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Welcome!

Physics 194 - Lecture 21

Have a question during class? Please ask it right away, even if it means interrupting in the middle of a thought. I want you to!

Agenda

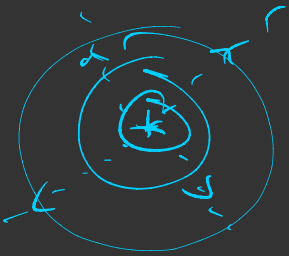
- Particle vs. wave model for light
- Interference
- Young's double slit experiment

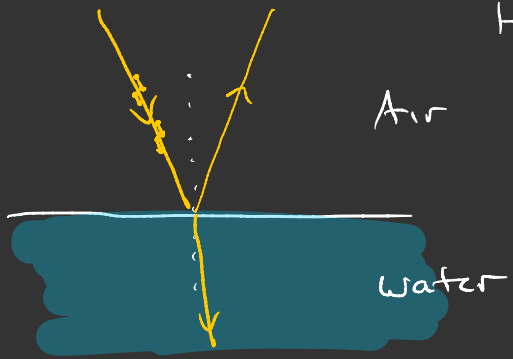
Class starts @2:15 pm

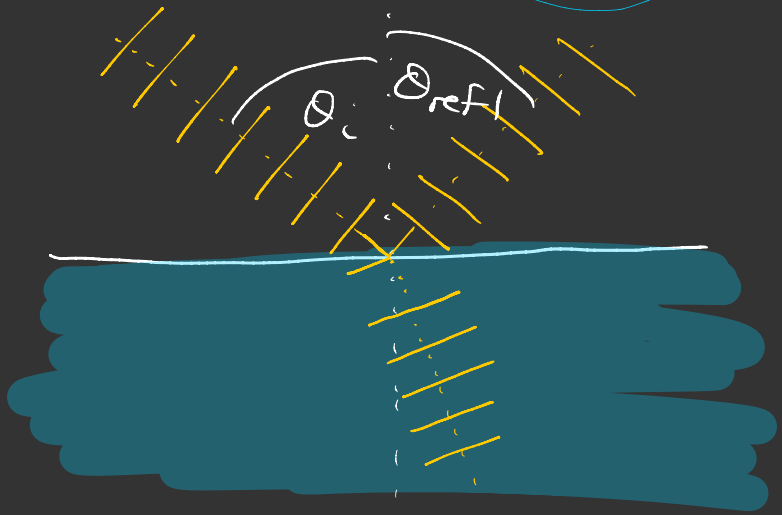
Geometric optics

Newton's particle model

Huygen's wave model

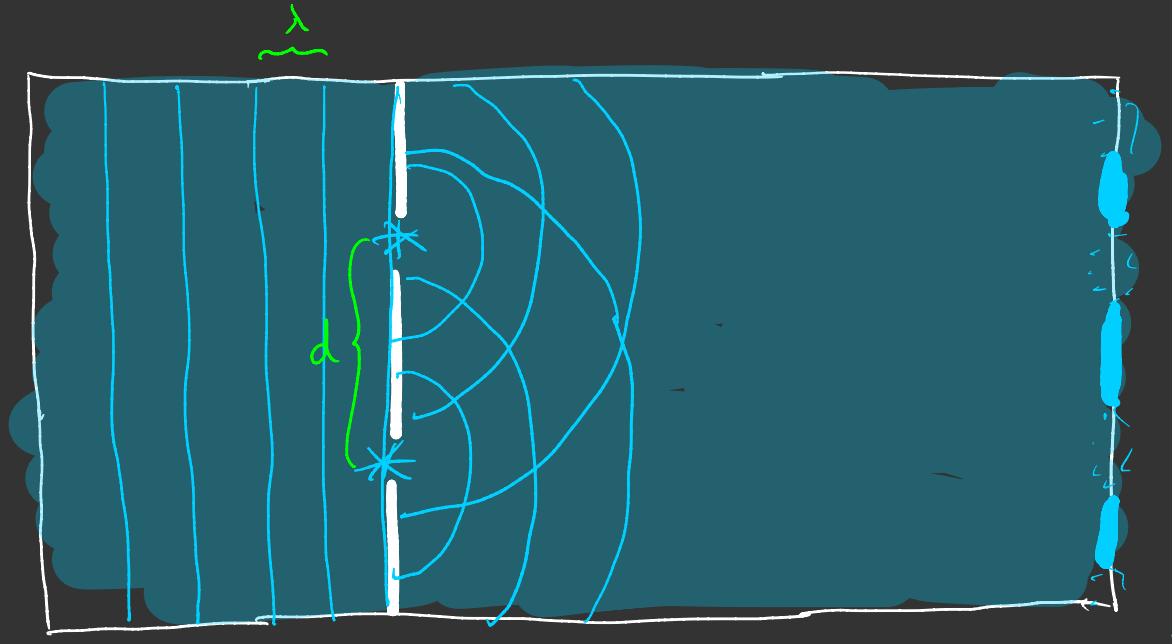






Wave model predicts that light travels slower in transparent materials compared to in vacuum.

