Laser Pointer Safety

Laser pointers are completely safe when properly used as a visual or instructional aid. However, they can cause serious eye damage when used improperly.

The important things to know about laser pointers are:

1. Check the type of laser pointer you are purchasing -- they should not exceed Class 2 (higher classes are 3A and 3B).
2. Do not purchase a laser pointer if it does not have a caution or danger sticker on it identifying its class.
3. Aim the laser pointer only at the presentation screen. Point only at inanimate objects - never at a person or animal regardless of power.
4. Never shine a laser pointer at anyone. Never shine them directly into someone's eyes.
5. Do not aim a laser pointer at a shiny/mirror-like surface. The reflected beam is as hazardous as the direct beam.
6. Permanent eye damage from Class 2 lasers is unlikely, but temporary blindness can be a serious safety hazard.
7. Never allow small children to play with laser pointers.
8. The laser should turn off immediately when the switch is released. Use of a laser pointer with a locking device that keeps the laser beam on is strictly prohibited.

Selecting a Safe Laser Pointer

1) Choose low power lasers (Class 2)

Whenever possible, select a Class 2 laser pointer because of the lower risk of eye damage.

2) Choose red-orange lasers (633 to 650 nm wavelength, choose closer to 635 nm)

The National Institute of Standards and Technology (NIST) researchers found that some green laser pointers can emit harmful levels of infrared radiation. The green laser pointers create green light beam in a three step process. A standard laser diode first generates near infrared light with a wavelength of 808nm, and pumps it into a ND:YVO4 crystal that converts the 808 nm light into infrared with a wavelength of 1064 nm. The 1064 nm light passes into a frequency doubling crystal that emits green light at a wavelength of 532nm finally. In most units, a combination of coatings and filters keeps all the infrared energy confined. But the researchers found that really inexpensive green lasers can lack an infrared filter altogether. One tested unit

was so flawed that it released nine times more infrared energy than green light. Initially, green will appear brighter than red due to the response of the human eye. However, green may actually be too bright and has been found to leave a distracting after-image on the retina, making it difficult to concentrate on the presentation. Safety concerns have been raised about photobiological effects from blue light laser pointers (400-500 nm) and they should be avoided. Due to the eye's sensitivity to green light, and also green lasers carry a risk of IR exposure, green laser pointers should not be used. Only red lasers pointers (633-690 nm) should be used.

3) On/Off Switch

Ensure that the on switch is a momentary contact type that is designed to shut off the pointer when released. Use of laser pointed with a locking device to keep the laser beam on is prohibited.

Identifying Laser Characteristics

Identify a laser's class by reading the FDA warning label. Most red laser pointers are Class 2 and radiate less than 1mW of power. Class 2 lasers are safe if the beam accidentally enters the eye for a short period. The aversion response (blinking or turning the head) is fast enough (0.25 seconds) to prevent injury from the laser exposure. Injuries have occurred when the eye was intentionally exposed for a longer period. Class 3R (called 3a before 2008) emit up to 5mW of power and are capable of damaging the eye with a direct exposure of only a few seconds.

Only use laser pointers that have clear warning labels. Many pointers that do not have warning labels have not had a hazard analysis performed and may be more powerful than expected.

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