Let $E_1$ be the outgoing energy of the incident particle after scattering. According to equation (3-117') of Goldstein, it is given by the relation

$$E_1(\Omega) = E_0 (1+\rho)^{-2} \left( 1 + 2\rho \cos \Theta + \rho^2 \right). \quad (3-117')$$

It lies within the range $(E_1^{\text{min}}, E_1^{\text{max}})$ with $E_1^{\text{max}} = E_0$ and $E_1^{\text{min}} = E_0 \frac{(1-\rho)^2}{(1+\rho)^2}$.

Let $\Delta N$ be the number of incident particles scattered into the energy interval $(E, E + \Delta E)$. Then, using $\chi$, one has the relation

$$\Delta N = \text{const} \int \chi \left( E_1(\Omega), E, \Delta E \right) \sigma(\Omega) d\Omega$$

Also, since $\sigma(\Omega) = \text{const}$, and