

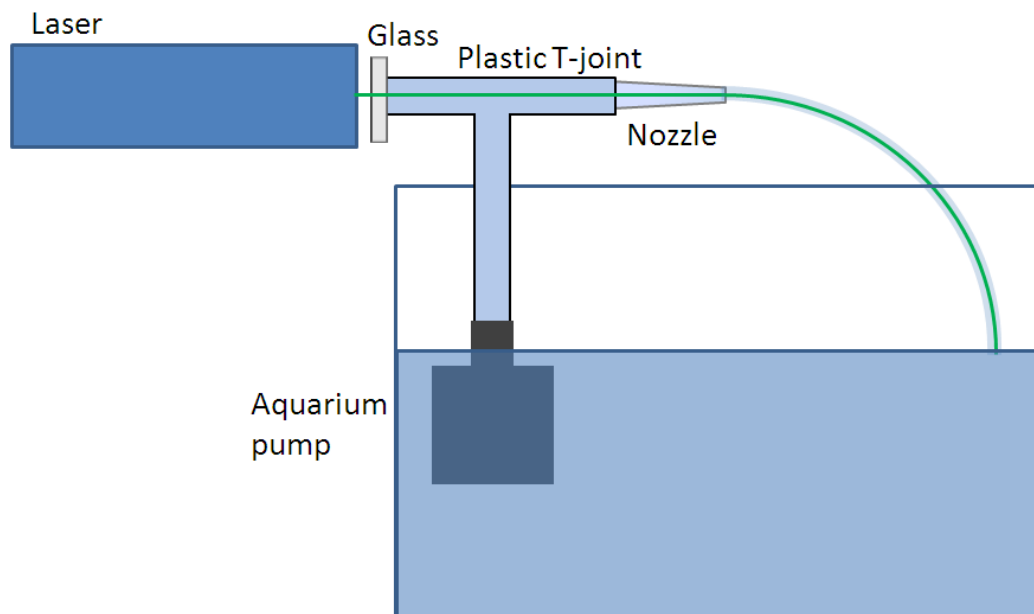
# Laser Fountain Demonstration

## Materials:

~5 mW visible laser or laser pointer (mounted)  
Additional laser pointer  
Water tank or small aquarium  
Small aquarium pump  
Plastic nozzle  
Plastic T-joint  
Epoxy/glue  
Glass slide

## Assembly

- 1) Glue or epoxy the glass piece to one end of the t-joint.
- 2) Put the bottom end of the plastic t-joint into aquarium pump.
- 3) Put the nozzle into the other end of the t-joint.
- 4) Mount the pump and attached t-joint to the aquarium.
- 5) Mount the laser so that it passes undisturbed through the plastic and nozzle.
- 6) Fill the tank with water.
- 7) Turn on the pump.
- 8) If properly aligned, the laser light should stay trapped inside the water.



## **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

## **Demonstration**

- 1) Explain what everything on the table is.
- 2) Total internal reflection – show laser pointer inside water tank. Relate to particle nature of light.
- 3) Turn on mounted laser. Show laser light staying inside water.
- 4) Move t-joint aside a little bit so that laser transmits through the air. Again, replace t-joint so that the laser light remains inside the water.
- 5) Describe that the laser light is totally internally reflecting inside the water stream. The light itself is not bending, but reflecting off the inner surfaces of the water
- 6) Explain that the laser light is totally internally reflecting inside the water. Explain the connection to fiber optic cables for communication applications.
- 7) If permitted, allow the students to approach the fountain and see up-close. This is a good opportunity to emphasize the importance of laser safety.