

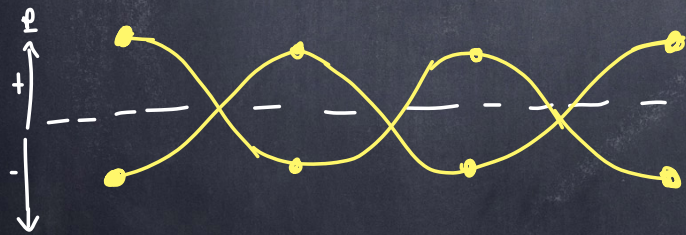
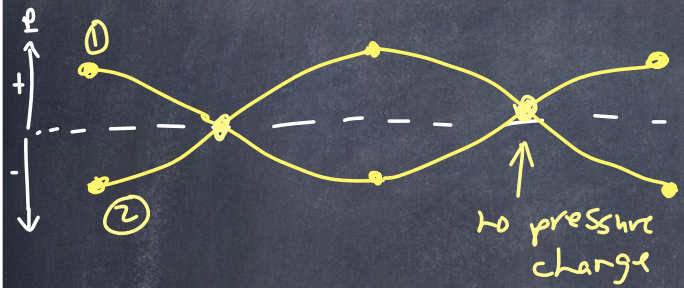
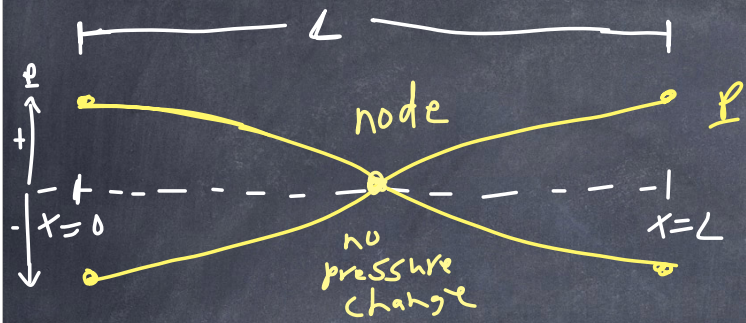
# PHY 117 HS2023

Week 11, Lecture 2

Dec. 6th, 2023

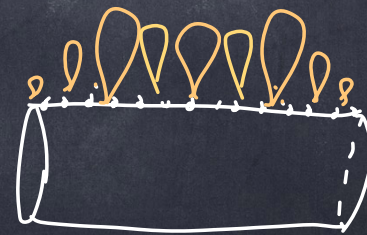
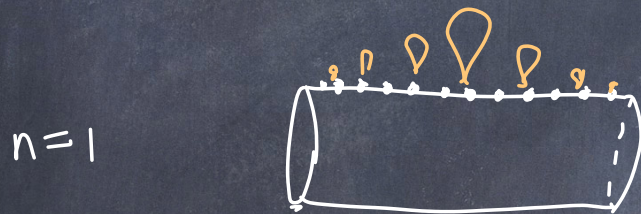
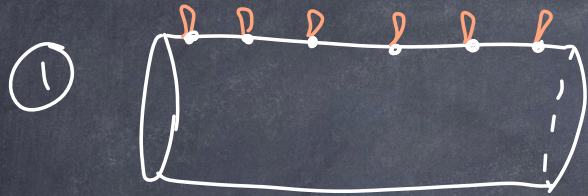
Prof. Ben Kilminster



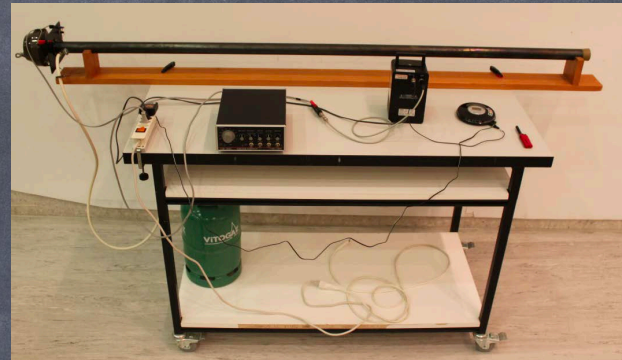




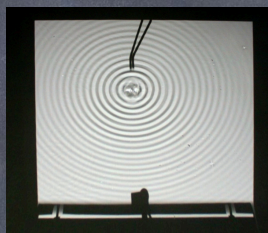
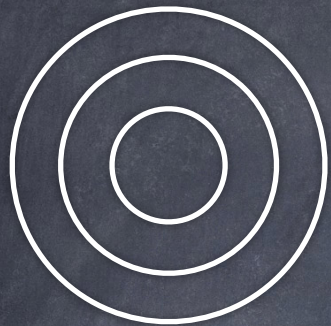
# Ruben's flame tube



