

Multi-Slit Interference + Diffraction

Combine:

Multi-slit Interference,

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

and

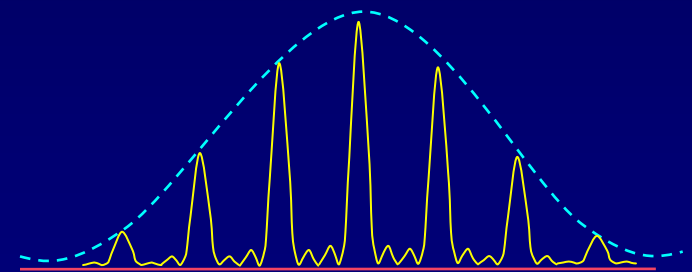
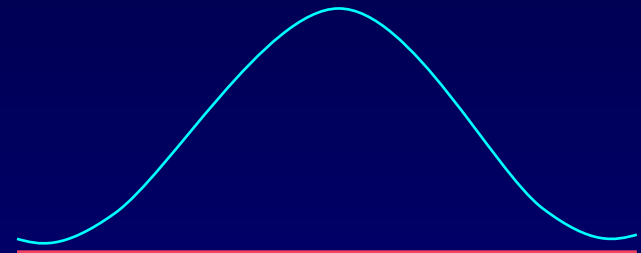
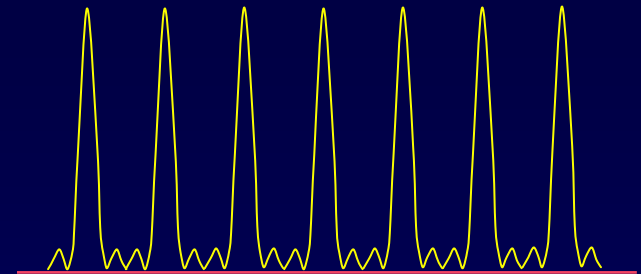
Single-slit Diffraction,

$$I_1 = I_0 \left\{ \frac{\sin(\beta/2)}{\beta/2} \right\}^2$$

to obtain

Total Interference Pattern,

$$I = I_0 \left\{ \frac{\sin(\beta/2)}{\beta/2} \right\}^2 \left\{ \frac{\sin(N\phi/2)}{\sin(\phi/2)} \right\}^2$$



Remember: $\phi/2\pi = \delta/\lambda = (d \sin\theta)/\lambda \approx d\theta/\lambda$
 $\beta/2\pi = \delta_a/\lambda = (a \sin\theta)/\lambda \approx a \theta/\lambda$

ϕ = phase between adjacent slits
 β = phase across one slit

You will explore these concepts in lab this week.