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|  | **Department of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  **Standard Operating Procedure for \_\_\_\_LASERS\_\_\_\_\_\_\_** | | |
| **Laser name/class:** | Lasers:  XXXnm, XXXnm, XXXnm, Lasers | **CAS #:** | N/A |
| **Lab Manager** |  | **Building:** |  |
| **Revision Number** |  | **Date:** |  |
| **Revision made by:** |  | **Approved by** |  |

1. **Circumstances of Use:**

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| This Standard Operating Procedure (SOP) outlines requirements to be considered by an authorized user of the XXXXnm, XXXXnm, & XXXXnm lasers as well as describes the normal operation of the laser and any hazards that may be encountered during normal operation. Finally, the SOP explains how to minimize any hazards and how to respond in an emergency situation. This document is to be reviewed one year from the date of approval or as conditions warrant, whichever is the shorter time period. |

1. **Potential Hazards:**

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| A. Laser Hazards: The XXXXnm lasers are Class 3B lasers. Another XXXXXnm laser is a Class 4 laser. Severe eye damage (including blindness) and skin damage can result from direct beam and specular reflections. Eye damage can also result from diffuse reflections.  B. Electrical Hazards: electrical shock or electrocution could result from direct contact with high voltage. Be careful to make sure no liquids are on your gloves or hands when plugging laser power cords into power supply.  C. Chemical: Keep flammable solvents out of beam path. |

1. **Work Practice Controls:**

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| **Lasers**  1.Only authorized personnel will operate lasers.  2.The laboratory doors will be closed when the laser is operating.  3.During alignments, the laboratory doors will be closed and a sign posted stating “**Laser**  **alignment in progress. Do not enter. Eye protection required**.”  4.Unauthorized personnel will be only allowed entry to the laboratory during laser  operation with the supervision of an authorized user under the terms specified by the PI.  5.Laser protective eyewear of OD+ XX for working with XXXXnm, XXXnm, XXXnm are available (specify area where eyewear is available) for every user.  6.Laser protective eyewear must always be worn when the laser is in operation.  7.No filters or other optics will provide suitable protection; use only laser safety protective eyewear with optical density necessary for the output power in use.  PLEASE NOTE: Laser protective eyewear is specific for the wavelength and power output and proper selection is important.  8.Specular and diffuse reflections will be controlled using apertures, beam housings and  enclosures, and optics. All of these control methods must be in place during normal  operation.  9.Laser alignment must be performed only by following the steps outlined in the alignment procedure supplement or alignment section.  10.Perform physical surveys to determine if there are stray beams (specular or diffuse)  emanating from each laser and its optics, and then document the beam surveys noting the  location of stray beams and the measures taken to control them.  11.Methods of documentation of survey may be recorded.  12.If the beam path must be changed significantly by relocating the laser or optics, all users must be notified of the change.  13.The same precautions that are taken for safe operation of the laser must also be followed when adjusting any of the optics in use with the apparatus.  14.When a new principal researcher/experimenter takes over use of the laser system, the new user must conduct a survey for unwanted stray or diffuse beams.  **B. Electrical**  1.Enclosures for protection against the high voltages of the laser power supply or laser head may only be removed after the power supply has been unplugged from the outlets and after following the safety procedures outlined in the safety and operations manual provided by the manufacturer.  2.Only qualified personnel may perform all internal maintenance to the laser and more than one user must be present when performing said maintenance.  3.Every portion of the electrical system, including the printed circuit cards, should be assumed to be at dangerous voltage level.  **C. Chemica**l  1.Always check that any flammable solvent placed under the laser beam does not ignite or combust by referencing the flash point of the chemical and the temperature increase of the chemical under laser exposure. |

**Personal protective equipment (PPE):**

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| OD+ XX laser protective eyewear specific to the wavelength and power of the laser.  Ultraviolet opaque clothing when working around high intensity UV lasers.  Long pants and closed toe shoes. |

1. **Experimental Procedure:**

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| **Normal Operation**   1. Inspect all electrical and water connections for damage and connectivity. 2. Complete the “check-in”. The checklist serves to confirm that all basic systems are operating within expected parameters and that basic safety mechanisms are in place. 3. The laser run log is a set of forms adjacent to the Standard Operating Procedure experimental set up and is used to ascertain the current state of the laser. 4. Log all use and add individual notes as necessary. 5. Also, replacement of optics and other routine maintenance should be noted in the log. 6. Once the checklist is complete, the laser may be turned on. 7. Turn laser system on.   **System Alignment**   1. See the attached alignment procedure supplement/alignment section for details.   **System Shutdown**   1. After a run is finished, complete the log entry and the checkout portion of the checklist in.   **Emergency Procedures**   1. Laser accidents: Follow the steps outlined in the Procedure for Laser Accidents. 2. Power outage: If there is a power outage, turn off the laser to avoid a hazardous situation when power is restored |

1. **Waste Disposal:**

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| [Waste Policies & Programs](https://ehs.ucf.edu/hazardous-waste) |

1. **Exposures/Unintended contact:**

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| Contact Environmental Health and Safety at (407) 823-6333 for medical advice on occupational chemical exposures. For an actual chemical exposure, complete the work-related injury or illness report found at: [EH&S, Workplace Safety, Accident Investigation Form](http://www.ehs.ucf.edu). |

1. **Spill Procedure:**

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| * Follow procedures outlined in Laboratory Safety Manual. |

1. **Training of personnel:**

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| 1. **Authorized Personnel:** The XXXXnm lasers may be operated only by authorized personnel who are fully cognizant of all safety issues involved in the operation of such a device. These personnel are to ensure that the laser is only operated in the manner laid out in this document. 2. **To become an authorized user, one must:**   1. Successfully complete EHS 309 online laser safety training.  2. Obtain a baseline ophthalmologic examination (considered optional by ANSI Z136.1)  3. Read and fully understand the SOP  4. Receive training on the XXXXXnm lasers by an authorized user.  5. Sign and date the authorized user sheet to affirm that the above steps have been completed.  **C. Unauthorized personnel:** No unauthorized personnel may enter during laser operation unless accompanied by an authorized user. All visitors must be briefed on proper safety protocol and must wear appropriate laser protective eyewear located on the premises. |

1. **Training of personnel:**

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| **Documentation of Training** *(signature of all users is required)*  Training records must be in lab for SOP. Training record must state the SOP that the person was trained on and must contain the phrase “I have read and understand the content of this SOP”, followed by the person’s name, signature and date of training.  “I Have Read and Understand the Content of this SOP.” |

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| Name | Signature | Date of Laser Safety Orientation Training | Date of Lab Specific Laser SOP Training |
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