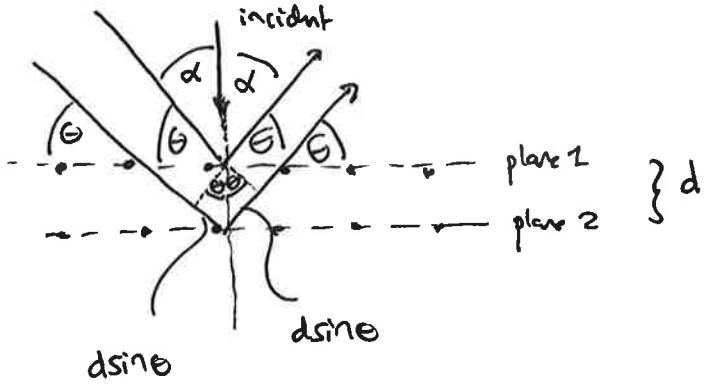
TL 5-11 (Bragg scattering of protons from Calcite)

a) If $\lambda_{proton} = 0.25\,nm$,

then $K = \frac{p^2}{2m} = \frac{h^2}{2m\lambda^2} = \boxed{13\,meV}$ or $2.1e{-}21\,J$

b) where is 1st order Bragg peak? Assume $d = 0.304\,nm$



The reflected beam from plane 1 & plane 2 will be in phase if $2d\sin\theta = n\lambda$

The 1st order peak occur when $n = 1$, so

$$\sin\theta_1 = \frac{\lambda}{2d}$$

$$\theta_1 = 24.3°$$

or $\alpha_1 = 90 - \theta_1$

$$\boxed{\alpha_1 = 65.7°}$$