$n=1 \neq n=2$















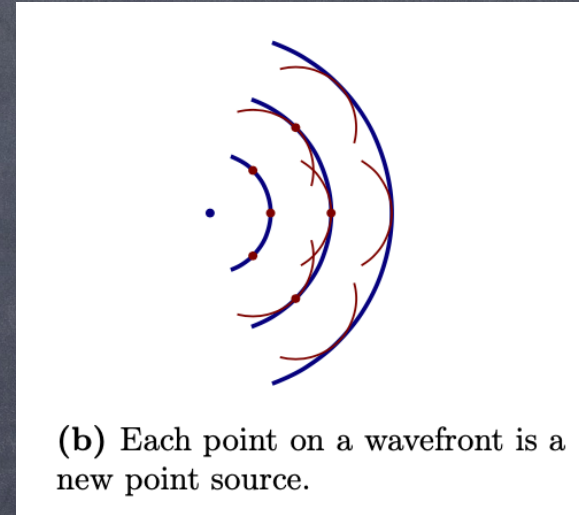
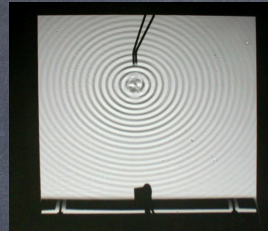
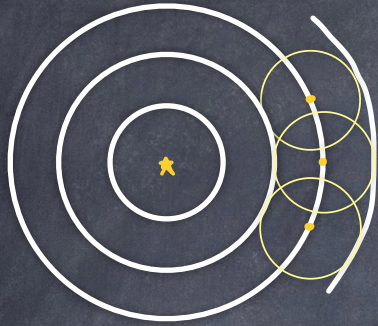








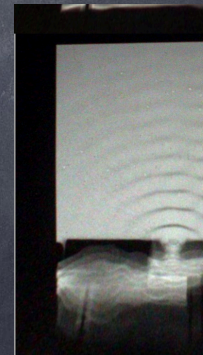
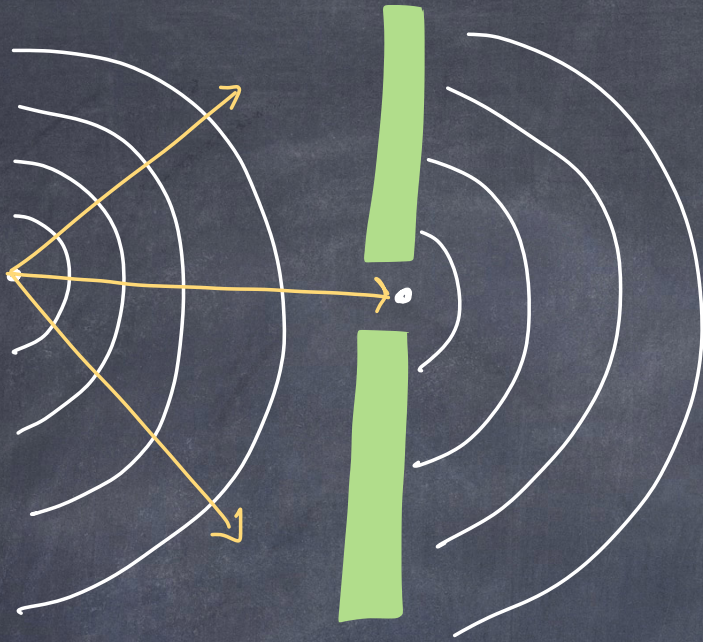




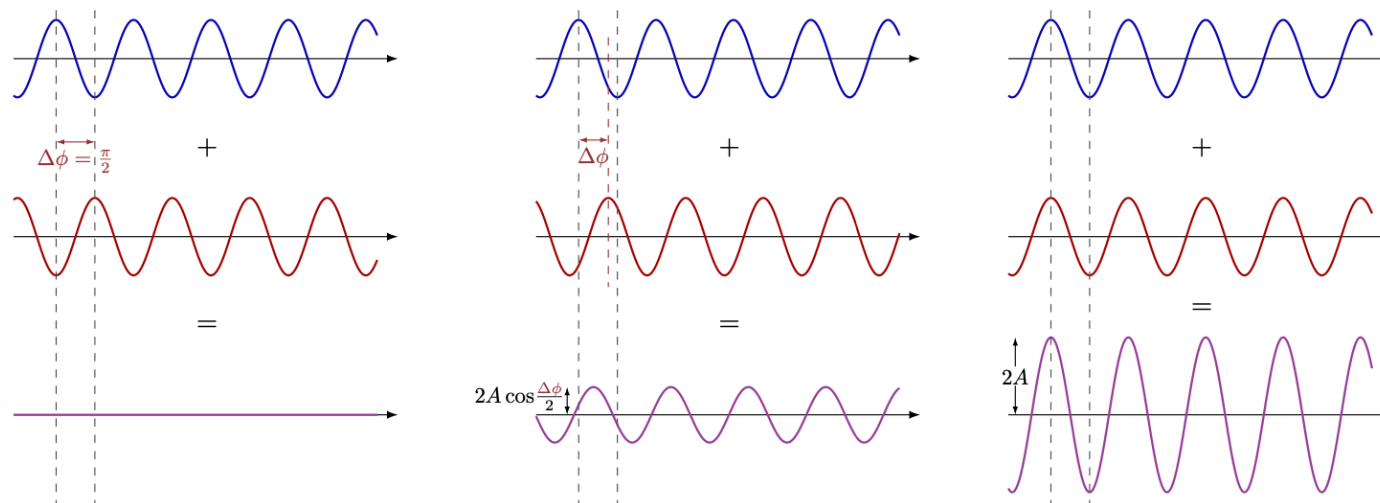
(b) Each point on a wavefront is a new point source.











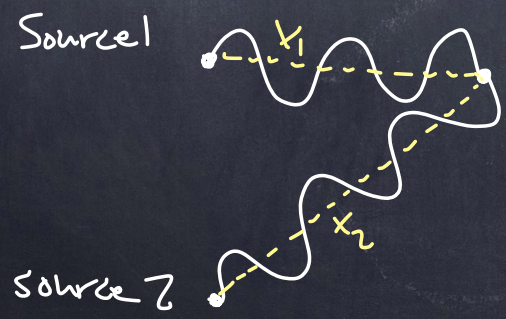
(a) If  $\Delta\phi = 90^\circ$ , there is destructive interference.

