

Beating of two wavelengths

Two sodium lines

$$I_1 = 2I \left[1 + \cos \left(\frac{2\pi}{\lambda_1} 2d \right) \right] \quad I_2 = 2I \left[1 + \cos \left(\frac{2\pi}{\lambda_2} 2d \right) \right]$$

assume $\lambda_1 + \lambda_2 = 2\lambda$ and $\lambda_1 \lambda_2 = \lambda^2$

Normal fringe oscillation term

Total intensity is

$$I_{total} = I_1 + I_2 = 4I \left[1 + \cos \left(\frac{4\pi d}{\lambda} \right) \cos \left(\frac{2\pi \Delta \lambda}{\lambda^2} d \right) \right]$$

We see successive minimum to minimum visibility with mirror separation given by:

$$\Delta d = \frac{\lambda^2}{2\Delta \lambda}$$

“Beat” term washes out fringes at periodic d