PH-105 Assignment Sheet - 2 (Quantum Mechanics)

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1. **A beam of mono-energetic x-ray gets scattering from a particle of mass m_o. It is found that the wavelength of the x-ray scattered at 60^o is half that scattered at 120^o. Find the incident energy of the photon.**
   Solution :
   $\lambda_f - \lambda_i = h(1 - cos\theta)/m_o c$
   $\lambda_{60} = \lambda_{120}/2$
   $\lambda_{60} - \lambda_i = h(1 - cos60^o)/m_o c = h/2m_o c...(i)$
   $\lambda_{120} - \lambda_i = h(1 - cos120^o)/m_o c = 3h/2m_o c...(ii)$
   Doing (ii) - 2(i) we get $\lambda_i = h/2m_o c$
   $E_i = hc/\lambda_i = hc/(h/2m_o c) = 2m_o c^2$