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Standard Operating Procedure
for the 145mW, 1550nm Thorlabs Turnkey Laser, NKT
Photonics Koheras BOOSTIK HP 15W Amplifier, and
Covesion WGCO-M-1550-40 Second Harmonic
Generator
in East Bridge B111B

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1. Introduction

This document is the Standard Operating Procedure (SOP) for 145mW, 1550nm Thorlabs Turnkey Laser (ULN15TK), NKT Photonics Koheras BOOSTIK HP 15W Amplifier, and 775 nm light in East Bridge B111B. This laser system is used for the operation of GQuEST related interferometers and filter cavities.

The ULN15TK is a Class 1M, fiber Bragg grating (FBG) laser system with output at 1550nm, with an absolute maximum output of 145mW.

The use of an NKT Photonics Koheras BOOSTIK HP 15W Amplifier will also be used in B111B. This product is a class 4 Laser system; class 4 laser systems are dangerous and has the potential to cause damage and injury.

We will be using up to 10 kW of laser power inside of laser cavities. This light will be contained within vacuum chambers and 10 kW of power cannot be discharged continuously. The vacuum chambers will physically block access to the 10 kW light. This “in cavity power buildup” is fairly standard.

We will be using up to 20 mW of 775 nm light from a Coversion WGC0-M-1550-40 Second Harmonic Generator.

1.1 Room B111

The floor plan of East Bridge B111 is shown in Figure 1. **The grey area indicated by waves is the Nominal Hazard Zone.** The area between the laser safety barrier (curtains) and the entrance door is non-hazard area that is designated for storing and donning laser safety glasses.

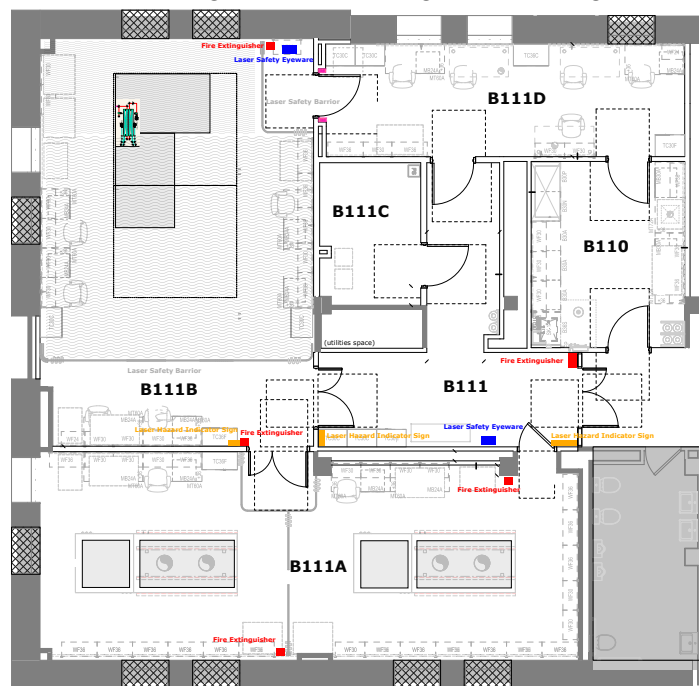


Figure 1. The floor plan for Room B111.

2. Hazards

2.1 Laser Radiation Hazards

All laser light used is infrared and is invisible to the naked eye. The output power of this ULN15TK alone can be operated above the accessible emission limit (AEL) of 9.6 mW at 1550 nm for both eye and skin. With the amplifier in use, the output can be operated at well above the AEL. Extreme caution should be taken when operating the laser with the amplifier. The 775 nm light AEL is 0.56 mW, below the power that is output from the Covesion SHG.

2.2 Electrical Hazards

The system is powered using Thorlabs' DS12 power supply (12 V, 4 A). There are no electrical hazards when operating the laser. The NKT Photonics Koheras BOOSTIK HP 15W Amplifier is powered with a standard wall outlet and the Covesion SHG is not powered but is connected to a temperature controller.

