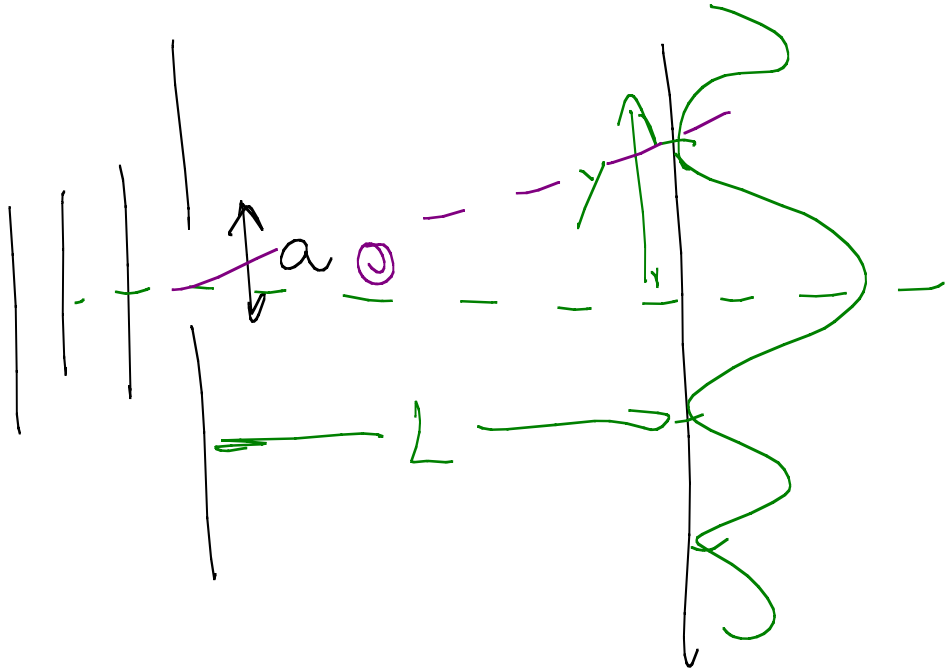
Phys 2120-4 11/30/12

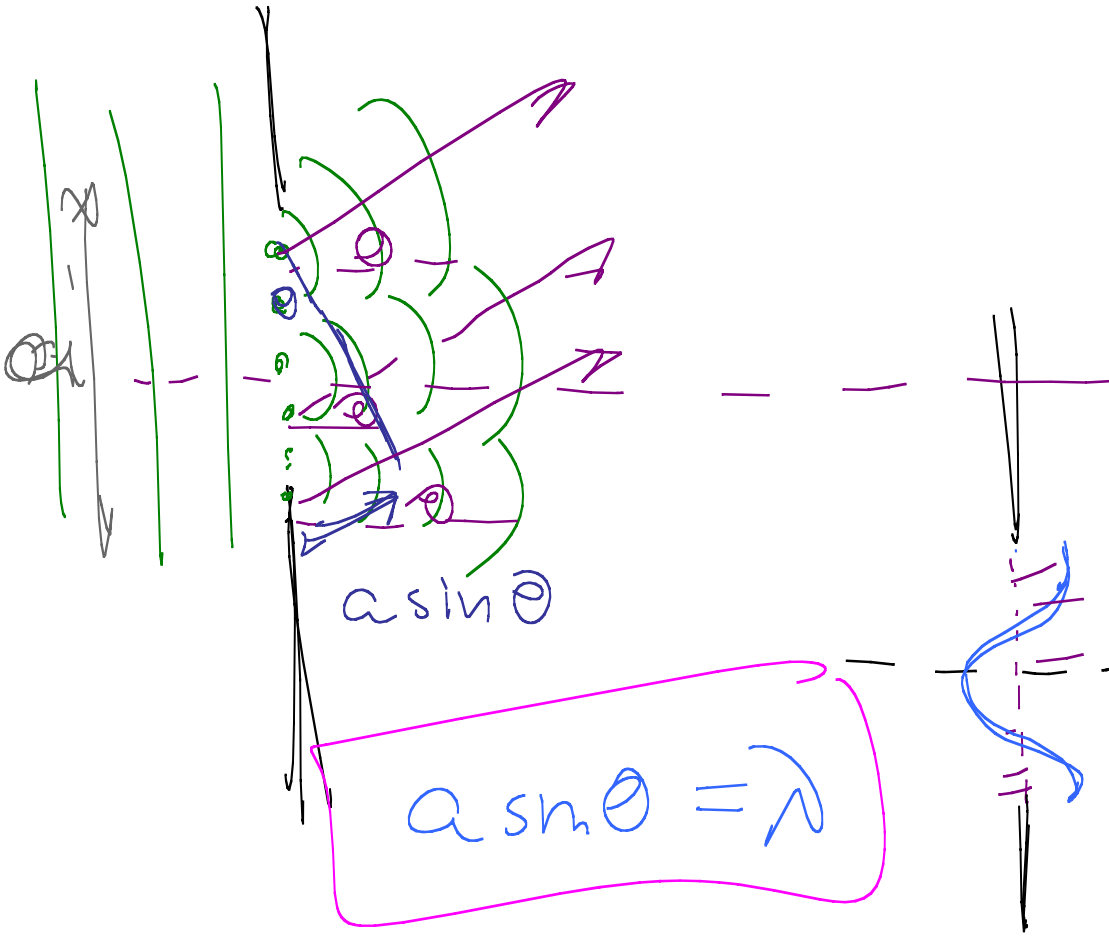
Note Title 11/30/2012



Single-slit

Huygens' Principle

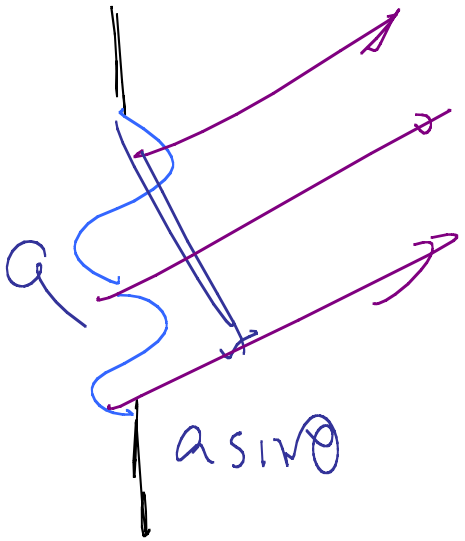
Each point is a radiator



Consider case where signal bottom radiator is full wavelength behind signal from top guy.

Contributions from individual radiators cancel.

