LASERS

For ages: 9-13
Should take 5-30 minutes; depending on how many activities you complete.

Safety: when operating lasers use some type of protective eyewear. UV ski goggles or large-framed sunglasses will serve just fine. Do NOT look directly into the laser for extended periods of time.

Laser: **L**ight **A**mplification by **S**timulated **E**mission of **R**adiation. Lasers are very important in the use of many electronics and tools. Use of lasers includes: CD and DVD players, fiber-optics, bar code readers, laser printers, laser pointers, tattoo removal, hair replacement therapy, and eye surgery.

Lasers are also proving useful in nanogold for cancer therapy. While treatments are still in the clinical stages, lasers are used to activate the injected nanogold that surrounds the tumor. Using a near-infrared laser the nanogold particles surrounding the tumor heat up and destroy the cancerous cells. An important feature of a near-infrared laser is that it is harmless to healthy body tissue. In this activity we will explore the features of a laser including how a laser works and what makes a laser different from a normal incandescent light bulb in your home.

What you'll need
- Plastic water or soda bottle, without label
- 1 teaspoon cornstarch

- Laser; green, blue or red
- Frosted light blub
- Old CD and/or DVD
- (2) Eye glasses, ask permission first!

Try This!
Note: Lasers from the Dollar Store® work fine with the following activities.

1. Plastic Bottle Beam. Fill up a plastic water or clean soda bottle with water and add a sprinkle of cornstarch. Turn down the lights and turn on the laser, aiming the beam through the bottle.

Do you see the original beam in the bottle?

Can you find the reflection beam and the pass-through beam?

What's going on?

The light is directional; in other words, the light emitted from the laser is very concentrated. Just a small amount of cornstarch can "get in the way" of the path of the laser.

2. Light Bulb Laser. In the dark, aim your laser at a frosted incandescent light bulb. The bulb will glow and have several internal reflections!
What other types of light bulbs work?

Now, shine your beam over the surface of an old CD or DVD. Does it work better with a scratched or smooth surface?

What's going on?

Light emitted from a laser is all of one color; therefore also the same wavelength. In contrast, the light emitted from a regular light bulb in your home covers the entire spectrum (rainbow) and emits light in many directions. Think about it, would a white laser really be able to light up an entire room? When experimenting with the CD you should see between five and 13 reflections off the surface of the CD.

3. Glass and Crystal. Pass the laser beam through several cut-crystal objects, such as wine glasses or clear glass vases.

Is there a difference between clear plastic and glass, smooth or multifaceted (with designs) glass?

3b. Lenses. If you have an old pair of eyeglasses, pop out the lenses and try one or both in the beam to see the various effects. Or if you have two pairs of glasses overlay them and try this experiment. Try one lens, and then try two in line with each other to see if you can change the path of the beam.

Is there are difference in the path of the laser when you use two lenses versus one lens?

What's going on?

The emitted light photons (atoms) are organized; each light photon moves in step with the others. You can explore this property of a laser by seeing what happens when you obstruct and redirect laser light.

References

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