

Determine the width of the screen in the double slit experiment with electrons

Claus Jönsson's famous experiment shows that electrons also exhibit wave behavior and can produce interference patterns when sent through two closely spaced slits. The positions of the interference maxima depend on the wavelength of the electrons and the geometric parameters of the experimental setup.

Task

Calculate the width of the screen using an interference pattern.

Observation

Using the given settings, observe the interference pattern on the screen and count the number of secondary maxima on both sides of the central maximum. Note the value n (number of maxima per side).

Experimental Settings

Slit width: $b = 100 \text{ nm}$

Slit center distance: $d = 1900 \text{ nm}$

Screen distance: $L = 0,35 \text{ m}$

Electron energy: $E = 50 \text{ keV}$

Physical Constants

Planck's constant: $h = 6,626 \cdot 10^{-34} \text{ Js}$

Electron mass: $m_e = 9,109 \cdot 10^{-31} \text{ kg}$