$$a \sin\theta = \lambda$$



Diffraction

$a \sin\theta = 2\lambda$

$a \sin\theta = m\lambda$

Destructive Interf

Dark Fringe

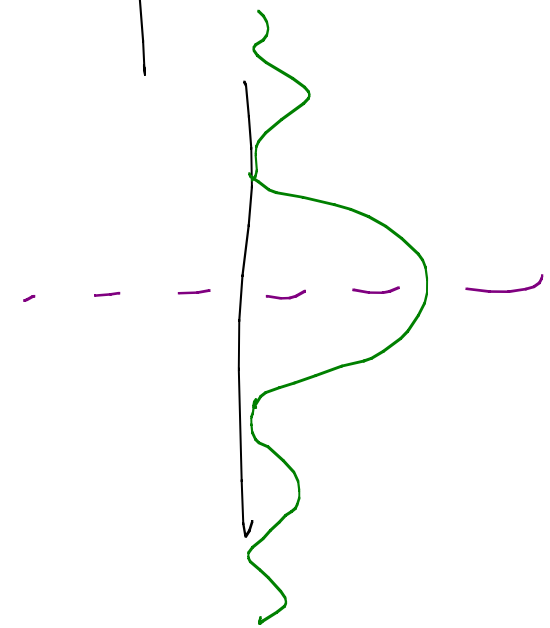
$d \sin\theta = m\lambda$ Bright

$d \sin\theta = (m + \frac{1}{2})\lambda$ Dark

$a \sin\theta = m\lambda$

Dark

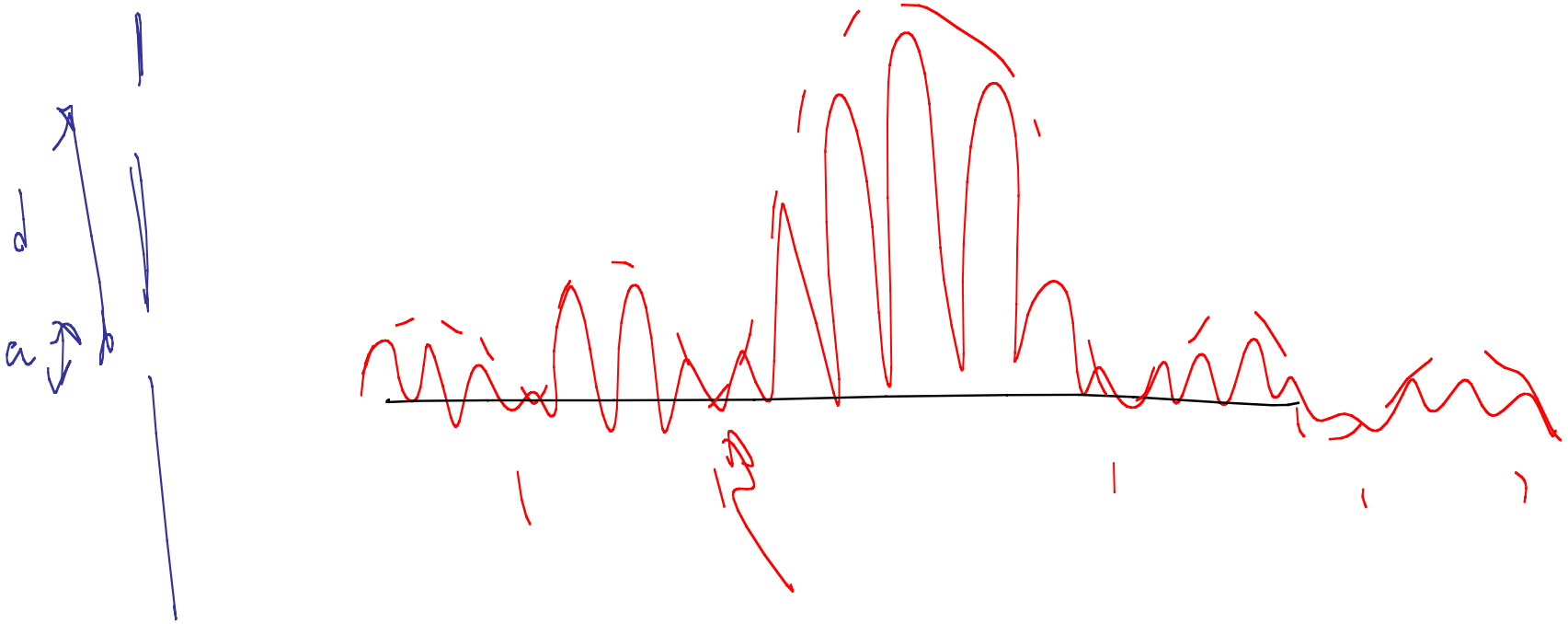
