

SAFETY-RELATED CONSIDERATIONS WHEN INSTALLING A RESEARCH LASER



LASER BEAM ISOLATION

- * Make sure that the laser is installed in a secure, lockable laboratory. Keep all doors to the laser laboratory locked during laser operation.
- * Cover all windows to the laser laboratory (*including those in doors!*) with opaque materials.
- * Install the laser in an isolated area of the laboratory well away from high-traffic areas and doorways. Direct laser beams away from entryways.
- * Avoid having desks and/or computer work stations in areas potentially impacted by laser radiation. Laser laboratories should be dedicated to laser operations only.
- * Enclose as much of the laser beam as possible. This is easiest when the distance between the laser aperture and the item being irradiated by the beam (the target) is minimized. Good choices for beam enclosure materials are large-bore black polyvinyl chloride tubing and metal (aluminum, steel) painted jet black. Avoid the use of wood and paper, since visible and infrared laser beams above about 1 Watt can present fire hazards.
- * Make sure that the laser beam is always contained within the boundaries of the optical table. Unenclosed laser beams must never be directed across walkways between tables, or through holes in walls to adjacent rooms.
- * Always position the laser beam below the normal eye level of seated personnel. Avoid upwardly-directed beams!!!!
- * All optical components used with the laser must be properly secured to the optical table to prevent their inadvertent movement, and the resultant loss of control of the beam, during laser operation.

LASER WARNING SYSTEMS/SIGNS

- * Make sure that the laser control panel/power supply is situated such that the activation warning light is visible to personnel entering the vicinity of the laser (especially for invisible beams!).
- * In some circumstances (such as when a very high power laser is operating in an open-beam configuration), it may be appropriate to install warning lights outside of the laser laboratory to alert those entering of potential hazards therein. In some cases audible warnings (alarms) are useful.





- * Post adequate laser warning signs on all access doors to rooms in which lasers are used to alert those entering of the presence of the lasers and the possible need for eye protection. Include information such as the type (Nd:YAG, argon, etc.) and class (3b or 4) of laser used, and specific precautions related to the laser operated (such as "invisible beam", etc.). Laser warning signs are available free of charge from EH&S (call Rick Mannix at 949-824-6098).

CONTROL OF NON-BEAM HAZARDS

- * Make sure that the installation, maintenance and service of high voltage power supplies are only performed by personnel with a great deal of experience in those operations. Personnel trained in CPR should always be nearby during such operations.
- * Be cognizant of non-beam hazards attendant to the use of certain lasers:

<u>Type of Laser</u>	<u>Hazard</u>	<u>Control Measure</u>
Excimer	Toxic gases	Gas cabinet, increased ventilation
Dye laser	Toxic dyes and solvents	Fume hood for mixing dyes; proper attire
Lasers >1 Watt	Fire	Fire retardant materials
Laser power density > 10 W/cm ²	Laser generated air contaminants	Local exhaust, respirators
Arc lamp lasers	Explosion	Suitable housings
All	Ergonomic problems	Properly designed work stations
Some pulsed lasers	Noise	Wear earplugs or muffs

BEFORE OPERATING THE LASER, MAKE SURE THAT:

-  **You have been properly trained in laser safety, and are well versed in the specific laser procedures to be performed. If you have any doubts, *immediately* seek assistance.**
-  **You have prepared written standard operating procedures for laser startup, alignment, etc., in order to prevent accidents due to forgetting key safety-related steps in the procedures due to haste, fatigue, etc. In some cases, the procedures specified in the laser manuals will suffice.**
-  **You have adequate protective eyewear, if needed (open-beam lasers). Contact Rick Mannix of EH&S at 949-824-6098 if you need assistance in eyewear selection.**
-  **You have been authorized by your supervisor to do the work.**



If you have any questions or concerns regarding laser safety, contact Rick Mannix at 949-824-6098 or rcmannix@uci.edu.