PHY250: Single Slit diffraction

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Digipen

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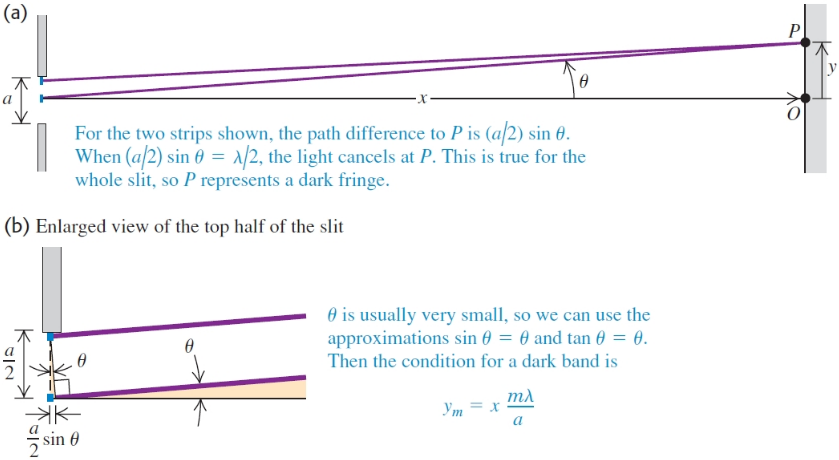
Let us calculate the wavelength of a laser

Position of dark fringes in a single slit of width *a*



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for small angles:

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Intensity of the pattern

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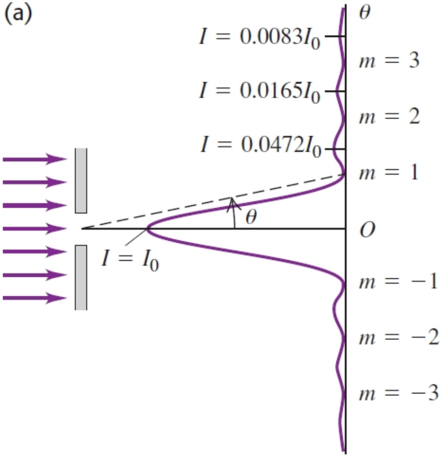
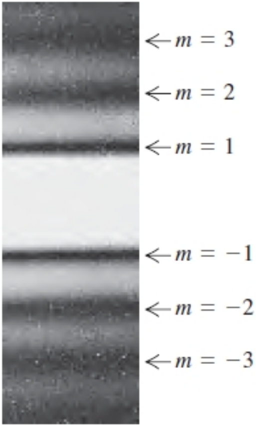


What we observe is something like this

Position of dark fringes in a single slit of width a



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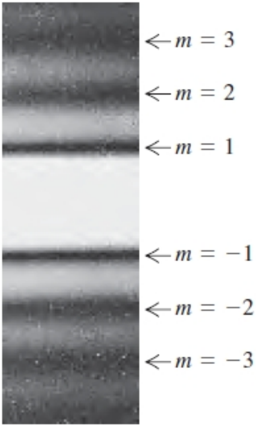

Then, if we know the position of the first dark fringe, the width of the slit and the distance to the screen, we can calculate λ for a given source:

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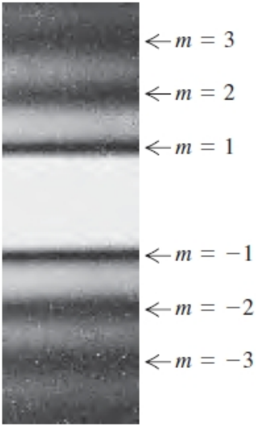

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$$\lambda = \frac{a y_m}{x m}$$

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$$\lambda \sim \frac{0.0005 \times 0.01}{2.5 \times 1} \sim 2 \times 10^{-6}\ m$$