1) 160(3): General Compton Scattering of Mass m_1 from m_2.

Consider a mass m_1 colliding with a stationary mass m_2. The conservation of energy equation is:

$$\gamma m_1 c^2 + m_2 c^2 = \gamma' m_1 c^2 + \gamma'' m_2 c^2 \quad -(1)$$

using the notation of UFT 159 and background notes. The de Broglie postulates are:

$$\hbar\omega = \gamma m_1 c^2 \quad -(2)$$

$$\hbar\omega' = \gamma' m_1 c^2 \quad -(3)$$

$$\hbar\omega'' = \gamma'' m_2 c^2 \quad -(4)$$

so:

$$\frac{\omega}{\omega'} = \frac{\gamma}{\gamma'}, \quad \frac{\omega''}{\omega} = \frac{m_2}{m_1}\frac{\gamma''}{\gamma}, \quad \frac{\omega''}{\omega'} = \frac{m_2 \gamma''}{m_1 \gamma'}. \quad -(5)$$

1) Express eq. (1) in terms of γ' using:

$$\gamma = \frac{\omega}{\omega'}\gamma', \quad \gamma'' = \frac{m_1}{m_2}\frac{\omega''}{\omega'}\gamma' \quad -(6)$$

then:

$$\gamma' = \frac{m_2}{m_1}\left(1 + \frac{\omega'' - \omega}{\omega'}\right)^{-1}. \quad -(7)$$

2) Express eq. (1) in terms of γ'' using:

$$\gamma = \frac{m_2}{m_1}\frac{\omega}{\omega''}\gamma'', \quad \gamma' = \frac{m_2}{m_1}\frac{\omega'}{\omega''}\gamma'' \quad -(8)$$

then:

$$\gamma'' = \left(1 + \frac{\omega' - \omega}{\omega''}\right)^{-1}. \quad -(9)$$

3) Express eq. (1) in terms of γ using:

$$\gamma' = \frac{\omega'}{\omega}\gamma, \quad \gamma'' = \frac{m_1}{m_2}\frac{\omega''}{\omega}\gamma \quad -(10)$$

then

$$\gamma = \frac{m_2}{m_1}\left(\frac{\omega' + \omega''}{\omega} - 1\right)^{-1}. \quad -(11)$$

Then by definition:

2) $$1-\frac{v'^2}{c^2} = \frac{1}{\gamma'^2} = \left(\frac{m_1}{m_2}\right)^2\left(1+\frac{\omega''-\omega}{\omega'}\right)^2 \quad -(12)$$

$$1-\frac{v''^2}{c^2} = \frac{1}{\gamma''^2} = \left(1+\frac{\omega'-\omega}{\omega''}\right)^2 \quad -(13)$$

$$1-\frac{v^2}{c^2} = \frac{1}{\gamma^2} = \left(\frac{m_1}{m_2}\right)^2\left(\frac{\omega'+\omega''}{\omega}-1\right)^2 \quad -(14)$$

So: $$v^2 = c^2\left(1-\left(\frac{m_1}{m_2}\right)^2\left(\frac{\omega'+\omega''}{\omega}-1\right)^2\right) \quad -(15)$$

$$v'^2 = c^2\left(1-\left(\frac{m_1}{m_2}\right)^2\left(\frac{\omega'+\omega''}{\omega}-1\right)^2\right) \quad -(16)$$

$$v''^2 = c^2\left(1-\left(\frac{\omega'-\omega}{\omega''}+1\right)^2\right) \quad -(17)$$

From eq. (2): $$m_1 = \frac{\hbar\omega}{\gamma c^2} = \frac{m_1}{m_2}\left(\omega'+\omega''-\omega\right), \quad -(18)$$

using eq (14), so: $$m_2 = \frac{\hbar}{c^2}\left(\omega'+\omega''-\omega\right). \quad -(19)$$

From eq. (3): $$m_1 = \frac{\hbar\omega'}{\gamma' c^2} = \frac{m_1}{m_2}\left(\omega'+\omega''-\omega\right) \quad -(20)$$

using eq. (12), so: $$m_2 = \frac{\hbar}{c^2}\left(\omega'+\omega''-\omega\right). \quad -(21)$$

From eq. (4): $$m_2 = \frac{\hbar\omega''}{\gamma'' c^2} = \frac{\hbar}{c^2}\left(\omega'+\omega''-\omega\right) \quad -(22)$$

using eq. (13).
So

$$\boxed{m_2 = \frac{\hbar}{c^2}\left(\omega'+\omega''-\omega\right) \text{ for all } m_1.} \quad -(23)$$

This is the same result as in the case of equal masses.