(b) If  $0^\circ < \Delta\phi < 90^\circ$ , there is partial interference with amplitude  $2A \cos \frac{\Delta\phi}{2}$ .

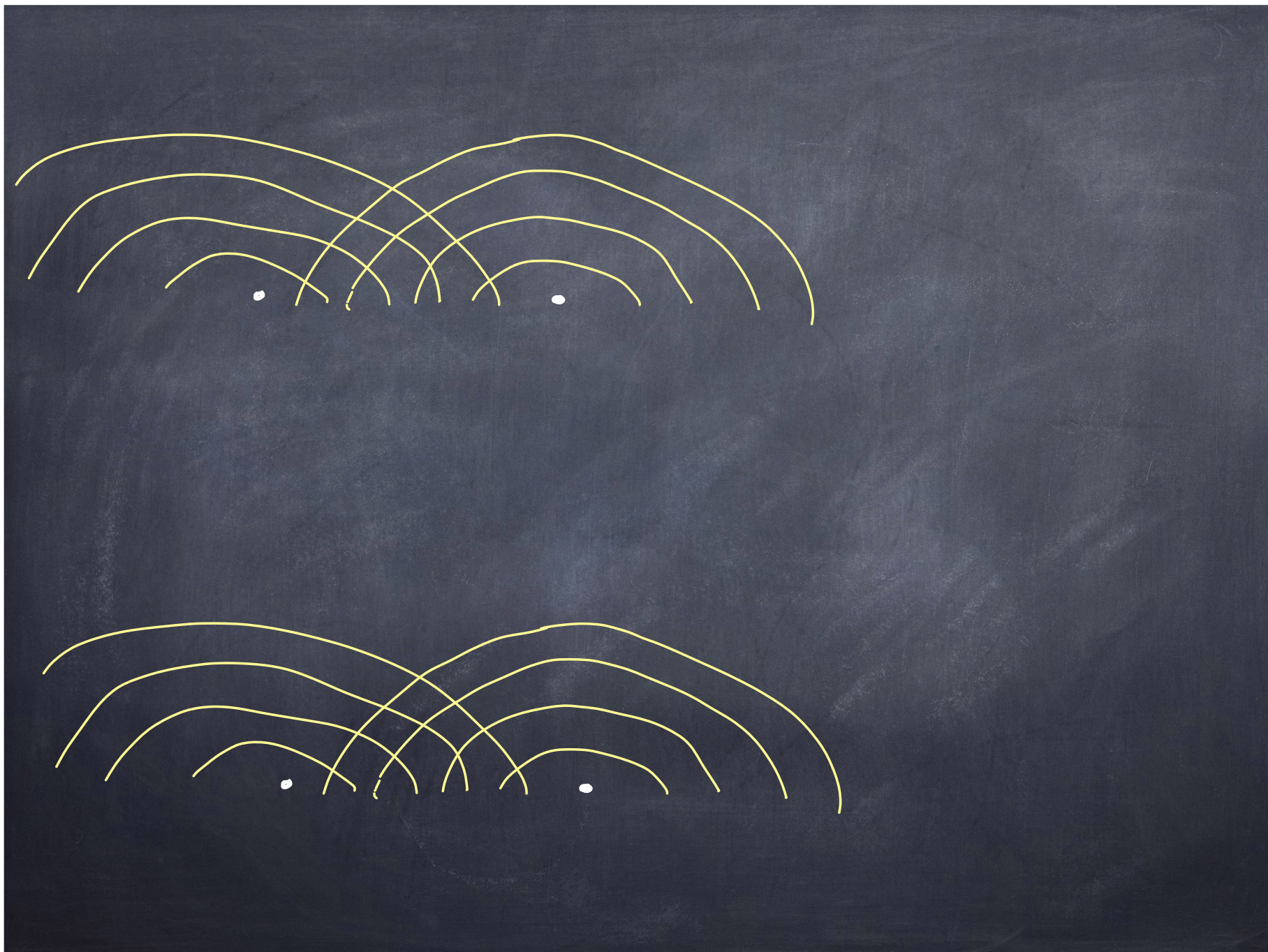
(c) If  $\Delta\phi = 0^\circ$ , there is constructive interference with amplitude  $2A$ .

**Figure 14.11:** Interference between two waves with the same wavelength  $\lambda$  and amplitude  $A$ , but phase difference  $\Delta\phi$ .