$m = 1, 2, 3, \ldots$



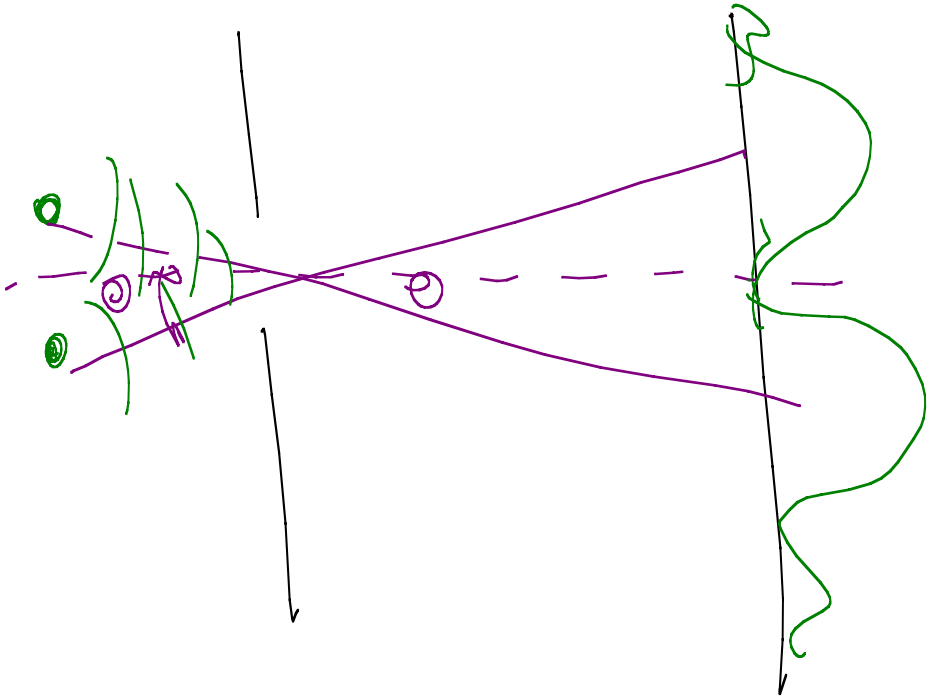
Intensity every where

$$\phi = \frac{2\pi}{\lambda} a \sin\theta$$

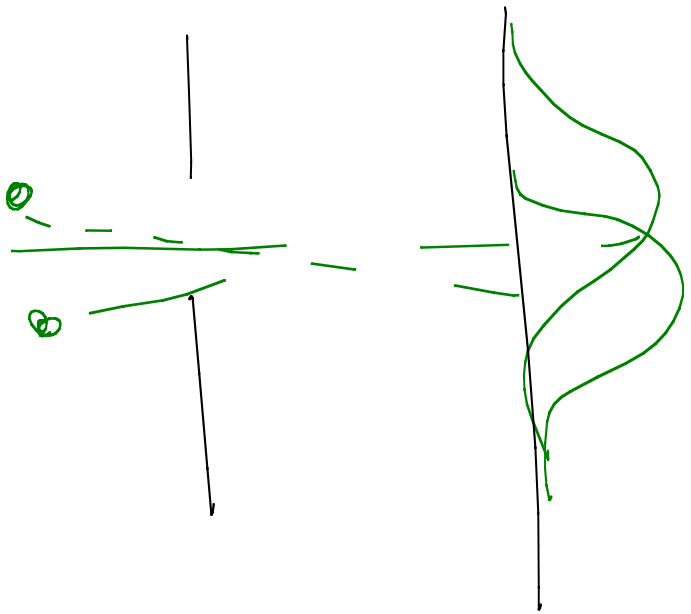
$$\bar{S} = \bar{S}_0 \left[\frac{\sin(\phi/2)}{\phi/2} \right]^2$$

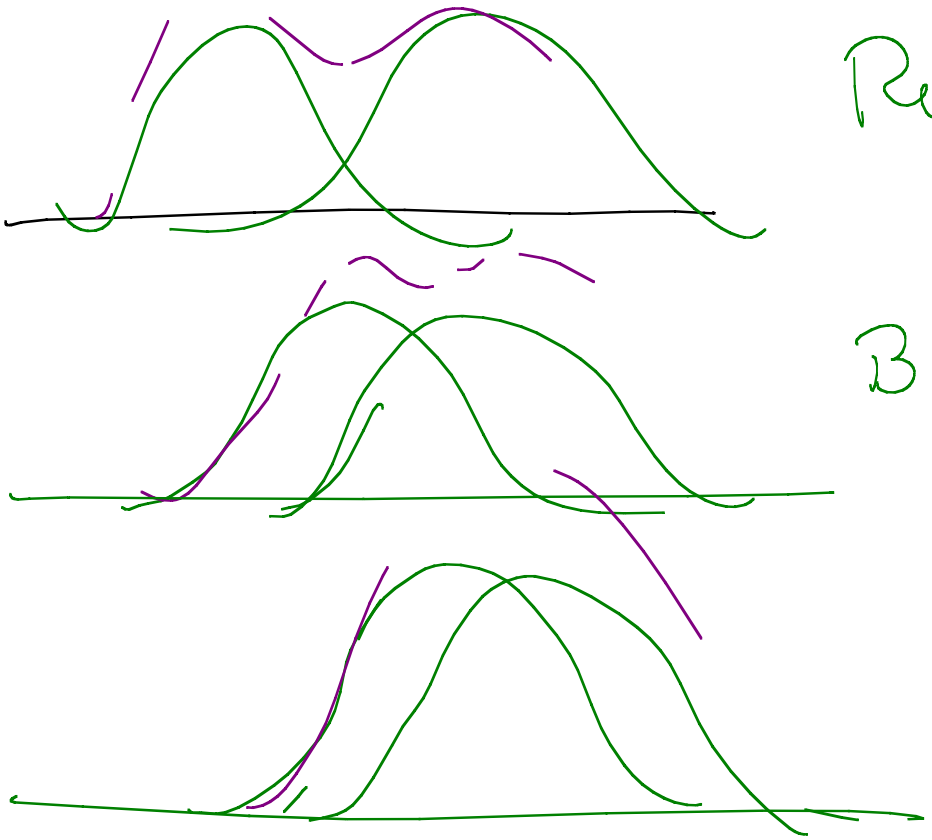

d
a

Diffractive Limit Resolving Power



Bumps are sep'd.




Resolved
Barely resolved
Unresolved

"Too close" max of pattern 1 coincides w/ first min of pattern. Rayleigh criterion

Peaks are indistinguishable closer

Slit with a $\theta_{min} = \frac{\lambda}{a}$ Rayleigh, slit.

Circle hole diam D $\theta_{min} = 1.22 \frac{\lambda}{D}$