SECTION I. Research Description/Summary

Describe the purpose of the research and outline the application or use of the laser in your research.

The Mai Tai Laser (Spectra physics) is used as a part of the two-photon microscope system to excite fluorophores for imaging purposes. The Mai Tai Laser delivers continuously tunable output from 700 nm to 1020nm with the maximum output power of 2.5 mW (Class 4). The Mai Tai Laser is used in the closed system except for when the laser beam is aligned. Aurora Laser Launch (Prairie Technologies) is also used as a part of the two-photon microscope system to activate light-activatable molecules or proteins. Aurora Laser Launch consists of 405nm solid state laser and 473nm solid state laser with the maximum output power of 50mW (Class 3B). Aurora Laser Launch is used in the closed system.

SECTION II. Hazards

Check and describe the types of hazards associated with the laser system(s) (check all that apply):

Beam Hazards
- Eye and skin hazard from direct beam
  - Keep your eyes out of the plan of the beam
- UV/Blue light exposure

Non-beam Hazards
- Eye and skin hazard from reflected or scattered beam
  - Remove reflective clothing items, jewelry, watch, etc.
  - Avoid reflective tools.
- High-power infrared
- Capacitors
- Compressed gases
- Flammable liquids
- Electrical hazard inside power supply
- Fire
- Chemical
- Hazardous waste
- Tripping/Housekeeping
- Other (specify):

SECTION III. Personal Protection Equipment (PPE)

PPE – Laser Eyewear (List all the types of eyewear available)

<table>
<thead>
<tr>
<th>Make</th>
<th>Model</th>
<th>Wavelength</th>
<th>OD</th>
<th>VLT</th>
<th>Quantity</th>
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<tbody>
<tr>
<td>Spectra Physics</td>
<td>Mai Tai HP 1040</td>
<td>702-1250</td>
<td>6</td>
<td>40%</td>
<td>2</td>
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- Face shield
- Laboratory coat
- Gloves

SECTION III. Engineering & Administrative Controls

Check the method of hazard controls for your laser system in the laboratory (check all that apply):

- Controlled area (curtain, barrier, enclosure, etc.)
- Illuminated warning sign: Do not operate a laser unless the illuminated sign is on.
- Entry control (keycard, key, etc.)
- Alignment procedures: Use the lowest possible power during alignment or adjustment
- Regular safety check
- Visitor/ Observers (specify control measure):
  - No unsupervised visitors are allowed.
- Other (specify):
# SECTION IV. Procedures

Enumerate the steps to be followed in operating the laser systems and the precautions to avoid harm.

## a. Initial preparation of lab environment for normal laser operation:

- i. Verify laser beam path is clear of objects, tools or instruments.
- ii. Ensure that all mounts and optical components are properly secured.
- iii. Restricts access to trained and authorized personnel only.
- iv. Turn ON the laser warning lights. Ensure the sign are illuminated.
- v. Close the laboratory door.

## b. Target area preparation, startup, shutdown procedures:

### Startup procedures:

- i. Turn on the computer to access the laser control system.
- ii. Ensure the shutter is closed during sample preparation.
- iii. Place the sample under the microscope objectives.
- iv. Close the protective barrier and ensure that the enclosures are intact.
- v. Close the shutter via the computer system.

### Shutdown procedures:

- i. Close the shutter (turn off the laser system) via the computer software.
- ii. Open the protective barrier.
- iii. Remove the sample from the microscope.
- iv. Turn off the laser warning light.
- v. Ensure the door is properly closed behind you.

## c. Beam alignment, maintenance, safety test procedures:

- i. Laser alignment can only be carried out by experienced laser worker (Murata, Yasunobu) or by the manufacturers.
- ii. Wear appropriate laser eyewear (by examining proper OD and selecting eyewear for comfort, proper fit)
- iii. Ensure that there are no reflective items under the microscope or the beam path.
- iv. Set the laser intensity and wavelength (800-950nm) at an appropriate value.
- v. Avoid looking directly at the output beam.
- vi. Put a fluorescent target to visualize the center of the beam path.
- vii. Turn off the safety interlock and open the laser shutter.
- viii. Use adjustments on the turning mirror to center the beam.

## d. Emergency procedure:

- i. In the event of emergency, turn off the laser via computer software or enable the key switch.
- ii. Contact your supervisor and LSO immediately.
- iii. In the event of fire or health threatening injuries, call 100.
- iv. For other injuries, call 3-1311 or proceed immediately to the MIT Medical.
- v. Promptly following any incident, ensure PI/supervisor is informed and that the incident is reported to EH&S Radiation Protection Program, 2-3477.

# SECTION V. Emergency Contacts

<table>
<thead>
<tr>
<th>Responsible person/supervisor: Murata, Yasunobu</th>
<th>Phone: (617) 258-6647</th>
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<tbody>
<tr>
<td>Laser Safety Officer: Amy Lim</td>
<td>Phone: (617) 253-5522</td>
</tr>
<tr>
<td>Laser Vendor/Maintenance: Spectra Physics/ Prairie Technology</td>
<td>Phone: (408) 980-4300</td>
</tr>
<tr>
<td>Medical Emergency: MIT Medical</td>
<td>Phone: 617-253-1311</td>
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