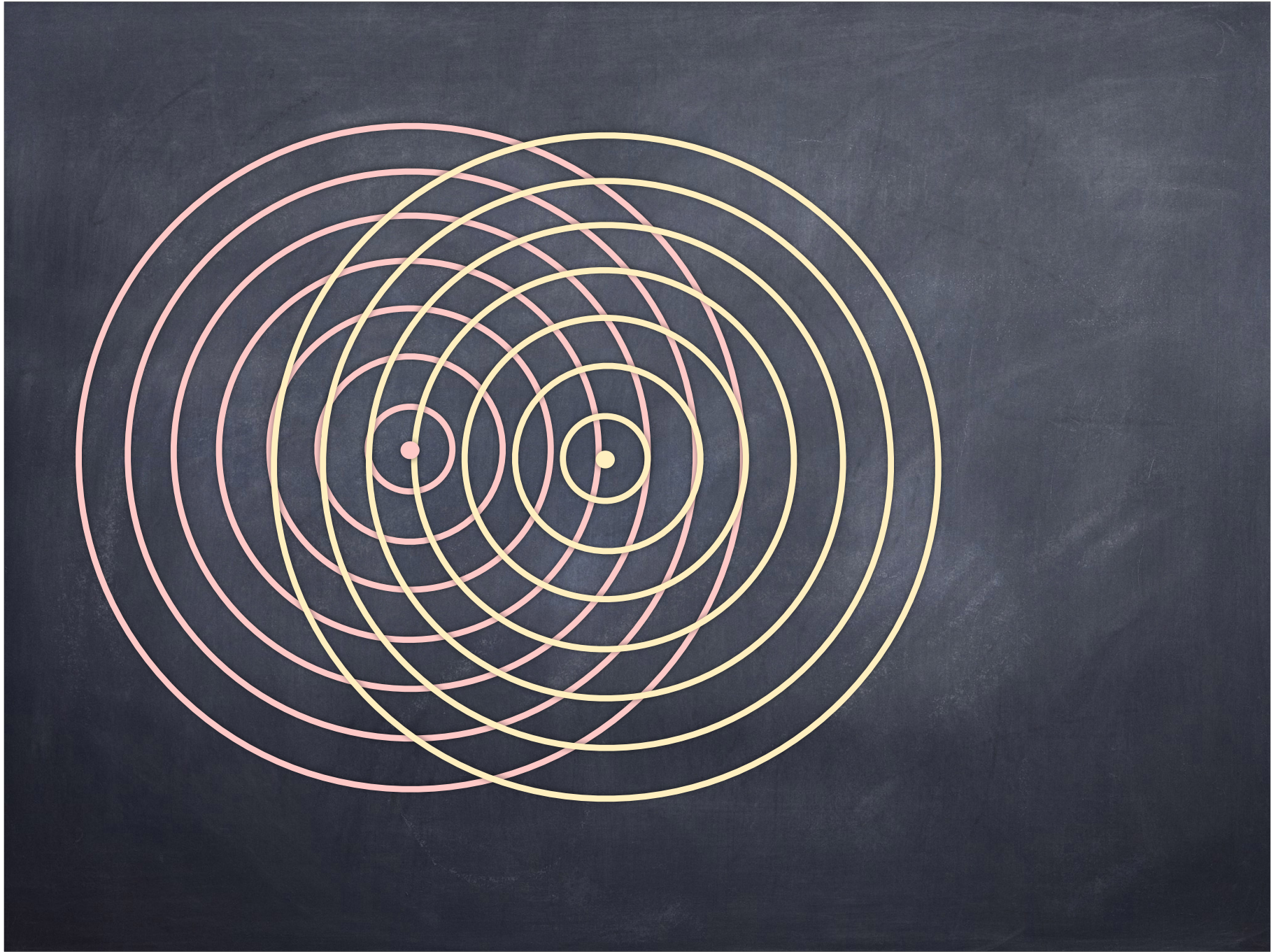




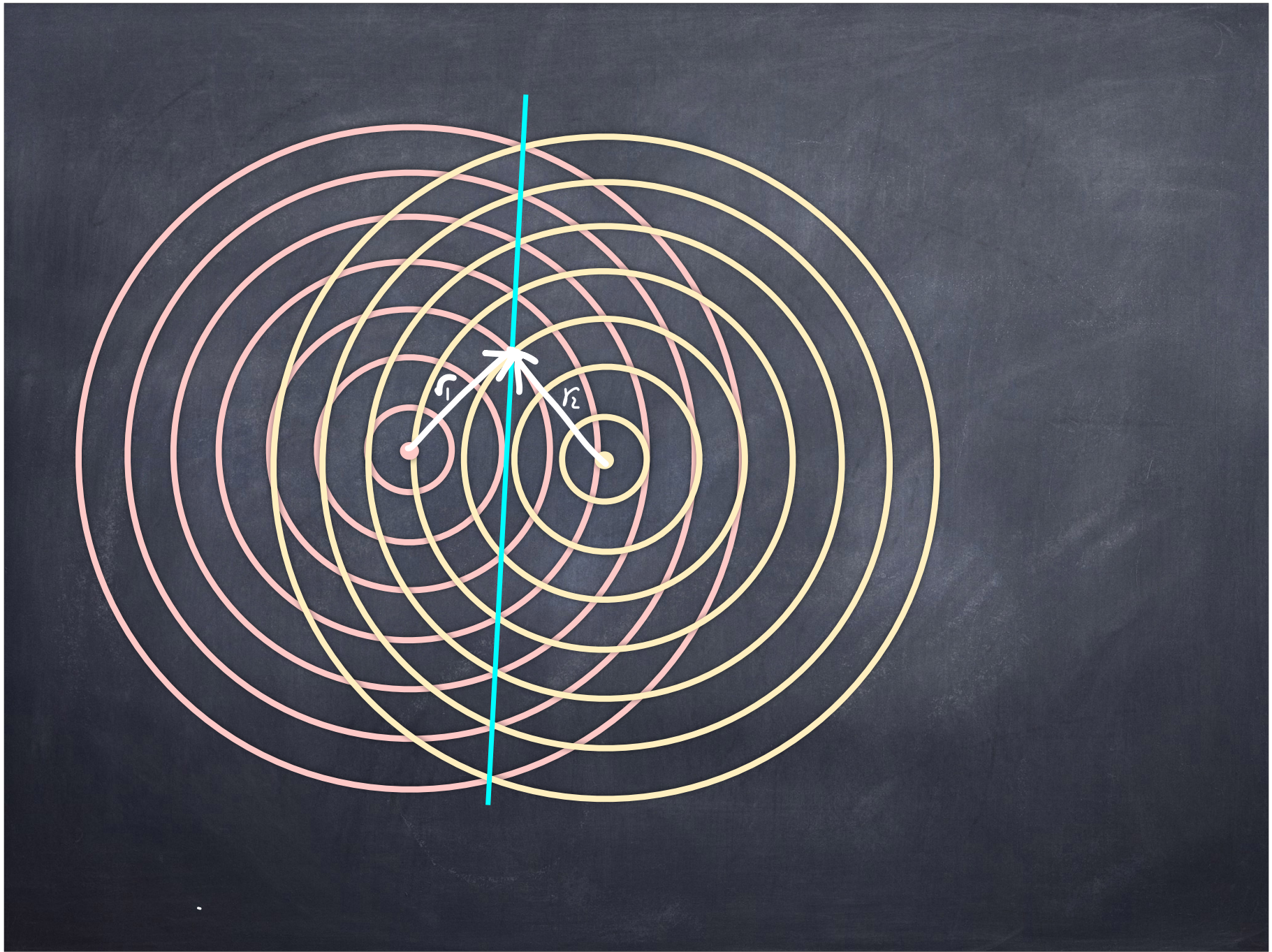