What is "wavelike behavior"?



Interference

Because λ + d are comparable in length scale, wavelike behavior happens.

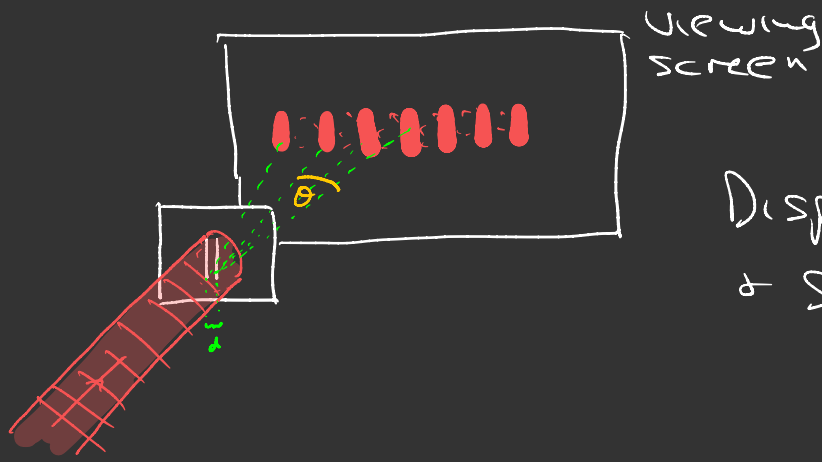
Does light do this?

