

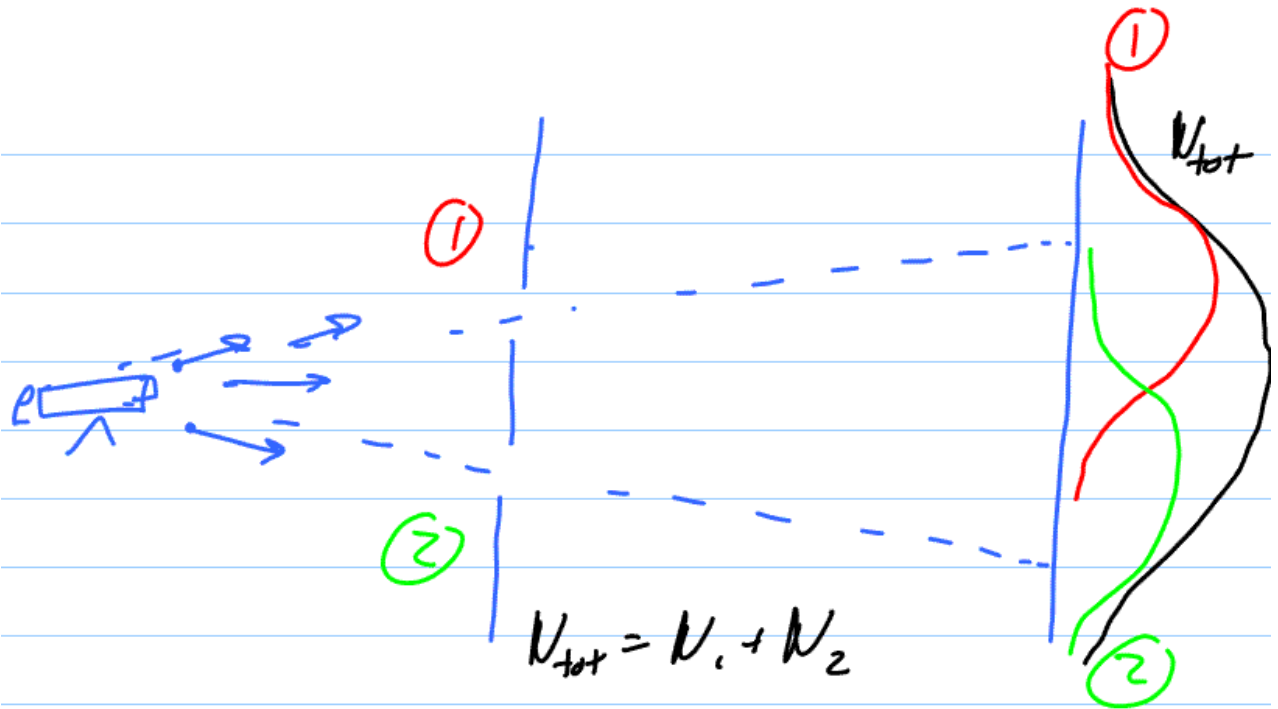
PHY132 - Class 5 - Monday January 19

§22.1 - What is light?