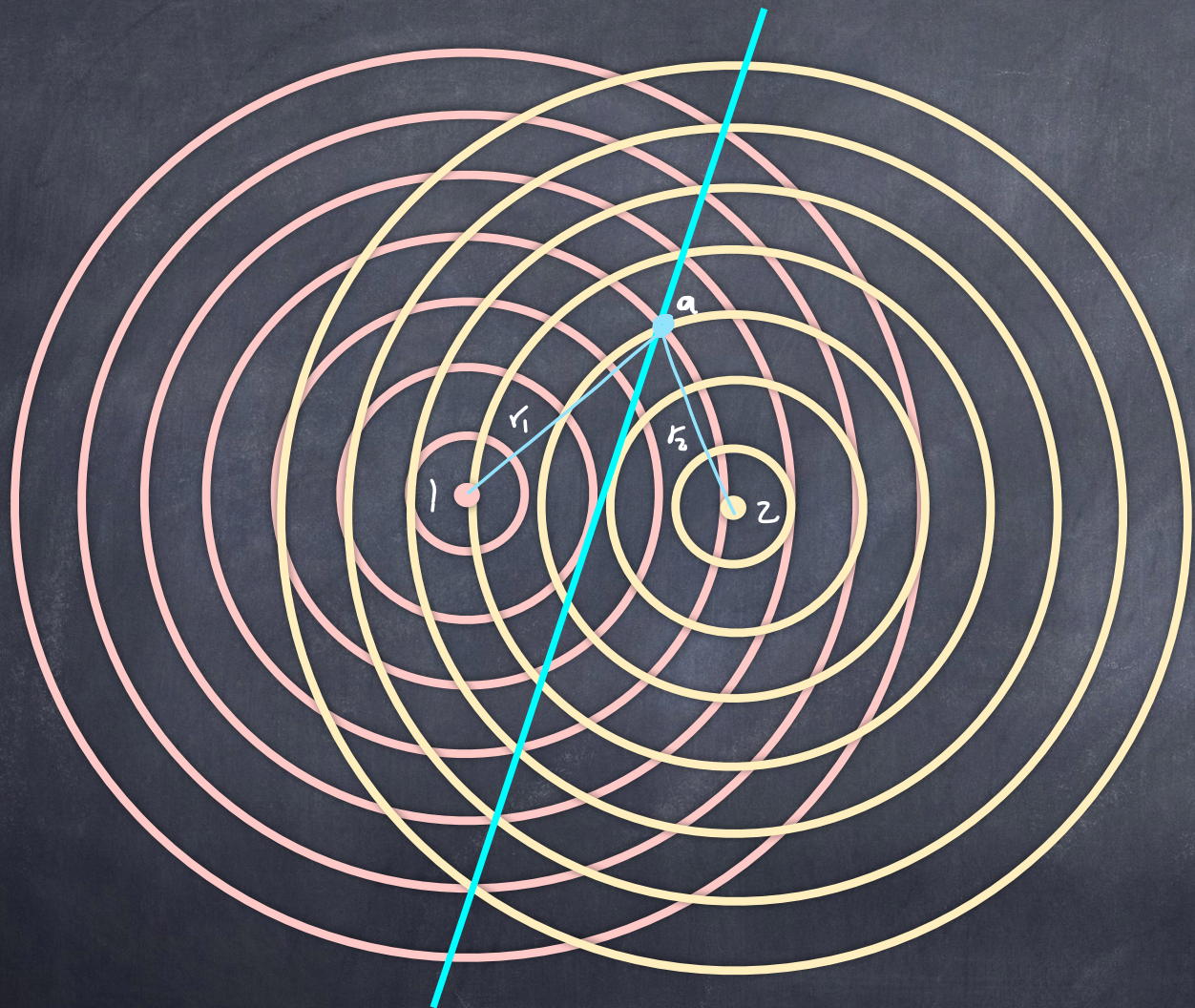




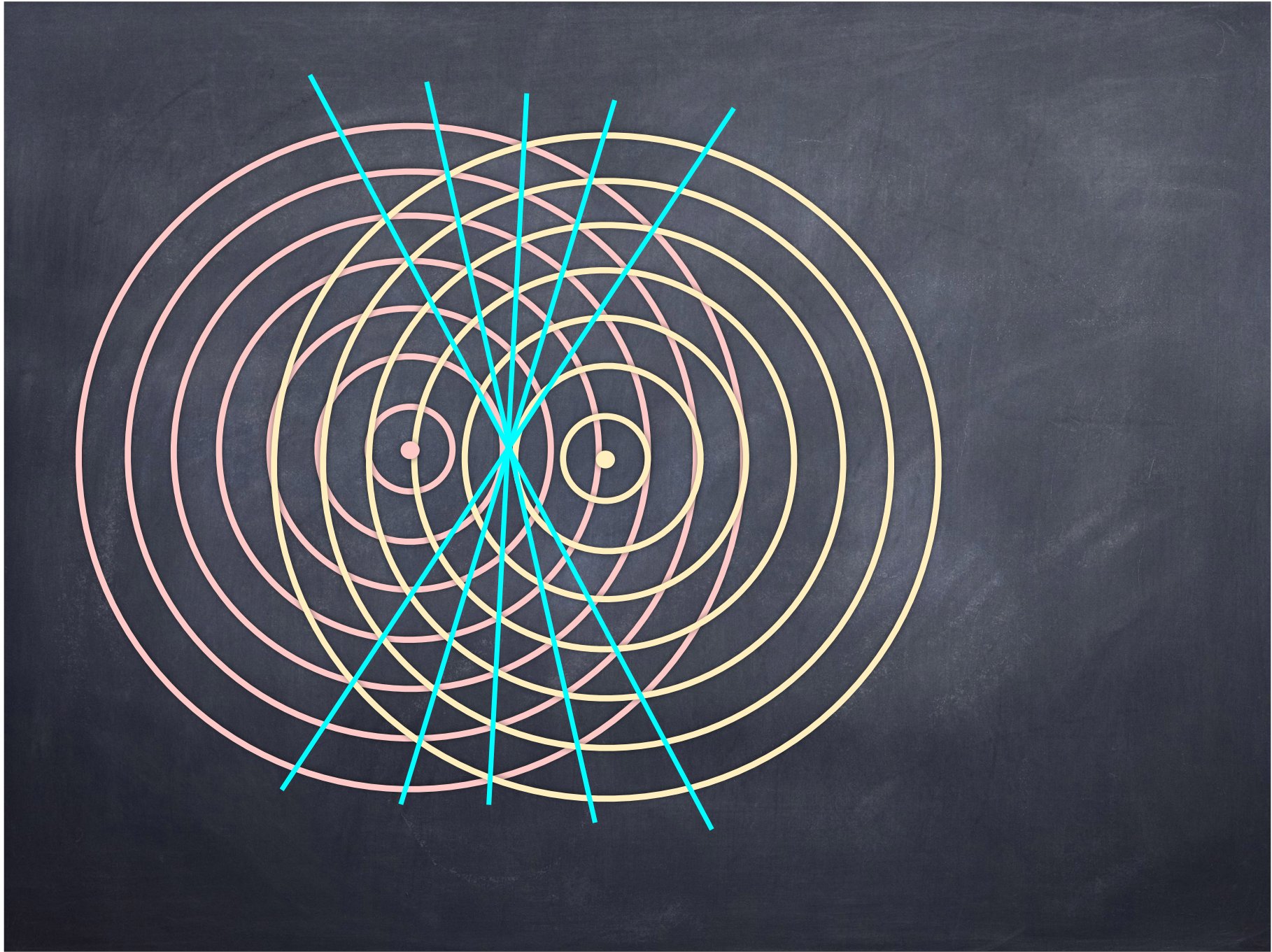




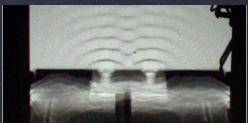
