COMPTON EFFECT

An elastic collision between a photon and an electron.

\[ E'_p = hf \]
\[ E'_e = m'c^2 \]
\[ P'_p = \frac{E'_p}{c} = \frac{hf}{c} = \frac{h}{\lambda} \]
\[ P'_e = m'v \]

Conservation of Energy
\[ mc^2 + hf_i = m'c^2 + hf_f \]

Conservation of Momentum
\[ \frac{hf_i}{c} = + \frac{hf_f}{c} \cos(\theta) + m'v \cos(\phi) \]
\[ 0 = - \frac{hf_f}{c} \sin(\theta) + m'v \sin(\phi) \]

\[ \lambda_f - \lambda_i = \frac{h}{mc}(1 - \cos(\theta)) \]
\[ \frac{h}{mc} = 2.43 \times 10^{-12} \text{ m} \]