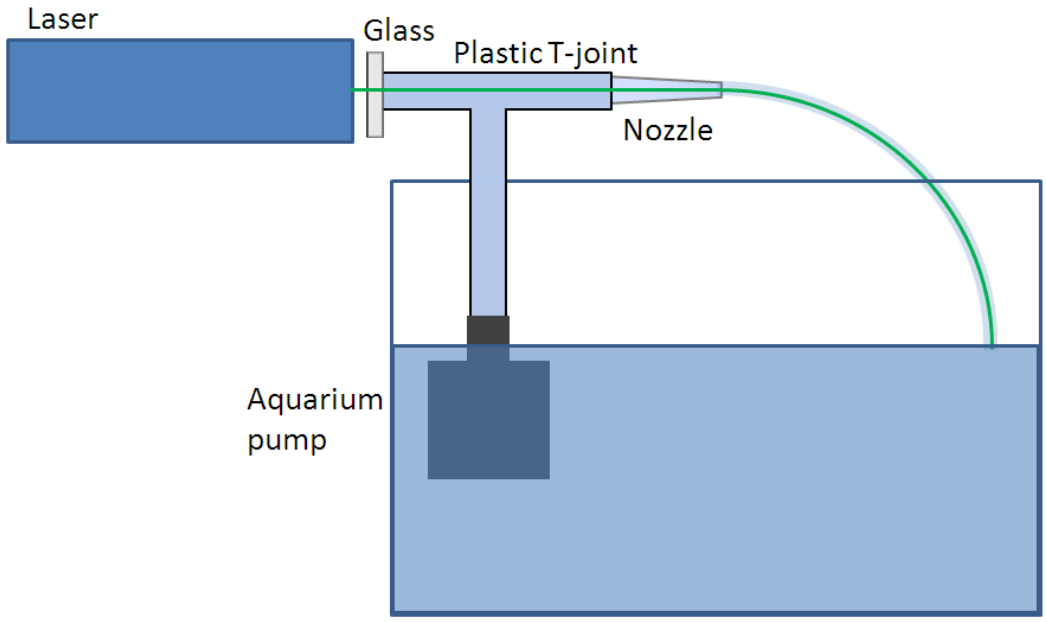
Laser Fountain Demonstration

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 once 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.