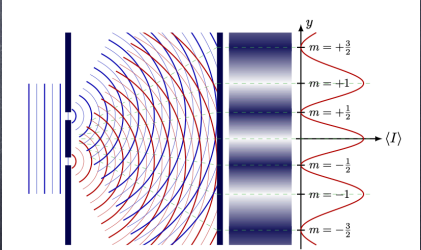
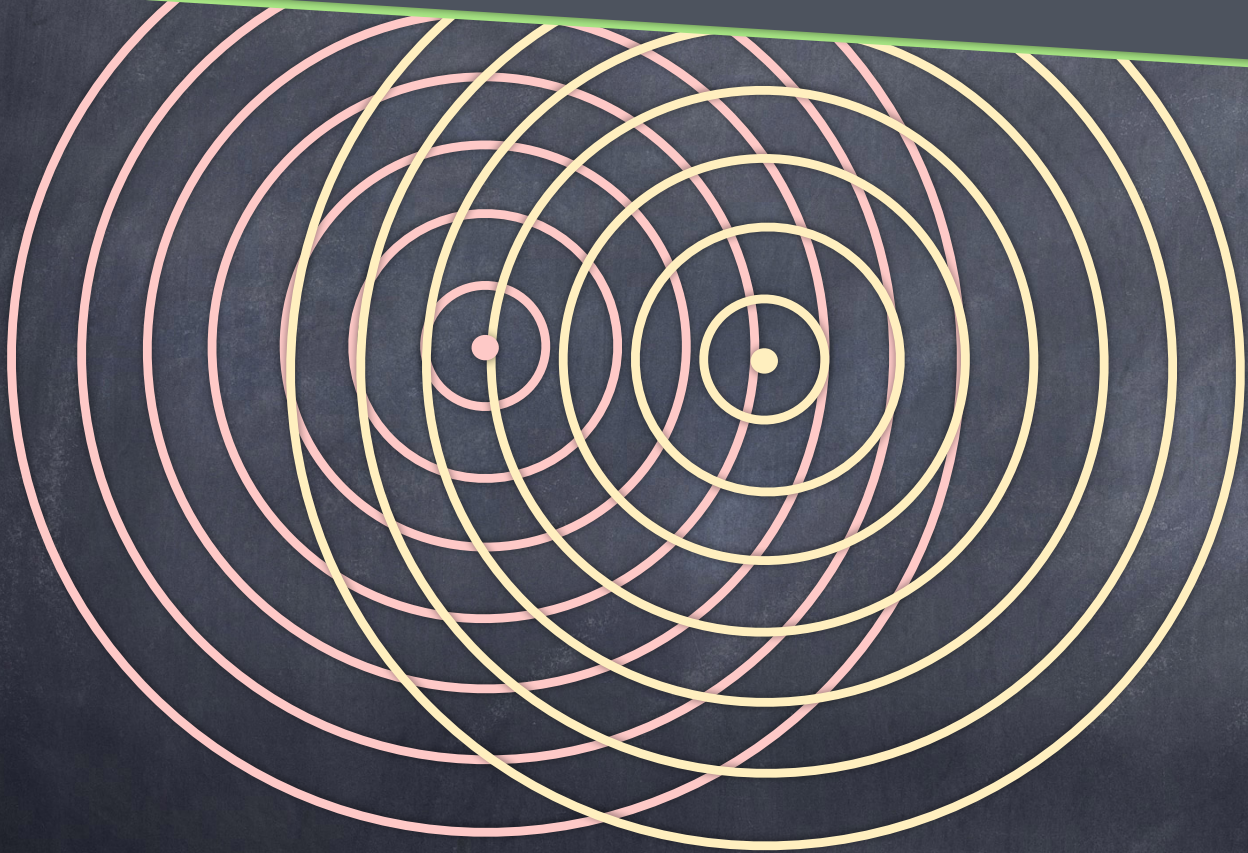




