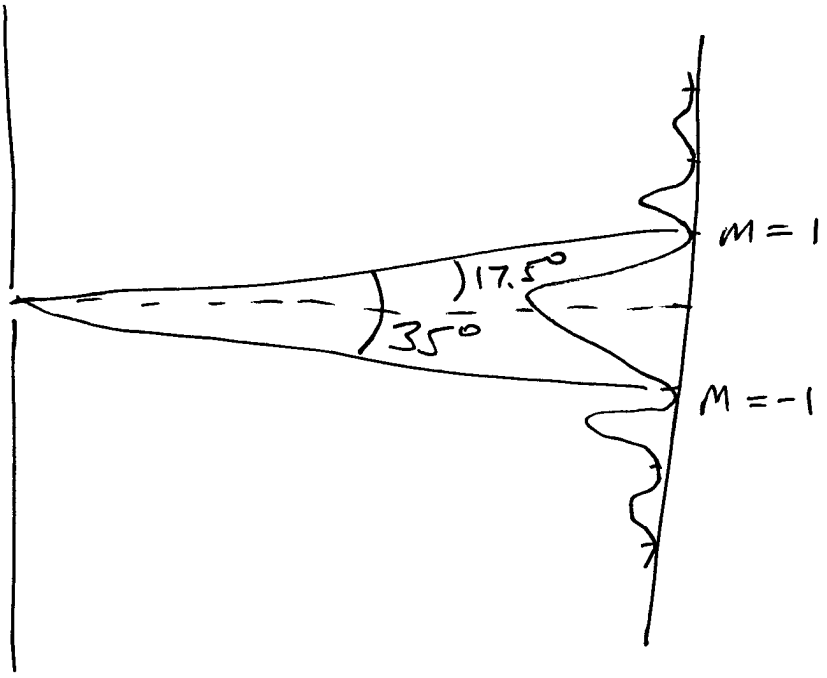
2012 APR 4

SINGLE-SLIT DIFFRACTION

$D \sin\theta = m\lambda$

(G6, Ch 24, P18)

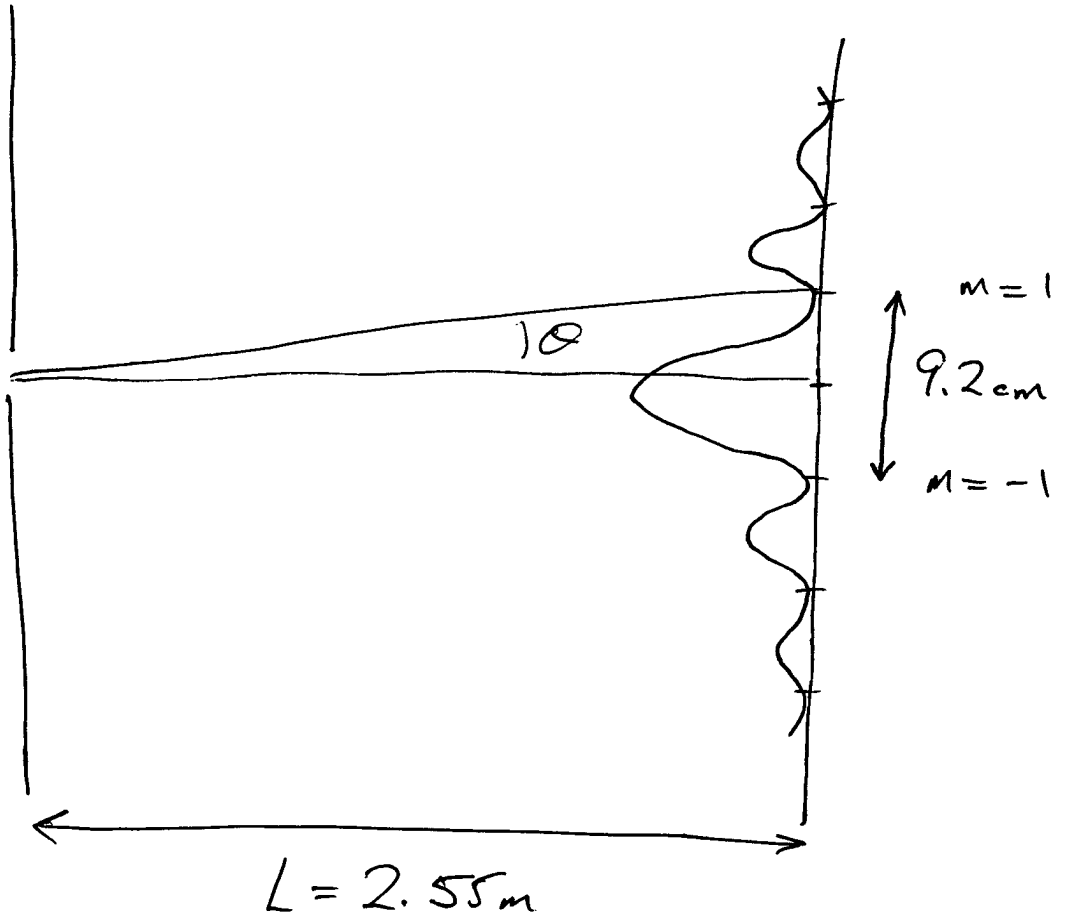


$$D \sin\theta = m\lambda$$

$$\lambda = \frac{D \sin\theta}{m} = \frac{(2.6 \times 10^{-3}\ mm) \sin 17.5^\circ}{1}$$

$$= 781\ nm$$

(GG, Ch 24, P 24)



$D \sin\theta = m\lambda$ $\quad \tan\theta = \frac{y}{L}$ $\quad y = 4.6\,cm$

SMALL ANGLE APPROXIMATION

$\sin\theta \approx \tan\theta$

$$D = \frac{m\lambda}{\sin\theta} = \frac{m\lambda L}{y} = \frac{(1)(415\,nm)(2.55\,m)}{4.6\,cm}$$

$$= 0.023\,mm$$

$$\tan\theta = \frac{y}{L}$$

$$\theta = \tan^{-1}\frac{y}{L} = \tan^{-1}\left(\frac{0.046\text{m}}{2.55\text{m}}\right)$$

$$= 1.03^\circ$$

$$D\sin\theta = m\lambda$$

$$D = \frac{m\lambda}{\sin\theta} = \frac{(1)(415\text{nm})}{\sin 1.03^\circ} = 0.023\text{mm}$$

Atomic & Nuclear Physics

(Modern Physics)

(20th century Physics)

Blackbody Radiation

- Hot objects radiate
- Max Planck (1900)
  - Light in discrete quanta

$$E = h\nu = hf$$

  - Able to get reasonable agreement with blackbody spectra