$x_2 = \omega' + \omega'' - \omega. \quad -(3)$$

The mass ratio is therefore:

$$\frac{x_1}{x_2} = \frac{m_1}{m_2} = \frac{[(\omega' - \omega)(\omega' + \omega'') + \omega^2]^{1/2}}{\omega' + \omega'' - \omega} \quad -(4)$$

where

$$\omega + \omega_0 = \omega' + \omega'' \quad -(5)$$

Therefore

$$\boxed{\frac{m_1}{m_2} = \frac{1}{\omega_0}\left((\omega' - \omega)(\omega + \omega_0) + \omega^2\right)^{1/2}} \quad -(6)$$

where

$$\omega_0 = m_{20}c^2/\hbar. \quad -(7)$$

Here m_{20} is the rest mass of the initially stationary particle. Therefore m_1/m_2 can be determined experimentally. Finally:

$$\boxed{\frac{R_1}{R_2} = \frac{1}{\omega_0^2}\left((\omega' - \omega)(\omega + \omega_0) + \omega^2\right)} \quad -(8)$$

2)

and a simple equation is obtained:

$$\boxed{\frac{R_1}{R_2} = \frac{1}{\omega_0^2}\left(\omega\omega' - \omega_0(\omega-\omega')\right)} \quad -(9)$$

for ninety degree scattering.

In the more general case of scattering at any angle the ratio R_1/R_2 can also be worked out. The rest ratio is:

$$\left(\frac{R_1}{R_2}\right)_0 = \left(\frac{m_{10}}{m_{20}}\right)^2 \quad -(10)$$

and is a constant because m_{10} and m_{20} are constants. In theory of special relativity the ratio of masses is always constant, and experiments show that this is not true. So absorption and scattering are process of general relativity as treated by ECE theory.

In eq. (9) note that:

$$\frac{R_1}{R_2} = 0 \quad -(11)$$

if

$$\omega\omega' = \omega_0(\omega-\omega') \quad -(12)$$

i.e. if

$$\omega\omega' = \frac{m_{20}c^2}{\hbar}(\omega-\omega') \quad -(13)$$

or

$$\frac{1}{\omega'} - \frac{1}{\omega} = \frac{\hbar}{m_{20}c^2} \quad -(14)$$

3) Eqn. (14) is the usual Compton effect formula.

$$\frac{1}{\omega'} - \frac{1}{\omega} = \frac{\hbar}{m_{20} c^2} \left(1 - \cos\theta\right) \quad -(15)$$

where

$$\cos\theta = 0 \quad -(16)$$

$$\theta = 90^\circ. \quad -(17)$$

i.e

In the Compton effect formula, R_1 is zero because the rest mass of the photon, m_{10}, is zero.

Therefore the calculation is rigorously self-consistent in concept.

Conclusion

The correct explanation of Compton scattering is general relativity corrected by ECE theory. The ratio R_1/R_2 generalizes Compton's calculation.