Visible light has a wavelength of 400nm – 700nm

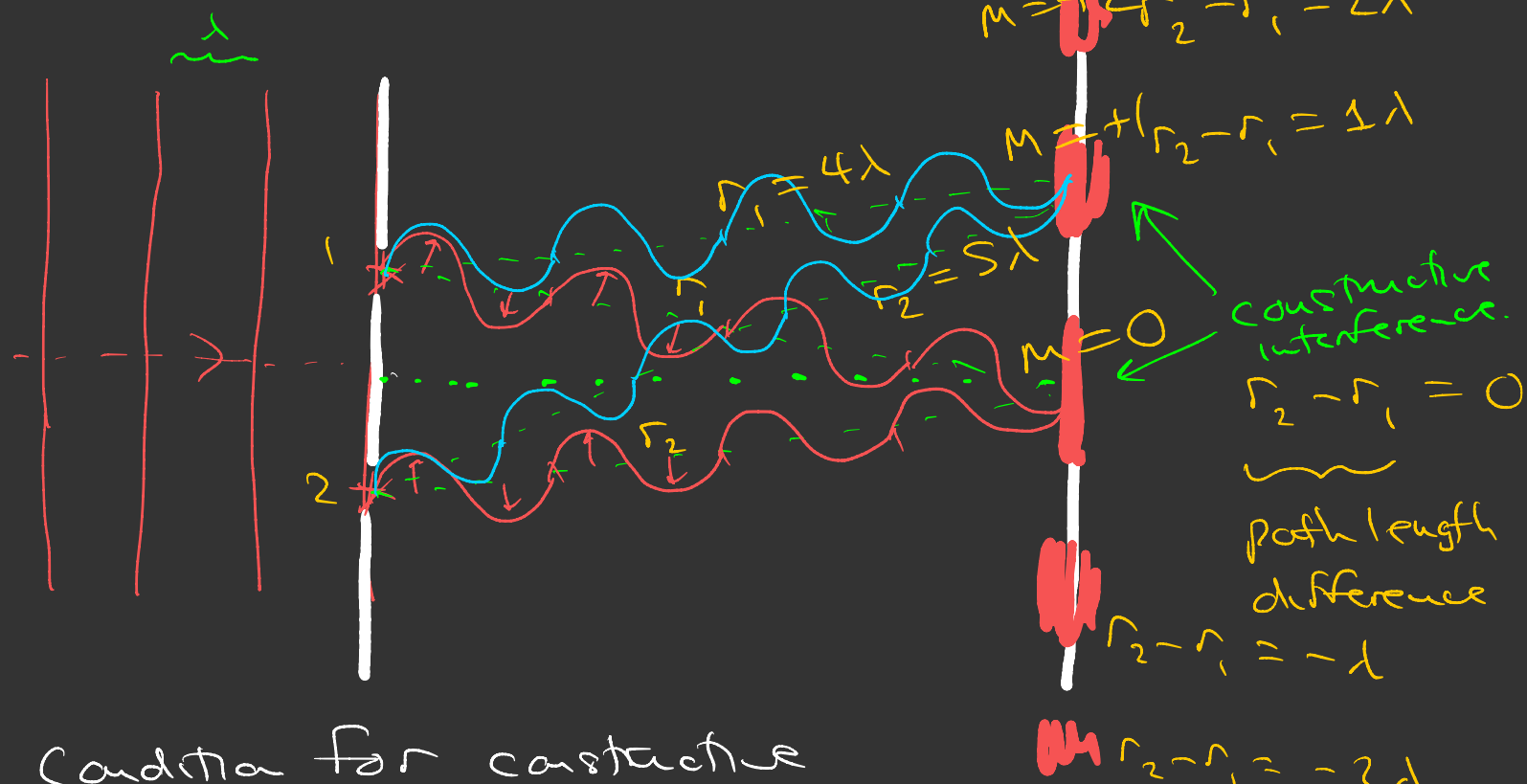
Violet Red

4×10^{-7}m 7×10^{-7}m

Thomas Young's experment



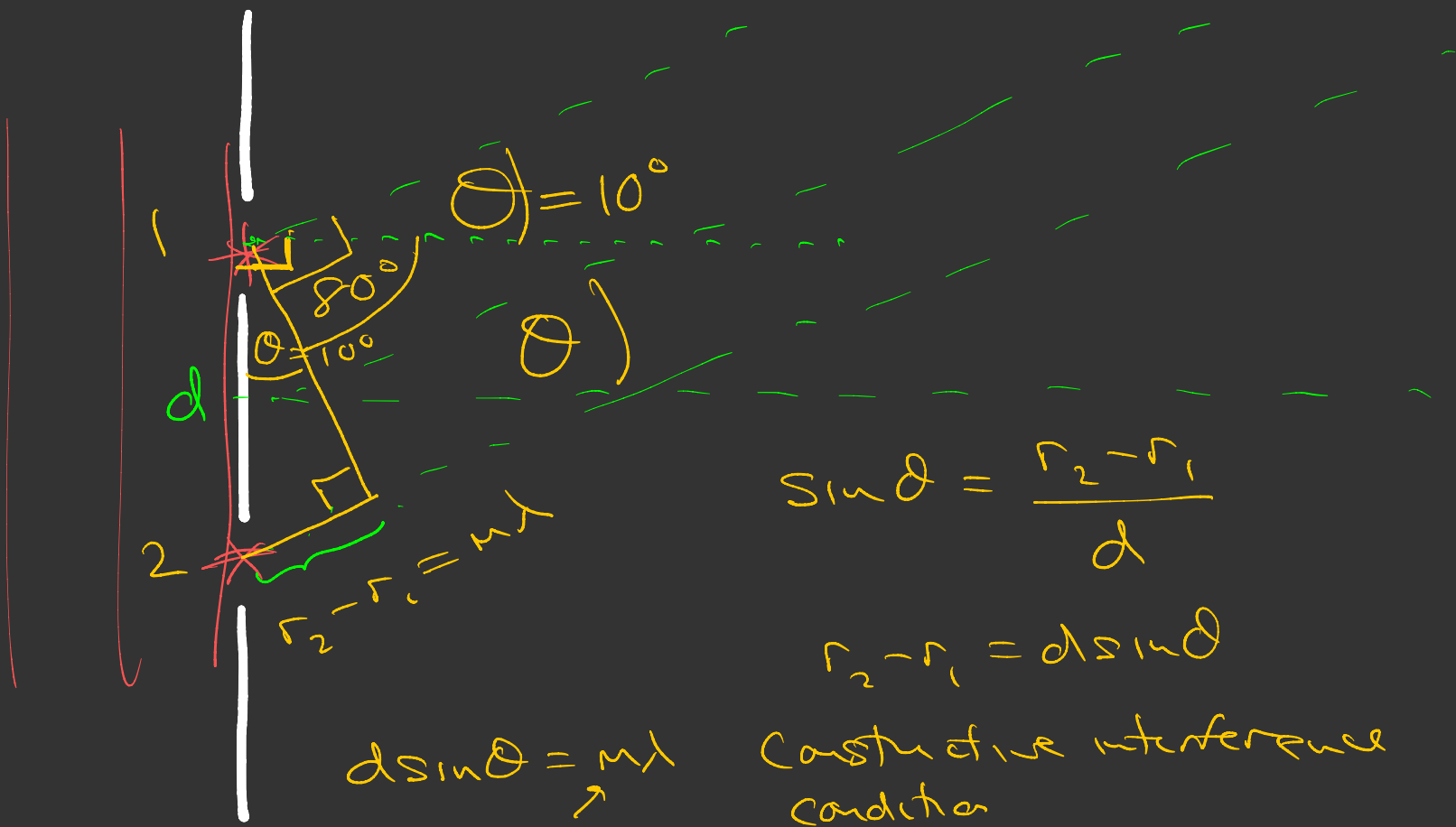
Disproves the particle model & Supports the wave model.



Condition for constructive interference $r_2 - r_1 = m\lambda$

m : $0, \pm 1, \pm 2, \pm 3$

$m = +1$



$$\sin\theta = \frac{r_2 - r_1}{d}$$

$$r_2 - r_1 = d\sin\theta$$

$d\sin\theta = m\lambda$ Constructive interference condition

$m = 0, \pm 1, \pm 2, \ldots$