Laser Operating Procedures for the LEAF Laser Room

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I. Introduction

This document details the laser operating procedures to be used in the LEAF laser Room (LLR) with regards to safety. Section II describes the facility and equipment to be used. Section III describes the operation of the tests. Section IV lists the actions required of the operators of the lasers.

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 clasifies 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. A sign with LASER ON warning will always be on display when the laser is in operation:

DANGER

CW Infra-red LASER ON

200 mWATTS max; 1320 nm

AUTHORIZED ENTRANCE ONLY

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 unecessary exposion. Also the laser protecting goggles will be worn. After alignment the exposed area will be covered with a cloth and 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. Actions Required of Laser Operators

1. Laser operators will have the required 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 Chemistry 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 cloth to eliminate any laser exposion due to reflections.

    d. Use of laser goggles; warnings that goggles are being exposed to the beam and may fail.

    e. Meaning of the laser warning signs.

6. The following checklist will be followed when turning on

    a. Place the class IIIb laser sign on the door of the controlled access area.

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

c. Verify that the laser is situated stably.

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

e. Verify that the laser beam, direct and reflected, is contained under the cloth.

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

g. Verify that only knowledgeable laser operators are present in the controlled access area, and that the access door is locked.

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

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

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

k. Insert key into keyswitch on laser power supply and turn tube current knob to lowest position.

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

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

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

o. Cover the beam path after alignment whenever possible.

p. If it is necessary to leave the room while the laser is operating, you need to turn off the laser and exit.

q. Turn laser off immediately after use. Five minutes later remove key from keyswitch on laser power supply and return to principal operator.

a. Remove the class IIIb laser sign from the door of the controlled access area.