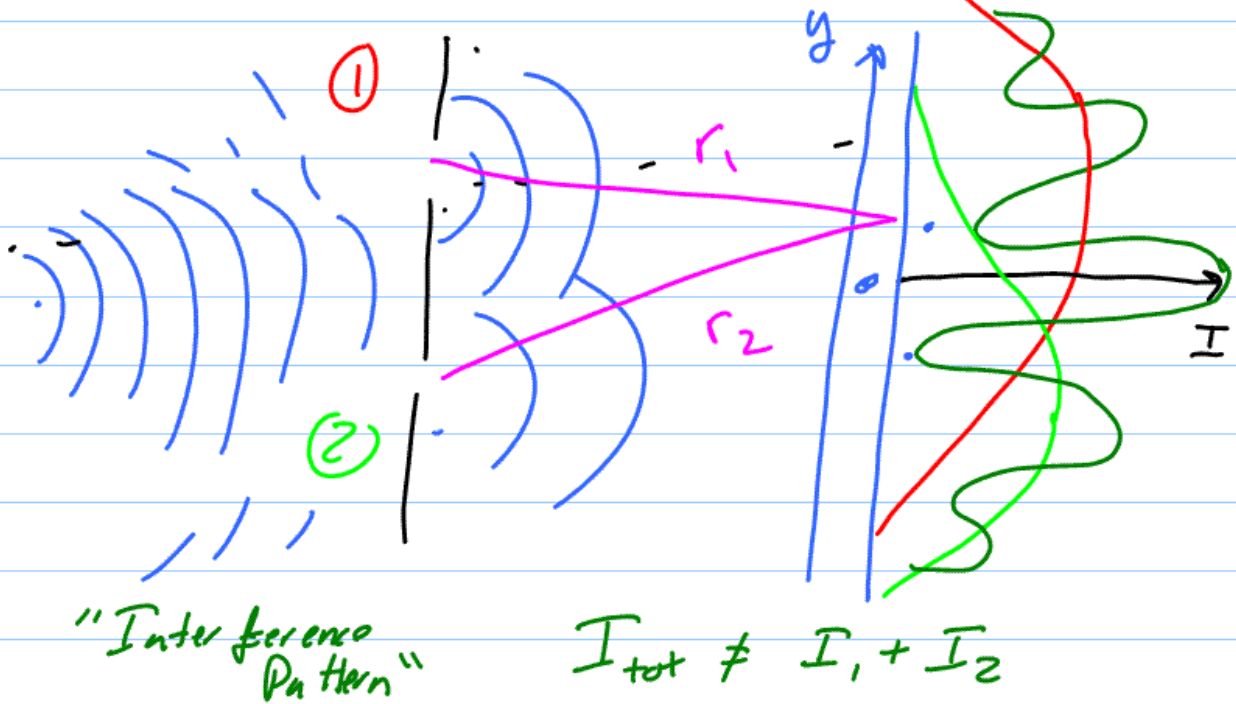
Alhazen:

- ① close eyes, then open
see a distant star
right away
- ② stare at sun, damage
my eyes

Double Slit FOR PARTICLES
(bullets)



WAVES (Water Waves)



"maxima" - 2 waves in phase

"minima" - 2 waves out of phase.

$$\int_{-\infty}^{\infty} I_{\text{total}} dy = \int_{-\infty}^{\infty} I_1 dy + \int_{-\infty}^{\infty} I_2 dy$$



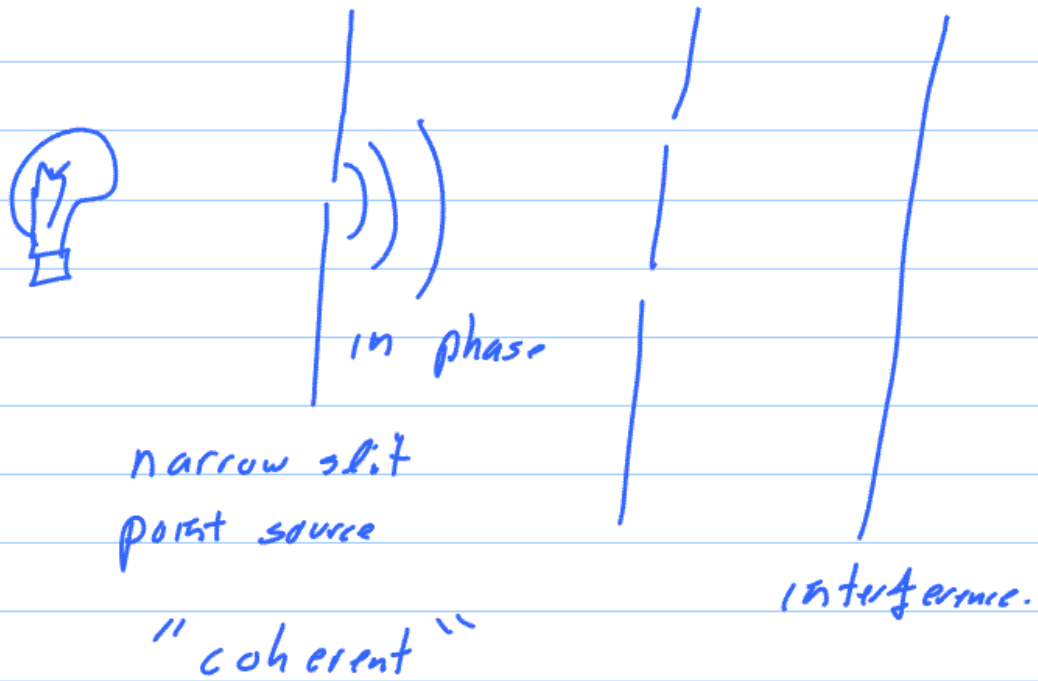
Why took until 1801 for the expt?

