

LASER is the acronym for Light Amplification by Stimulated Emission of Radiation. It emits radiation in the infrared, visible light, and ultraviolet regions. Lasers are highly advanced tools that are commonplace in research, healthcare, manufacturing, and construction and present unique hazards that users need to be aware of.

What injuries may occur when working with lasers?

Potential injuries from use of lasers include exposure to the actual beam (e.g., skin burns and blindness) and to the equipment (e.g., shock and electrocution). See Table 1 for the biological effects of light.

Table 1. Biological Effects of Light

Light Range	Eye effects	Skin effects
Ultraviolet C (0.200-0.280 μm)	Photokeratitis	Erythema (sunburn) Skin cancer
Ultraviolet B (0.280-315 μm)	Photokeratitis	Accelerated skin aging Increased pigmentation
Ultraviolet A (0.315-0.400 μm)	Photochemical UV cataract	Pigment darkening Skin burn
Visible (0.400- 0.780 μm)	Photochemical and thermal retinal injury	Photosensitive reactions Skin burn
Infrared A (0.780- 1.400 μm)	Cataract, retinal burns	Skin burn
Infrared B (1.400- 3.00 μm)	Corneal burn Aqueous flare IR cataract	Skin burn
Infrared C (3.00- 1000 μm)	Corneal burn only	Skin burn

Do I have to register my lasers?

All Class 3B and Class 4 lasers at USC must be registered with the Laser Safety Program. Registration forms are available at the following link: <http://adminopsnet.usc.edu/department/environmental-health-safety/laser-safety>.



What I need to know...

- ✓ Follow SOP and beam alignment procedures.
- ✓ Wear appropriate Optical Density (O.D.) eye protection when required.
- ✓ Always position laser beams above or below normal eye levels. Never stare directly into a laser beam.
- ✓ Be aware of non-beam hazards (toxic gases and chemicals, electrical hazards, etc.).
- ✓ Notify the Laser Safety Officer (LSO) when lasers are relocated to another lab.

What documentation is needed for the laser system?

Each laser system needs a Standard Operating Procedure (SOP) that covers set-up/start-up; safe operation; alignment; and emergency preparedness and response (see VI. Control Measures and Safety Programs in OSHA Technical Manual https://www.osha.gov/dts/osta/otm/otm_iii/otm_iii_6.html for more information). All authorized users are required to read and sign the SOP.



Is training necessary?

Yes. All users are required to complete the on-line Laser Safety Training module through TrojanLearn before working with any laser system at the university. Subsequent refresher and/or lab-specific trainings are required as well and are conducted by the Principal Investigator (PI) and/or the LSO.

Additional Information

American National Standards Institute ANSI Z136.1. Contact radsafety@usc.edu for more information.

CFR - Code of Federal Regulations Title 21 PART 1040 Performance Standards for Light-Emitting Products <http://tiny.cc/cfr-title21-part1040>

OSHA Technical Manual Section III: Chapter 6 - Laser Hazards https://www.osha.gov/dts/osta/otm/otm_iii/otm_iii_6.html