Electron Diffraction at Multiple Slits

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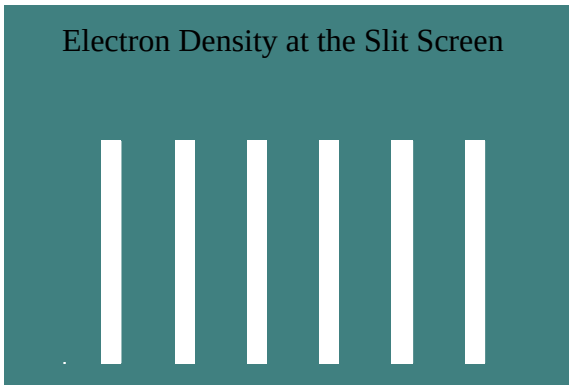
The American Journal of Physics published a translation of Claus Jonsson's paper "Electron Diffraction at Multiple Slits" in *American Journal of Physics* **42**, 4-11 (1974). The followin calculations are in agreement with the diffraction patterns reported by Jonsson.

Number of slits: $n := 6$ Slit width: $w := .5$

Slit locations: $s_1 := 0$ $s_2 := 2$ $s_3 := 4$ $s_4 := 6$ $s_5 := 8$ $s_6 := 10$

Normalized coordinate-space wave function at the slit screen:

$$\Psi(x) := \frac{1}{\sqrt{n}} \cdot \begin{cases} \frac{1}{\sqrt{w}} & \text{if } \sum_{j=1}^{n} \left[\left(x \geq s_j\right) \cdot \left(x \leq s_j + w\right) \right] \\ 0 & \text{otherwise} \end{cases}$$



Fourier transform the position wave function into the momentum representation:

$$\Phi\left(p_x\right) := \frac{1}{\sqrt{2 \cdot \pi}} \cdot \int_0^{s_n + w} \exp\left(-i \cdot p_x \cdot x\right) \cdot \Psi(x)\, dx$$

Electron Distribution at the Slit Screen