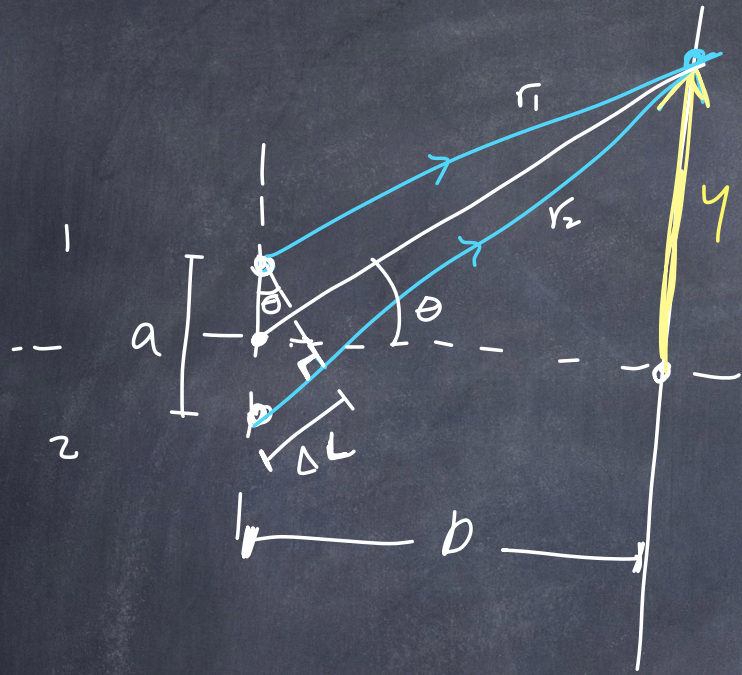








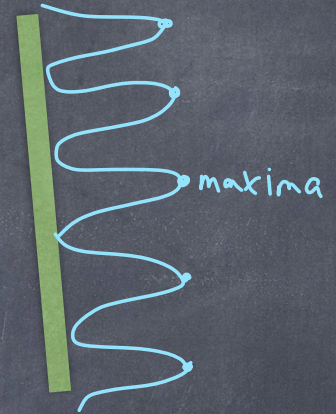
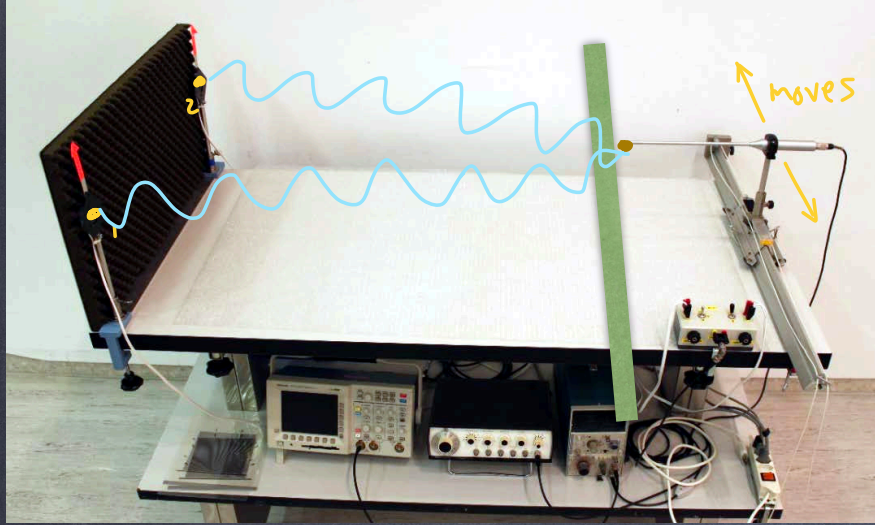




