

Laser Microphone Demonstration

Materials:

~5 mW visible laser or laser pointer (mounted)

breadboard

mirror

mylar cut into circle & mounted

iris

photodiode, BNC output

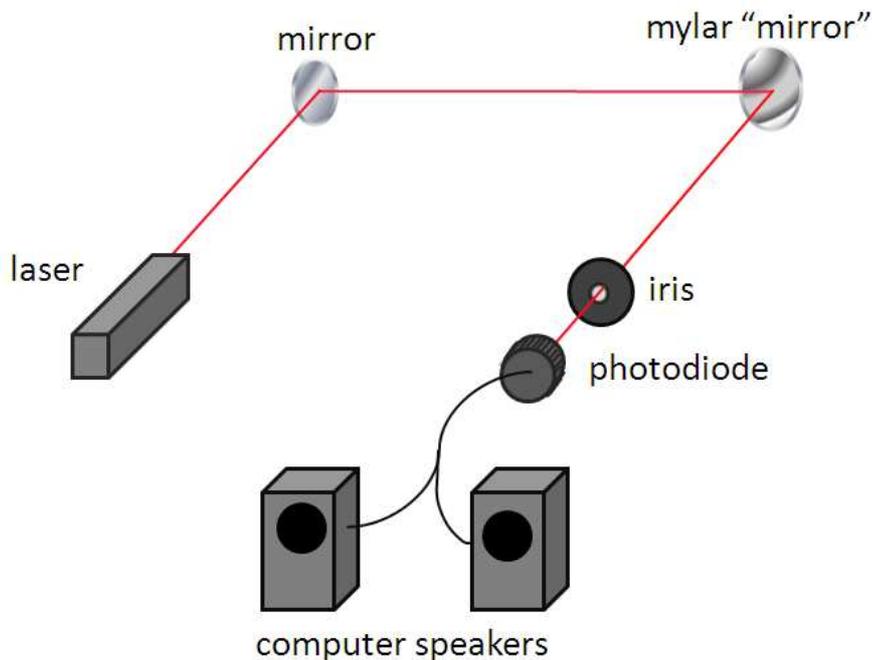
BNC cable

adapter: male BNC connector to female TRS connector (audio jack)

computer speakers

Setup

- 1) Fix laser, mirror, mylar mirror, and photodiode as shown on diagram.
- 2) Use mirror to align laser beam onto photodiode.
- 3) Place the iris very close to the photodiode, so that the edge of the laser beam passes through the center of the aperture.
- 4) Connect the BNC cable to the photodiode output. Connect the adapter to the BNC cable, and connect the speaker cable to the adapter.
- 5) Turn on the speakers and the photodiode if battery powered.
- 6) Speak near the mylar mirror. This should induce vibrations and cause the laser beam to move on the photodiode. If no signal can be heard on the speakers, you may need to use a signal amplifier between the photodiode and the speakers, or use more powerful speakers.



Lecture: What is light? How is laser light special?

With mounted laser turned off, briefly explain...

- 1) Light is important because it allows us to see, and is important for technology, etc.
- 2) Basic properties of light
 - the particle and wave nature of light
 - light travels in straight line
- 3) “Natural” or “regular” light comes from the sun, light bulbs, etc.
 - Polychromatic (made of many colors/wavelengths)
 - Non-coherent (waves are not lined up)
 - Cannot be collimated

If possible, use light bulb and prism or other materials to show the spectrum of visible light.
- 4) Laser light
 - Monochromatic (made of only one color and only one wavelength)
 - Coherent (the light waves are all synchronized)
 - Can be collimated so that the light all travels in the same direction
- 5) Reflection & refraction, total internal reflection, connection to fiber-optics

Demonstration

- 1) Explain what everything on the table is.
- 2) Turn on speakers.
- 3) Speak near mylar, showing that your voice is amplified on the speakers.
- 4) Block the laser and speak near the mylar. Show that your voice is no longer amplified on the speakers.
- 5) Describe that the laser light is moving with the frequency of your voice, causing the electrical signal from the photodiode to also change with the same frequency.
- 6) Describe the connection to the “listening” end of a telephone conversation.