2.3 Fire Hazards

Operating the BOOSTIK amplifier at powers on the order of 10 W has the potential for fire. Ensure the beam is only directed at approved optics equipment or qualified beam dumps. **Check Figure 1 for fire extinguisher location.** Fire extinguisher #21957.

3. Hazard Controls

3.1 Access Controls

There are no active access controls to East Bridge Room B111B.

Access to laser areas requires a key card and physical key.

An interlock may be added.

3.2 Beam Controls

There is a Laser Enable PushButton Switch that be used to shutter the laser. The laser will remain on at all times to increase the operating life length of the laser.

3.3 Laser Interlock

The ULN15TK is equipped with a remote interlock connector located on the rear panel. In order to enable the laser, a short circuit must be applied across the terminals of the Remote Interlock connector. This connection is made available to allow the user to connect a remotely actuated switch to the connector. All units shipped from Thorlabs are configured with a shorting device installed in the interlock connector. This device can be removed, and a 2.5 mm mono jack can be installed to provide remote interlock connectivity.

A safety door switch circuit is connected to the LEMO interlock connector of the BOOSTIK HP system. The door switch circuit is part of the system's interlock circuit and connected to the BOOSTIK HP

amplifier through an External bus connection from the seed laser. Refer to the ADJUSTIK or ACOUSTIK product guides for specific information on connecting a safety door switch to either device. This interlock must be CLOSED for emission to be permitted.

3.4 Safety Sign

A laser hazard indicator sign is located at the outside of the room. Whenever there is a possibility to use the laser beam for a task, this sign should be turned on by a switch next to the entrance door.

3.5 Laser Safety Eyewear

The use of laser safety eyewear is mandatory whenever the laser power supply is energized. If the ULN15TK alone is in use, a minimum optical density (OD) of 2 at 1550 nm is required. When the amplifier is in use, a minimum of OD 4 1550nm is required. 20 mW of 775 nm light will be used, although the maximum Covesion SHG output is 500 mW. Therefore, OD 3 at 775 nm is needed. C2KG5 laser safety goggles will be stored in the entrance area. These goggles have filtering at the following wavelengths:

OD 6+ @530-570nm
OD 4+ @655-664nm
OD 5+ @665-679nm
OD 6+ @680-695nm
OD 7+ @696-1550nm
OD 4+ @1551-2750nm

Always double check the listed filtering on the side of the goggles before entering the laser hazard area.

3.6 Handling of the optical fiber

The laser source output is a PM, FC/APC Bulkhead optical fiber. This will initially be connected to a fiber coupler, where the max output of this fiber is 145 mW. The laser source should be turned off when handling the output fiber. This output will be connect to the BOOSTIK amplifier.

Other optical fibers will be used with up to 15 W. Use extreme caution, ensure 90%+ coupling efficiency into the fiber, and do not adjust open the output of fiber with any power going through the fiber.

4. Training

Users of the ULN15TK laser, BOOSTIK amplifier, and Covesion SHG should have received the Caltech basic laser safety training. They are not permitted to operate the laser by themselves until they have received this training.

5. Operating Procedures

Items such as jewelry and watches should not be worn while manipulating beams on the optical table.

Caution should be exercised when one's head passes through the plane of the laser beam.

Prior to turning on the laser or enabling via the Laser Enable PushButton Switch:

- check the beam path to ensure that there are no reflective objects in the beam path that may unintentionally deflect the beam
- alert any personnel in the room that the laser is about to be operated and ensure that everyone is wearing the appropriate laser safety eyewear
- check that the laser warning sign is illuminated

Prior to turning off the laser, placing the laser in standby or close the shutter:

- scan the optical table for any stray beams and correct the situation as necessary

The laser BOOSTIK amplifier should be turned off before the ULN15TK.

6. Emergency Procedures

In case of an emergency, call x5000.

Follow the emergency response guide.