Laser Operating Procedures for the Physics Laser Room (1-99)

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I. Introduction

This document details the laser operating procedures to be used in the Physics Laser Room (PLR) with regards to safety. Section I describes the facility and equipment to be used. Section III describes the operation of the tests. Section IV describes the laser beam shutter and section V lists the actions required of the laser operators.

II Laser and Equipment

One laser will be used during the whole period of tests: An ADLAS laser capable of delivering 1.4W will be operating at a maximum of 200 mW of optical power in the infra-red ($\lambda = 1.32\,\mu$m). Exceeding the 200 mW limit will irreversibly damage the electro-optic crystal. The operating limit of 200 mW classifies the laser as a class IIIb. The laser light will, in most part be contained in a fiber and the electro-optic crystal and will be exposed to air in small sections. Other equipment in this room will include optical elements (polarizers, mirrors etc), one electro-optic modulator and detector electronics.

Access to the room will be limited and the door will always be closed when the laser is in operation.

III. Operation of the Tests

The tests will be conducted in air and the laser power will always be limited to 1 mW for alignment in order to minimize unnecessary exposure. Also the laser protecting goggles will be worn. After alignment the laser power will increase to between 20 and 200 mW. At this time the operators need not be close to the laser beam and should make only fine adjustments through the remote control equipment. The remote control equipment is only capable of rotating the last polarizer and thus it does not steer the beam. The laser beam will terminate on a photodiode that will monitor its amplitude.

IV. Description of the Laser Beam Shutter

The room door is to be kept closed but **unlocked** while the laser is in operation. The laser beam shutter is always connected to the power outlet interlocked to the door. When the shutter is in the open position the LASER ON warning light will be flashing outside the room. When the shutter is in the off position it completely contains the laser beam. The shutter is power fail safe, i.e. with no power it completely contains the laser beam.

The shutter operation is going to be tested semi-annually. See attachment for the procedures.

IV. Actions Required of Laser Operators

1. Laser operators will have the required laser safety awareness and operator training prior to be allowed in the room while the laser is on.

2. Laser operators will read the present document prior to work in the controlled access area.

3. Laser operators will receive eye examinations through BNL designated physician prior to work in the controlled access area.

4. Laser operators will make their names and life numbers available to the Physics safety group prior to work in the controlled access area.

5. Laser operators will be required to learn the following hazards of laser operation prior to work in the controlled access area:

a. Danger of eye injury from specular reflections of the Class IIIb laser beam from optical components, watches, jewelry, etc.

b. Use of beam stops to safely terminate laser beams.

c. Use of a cover to eliminate any laser exposure due to reflections.

d. Use of laser goggles.

e. Meaning of the laser warning signs.

6. The following checklist will be followed when turning on

a. Verify that the interlock is operating and the laser power is connected to it. WARNING: The power for the laser beam shutter should ONLY be connected to the interlocked power outlet.

b. Verify that laser goggles blocking the 1320 nm line of the laser are available for each occupant of the controlled access area.

c. Verify that all specularly reflecting objects are removed from the hands and wrists of the operators.

d. If the optics have not been aligned, pre-align them using a low power (1 mW) beam.

e. Request laser key from the designated principal laser operator. This key will be held by the principal operator while on the lab site.

f. Insert key into key-switch on laser power supply and turn tube current knob to lowest position.

g. Give a verbal warning to those inside the controlled access area that the laser is to be turned on.

h. Switch laser on. Lasing will commence in approximately 30 seconds.

i. Turn tube current knob until necessary laser output is reached. Use only the minimum power necessary for the operation attempted.

j. Direct the laser beam through the optical element or elements under test by using a beam steering device. Avoid moving the laser head itself.

k. Cover the beam path after alignment whenever possible.

l. If it is necessary to leave the room while the laser is operating, you may do so. The laser beam shutter will block the laser beam the moment the (interlocked) door is opened.

m. Turn laser off immediately after use.