Conclusion

If the experimentally measured conservation $\omega' + \omega'' - \omega$ is not constant, the de Broglie Einstein theory fails. This has never been tested experimentally in ninety years.

The conservation of momentum equation is:

$$\underline{p} = \underline{p}' + \underline{p}'' \quad -(24)$$

so

$$p''^2 = p^2 + p'^2 - 2pp'\cos\theta \quad -(25)$$

The de Broglie relations are:

$$\underline{p} = \hbar\underline{\kappa}, \quad \underline{p}' = \hbar\underline{\kappa}', \quad \underline{p}'' = \hbar\underline{\kappa}'' \quad -(26)$$

so

$$\kappa''^2 = \kappa^2 + \kappa'^2 - 2\kappa\kappa'\cos\theta \quad -(27)$$

Furthermore:

$$\hbar\kappa = \gamma m_1 v, \quad \hbar\omega = \gamma m_1 c^2 \quad -(28)$$
$$\hbar\kappa' = \gamma' m_1 v', \quad \hbar\omega' = \gamma' m_1 c^2 \quad -(29)$$
$$\hbar\kappa'' = \gamma'' m_2 v'', \quad \hbar\omega'' = \gamma'' m_2 c^2 \quad -(30)$$

so

$$\kappa = \frac{\omega v}{c^2}, \quad \kappa' = \frac{\omega' v'}{c^2}, \quad \kappa'' = \frac{\omega'' v''}{c^2} \quad -(31)$$

and

$$\boxed{\omega''^2 v''^2 = \omega^2 v^2 + \omega'^2 v'^2 - 2\omega\omega' v v' \cos\theta} \quad -(32)$$

This is again the same as in equal mass scattering.

Ninety Degree Scattering

In this case

$$\cos\theta = 0 \quad -(33)$$

and

$$\omega''^2 v''^2 = \omega^2 v^2 + \omega'^2 v'^2 \quad -(34)$$

In the general case of m_1 not equal to m_2:

$$v''^2 = 1 - \left(\frac{m_2 c^2}{\hbar\omega''}\right)^2 \quad -(35)$$

$$v'^2 = 1 - \left(\frac{m_1 c^2}{\hbar\omega'}\right)^2 \quad -(36)$$

$$v^2 = 1 - \left(\frac{m_1 c^2}{\hbar\omega}\right). \quad -(37)$$

Eq. (34) becomes:

$$\boxed{\omega^2 + \omega'^2 - \omega''^2 = 2x_1^2 - x_2^2} \quad -(38)$$

where:

$$x_1 = \frac{m_1 c^2}{\hbar}, \quad x_2 = \frac{m_2 c^2}{\hbar} \quad -(39)$$

From energy conservation, eq. (23):

$$\boxed{\omega' + \omega'' - \omega = x_2} \quad -(40)$$

The frequency ω'' can be eliminated between eqs. (38) and (40):

$$\omega^2 + \omega'^2 - (\omega - \omega' + x_2)^2 = 2x_1^2 - x_2^2$$

$$\omega'^2 = x_2^2 + 2(\omega - \omega')x_2 + (\omega - \omega')^2 + 2x_1^2 - x_2^2$$

$$= 2(\omega - \omega')x_2 + \omega^2 - 2\omega\omega' + \omega'^2 + 2x_1^2$$

$$-(41)$$

5)

So:

$$x_1^2 + (\omega - \omega')x_2 - \omega\omega' = 0 \quad -(42)$$

and

$$\omega'(\omega + x_2) = x_1^2 + \omega x_2 \quad -(43)$$

$$\boxed{\omega' = \frac{\omega x_2 + x_1^2}{\omega + x_2}} \quad -(44)$$

i.e.

$$\boxed{\omega' = \frac{\omega\left(\frac{m_1 c^2}{\hbar}\right) + \left(\frac{m_2 c^2}{\hbar}\right)^2}{\omega + \left(\frac{m_2 c^2}{\hbar}\right)}} \quad -(45)$$

for:

$$\theta = \pi / 2 \quad -(46)$$

If

$$m_1 = m_2 \quad -(47)$$

then

$$\omega' = \frac{m_1 c^2}{\hbar} \quad -(48)$$

$$m_1 = \frac{\hbar \omega_1}{c^2} \quad -(49)$$

which is the equal mass result of UFT 159, QED. This is again an absurd result because m_1 is proportional to ω_1, and the de Broglie theory fails.