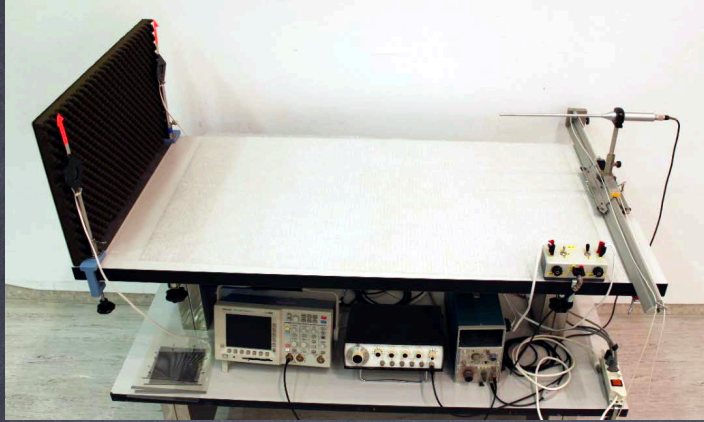


2  
Sources

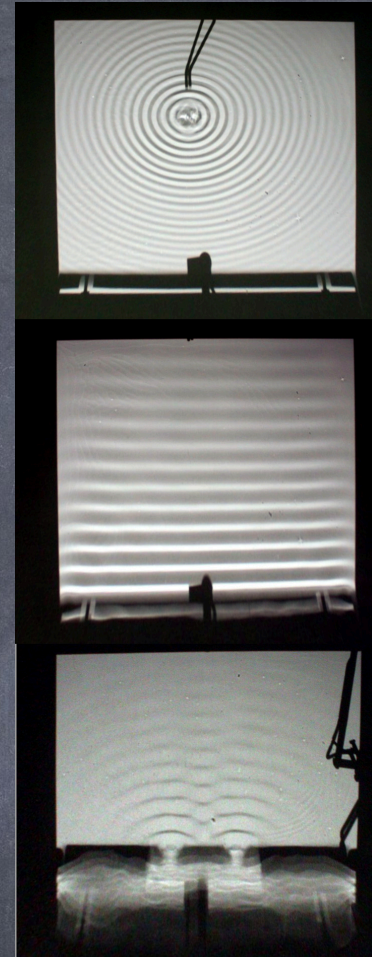
1  
receiver







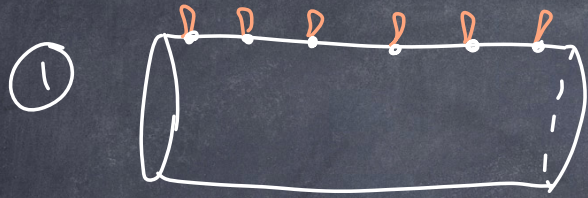
W110



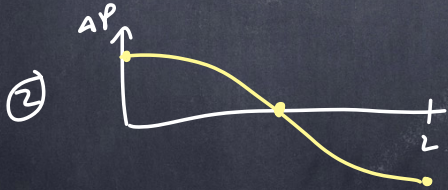
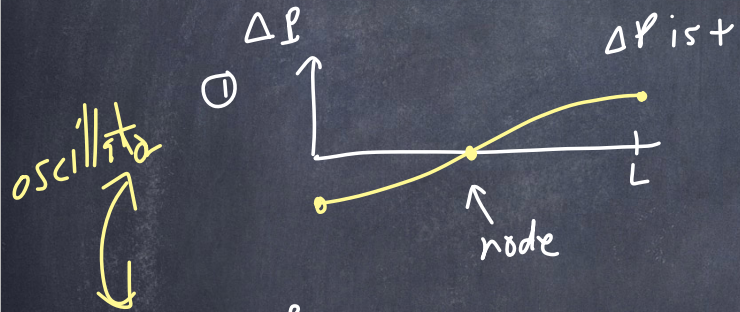
W108



# Ruben's flame tube



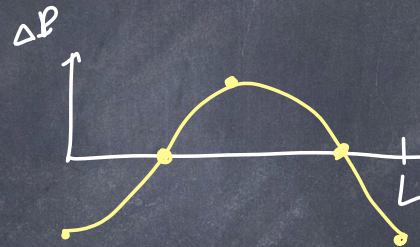
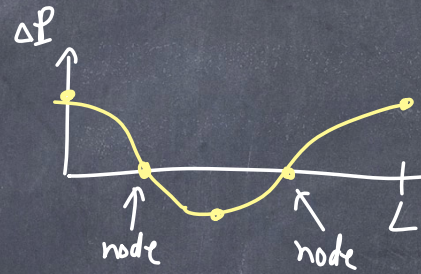
$n=1$



① → ② → ① ...



$n=2$





For quiet sounds,  $\Delta P$  of the gas  $<$   $P$  of the gas

From Bernoulli's equation, gas flow is proportional to square root of the pressure difference between inside + outside tube.

$$\text{Flow} \sim \sqrt{P_{\text{inside}} - P_{\text{outside}}}$$

(The flow of gas out of the pipe)

$\Delta P_{\text{maximal}}$ , anti-nodes produce lower flames  
(flow rate is lower)

$\Delta P = 0$ , nodes, flow rate is higher

Part of the cycle, pressure is higher than average but part is lower. On average

This is why pressure is higher at nodes:

$$\sqrt{\text{Pressure difference at anti-nodes}} < \sqrt{\text{Pressure at nodes}}$$