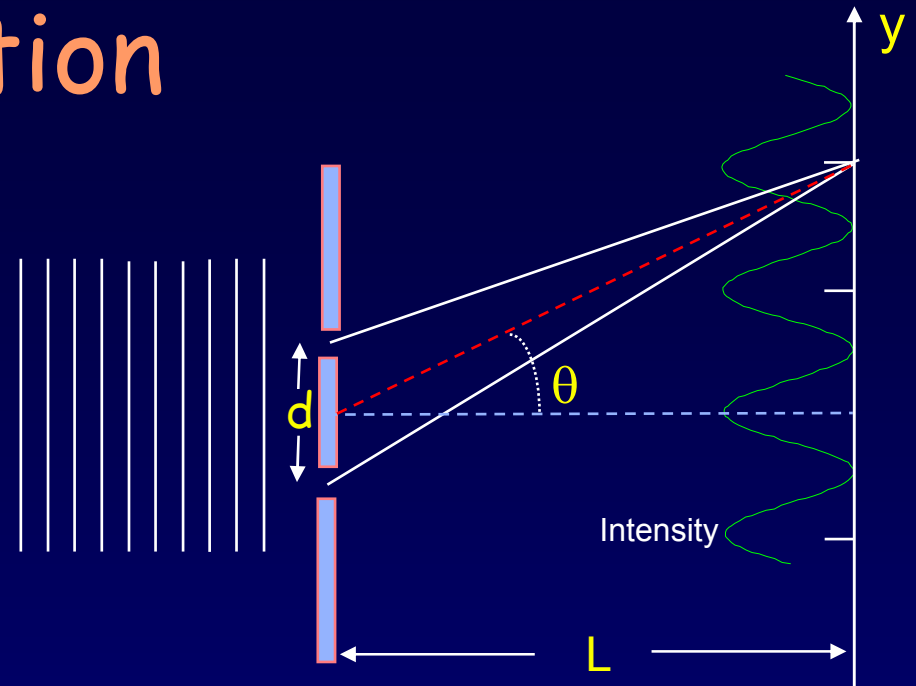


# Solution

A laser of wavelength 532 nm is incident on two slits separated by 0.125 mm.



1. What is the angle of the second principle maximum?

First: Can we use the small angle approximation?

$$d = 125 \mu\text{m}; \lambda = 0.532 \mu\text{m} \rightarrow d \gg \lambda \rightarrow \theta \text{ is small.}$$

$$d \sin\theta_m = m\lambda \sim d\theta_m \rightarrow \theta_m \approx m(\lambda/d) = 2 (0.532/125) = 0.0085 \text{ rad} = 0.49^\circ \text{ (small!)}$$

2. What is the spacing  $\Delta y$  between adjacent fringe maxima (*i.e.*,  $\Delta m = 1$ ) on a screen 2m away?

$$\Delta y \approx L(\theta_2 - \theta_1) \approx L(2 - 1)(\lambda/d) = L\lambda/d = (2 \text{ m})(0.532 \mu\text{m})/125 \text{ mm} = 0.0085 \text{ m} \sim 1 \text{ cm}$$

Could have also used 1 – 0 (or 6 – 5).