Non-Laser light source



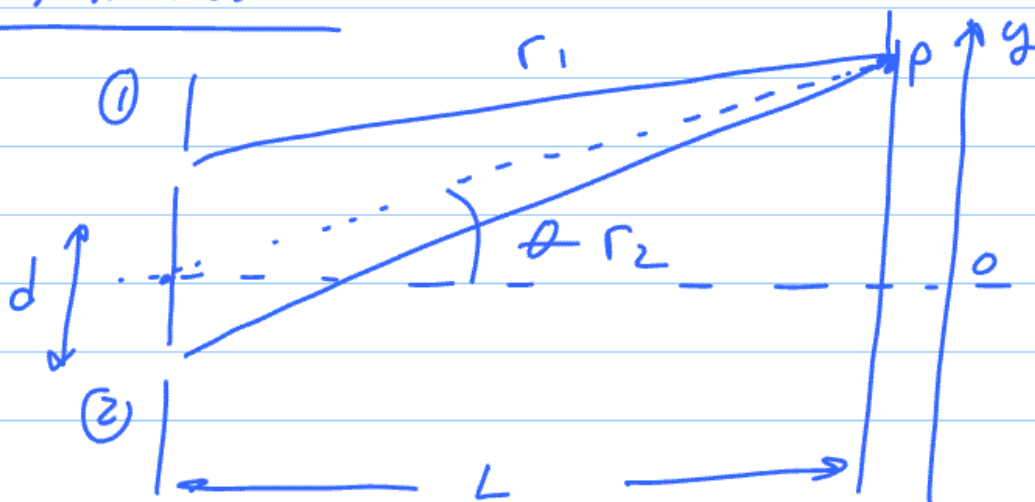
each atom emits
light wave.

different waves are
not in phase



Lasers are coherent.

ANALYSIS

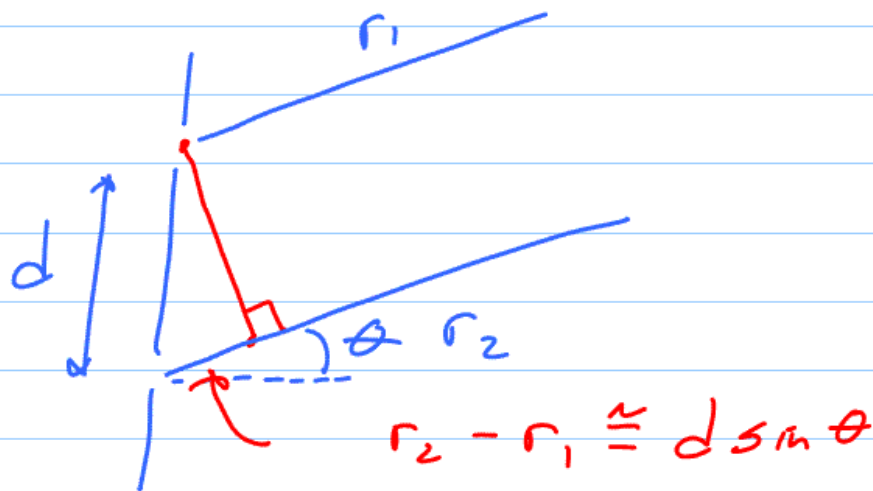


$$\Delta r = m\lambda, \quad m = 0, 1, 2, \dots$$

maxima

Assume $L \gg d$

r_1 & r_2 almost parallel



Maxima: $r_2 - r_1 = m\lambda \quad m = 0, 1, 2, \dots$

$$= d \sin \theta_m$$

$$d \sin \theta_m = m\lambda$$

θ_m

$$\theta \text{ small: } \sin \theta_m = \theta_m$$

$$d \theta_m = m \lambda$$

$$\theta_m = \frac{m \lambda}{d}$$

$$\theta \text{ small: } \theta_m = \tan \theta_m$$

$$\tan \theta_m = \frac{m \lambda}{d}$$

$$y_m = \frac{m \lambda L}{d}$$