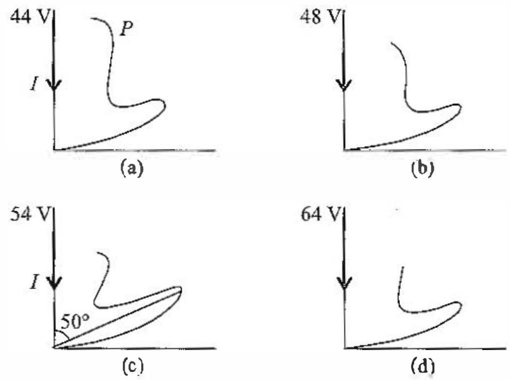
- For different values of scattering angles, intensity of scattered beam of electrons is measured.



- When the graphs are drawn showing the variation of the intensity I of the scattered electrons with the angles of scattering ϕ at different accelerating voltages. It is found that intensity is different for different angles of scattering. Further, the maximum intensity is obtained due to constructive interference of electrons scattered from different layers of regularly spaced atoms of the crystals.

It is found that angle θ between the scattered beam of electrons with the plane of atoms of crystal, when scattering angle $\phi = 50°$ is

$\theta + \phi + \theta = 180°$

$2\theta = 180° - 50°$ or $\theta = 65°$

Now using Bragg's law, $2d \sin \theta = n\lambda$

but for first order diffraction, $\lambda = 2d \sin \theta$

where $d = 0.91$ Å is distance between two successive layers of atoms in Ni crystal

or $\lambda = 2 \times 0.91 \sin 65°$ or $\lambda = 1.66$ Å

This is the value of wavelength of electron as measured by Davission and Germer experiment. However, the de-Broglie wavelength of an electron accelerated through potential difference $V = 54$ volts is

$$\lambda = \frac{12.27}{\sqrt{V}} = \frac{12.27}{\sqrt{54}} \quad \text{or} \quad \lambda = 1.65 \text{ Å}$$

As the two results are same, so this experiment proves the wave nature of electron and hence of a particle in general.