Phys 5B:

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- $E_\Theta = 2\text{Ecos}\left(\frac{\delta}{2}\right)\sin\left(\omega t + \frac{\delta}{2}\right)$
- Intensity of Light: $I_\Theta \sim E_\Theta^2$

  $I_\Theta \sim \left(2\text{Ecos}\left(\frac{\delta}{2}\right)\right)^2$

  Define $I_\Theta \sim (E_{\Theta=0})^2 = (2E_0)^2$
- Falloff of Intensity: $\frac{I_\Theta}{I_{\Theta=0}} = \frac{(E_\Theta)^2}{(2E_0)^2} = \frac{\left(2E_0\text{cos}\left(\frac{\delta}{2}\right)\right)^2}{(2E_0)^2} = \cos^2\left(\frac{\delta}{2}\right)$

  $I_\Theta \Rightarrow I_0\text{cos}^{2\left(\frac{\pi d\sin\Theta}{\lambda}\right)}$
- Thin − film interference

  Light reflecting from higher n undergoes phase shift π radians.

  $\text{ABC} = \left(m + \frac{1}{2}\right)\lambda$ Destructive Interference

  $2t = \text{ABS} = m\lambda$ Counstructive Interference
- Destructive int: $t = \frac{\lambda}{4}$ dark

  $\lambda_{\text{oil}} = \frac{v_{\text{oil}}}{f} = \frac{\frac{c}{n_{\text{oil}}}}{f} = \frac{c}{f}\frac{1}{n_{\text{oil}}} = \frac{\lambda_{\text{vac}}}{n_{\text{oil}}}$
- EXAMPLE:

  Oil slick (n=1.50) float on water (n=1.33)

  Relfect colors: red(650nm) and violet (390 nm)

  $t = 0 \Rightarrow$ destructive interference

  $2t = \text{ABC} = m\lambda_{\text{oil}} + \frac{1}{2}\lambda_{\text{oil}} = \left(m + \frac{1}{2}\right)\lambda_{\text{oil}}$ Constructive interfence

  $2t = \left(m + \frac{1}{2}\right)\frac{\lambda}{n_{\text{oil}}}$
- Interferomter