

N-Slit Interference

The Intensity for N equally spaced slits is given by:

$$I_N = I_1 \left(\frac{\sin(N\phi/2)}{\sin(\phi/2)} \right)^2 *$$

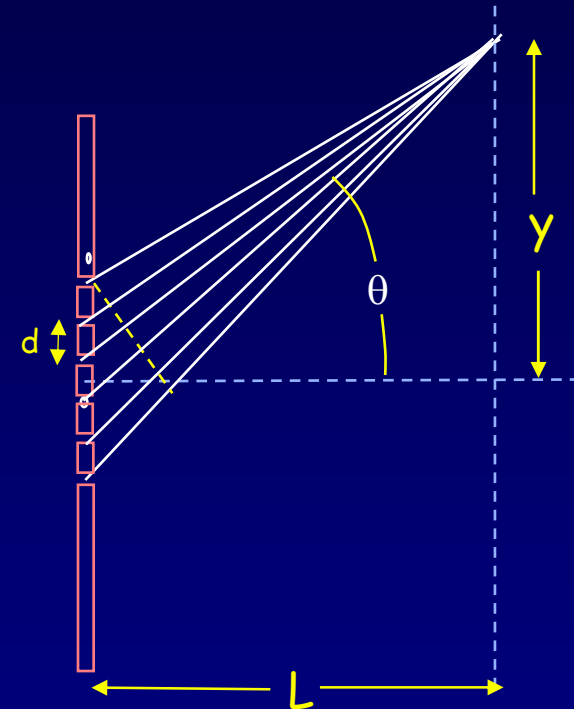
Derivation (using phasors) is in the supplementary slides.

As usual, to determine the pattern at the screen, we need to relate ϕ to θ or $y = L \tan\theta$:

$$\frac{\phi}{2\pi} = \frac{\delta}{\lambda} = \frac{d \sin\theta}{\lambda} \approx \frac{d\theta}{\lambda} \quad \text{and} \quad \theta \approx \frac{y}{L}$$

ϕ is the phase difference between adjacent slits.

You will not be able to use the small angle approximations unless $d \gg \lambda$.



* Your calculator can probably graph this. Give it a try.