

## Laser Safety

Work with lasers and/or in laser designated laser areas in the Department of Physics is in accordance with University Policy Statement [S2/09](#) and the publication by the Committee of Vice Chancellors and Principals "Safety in Universities: Notes of Guidance, part 2:1 Lasers, revised 1992".

The Departmental Laser Supervisor (DLS) is responsible for the supervision and inspection of laser safety procedures for both the East and West Sites of the Department of Physics. See the Statement of Safety Organisation or the relevant Safety Committee lists elsewhere in this handbook for further details.

The DLS must be consulted if any safety procedures concerning lasers are unclear and informed immediately of any accidents/incidents involving such items. All lasers and the personnel working with lasers must be registered with, and authorised by, the DLS prior to such work commencing.

Further details relating to the safe use of lasers within Physics may be found on the Physics Laser Safety homepage <http://www2.physics.ox.ac.uk/laser-safety>

Hierarchy of control measures to prevent personnel being exposed to laser radiation in excess of Maximum Permitted Exposure in order of priority:

- 1) Engineering Controls
- 2) Administrative Controls
- 3) Personal Protective Equipment

### 1) Engineering Controls

Engineering controls are given in Section 6 of the University Policy Statement [S2/09](#) and the publication by the Committee of Vice Chancellors and Principals "Safety in Universities: Notes of Guidance, part 2:1 Lasers, revised 1992" and in the Department of Physics model risk assessment on Lasers.

The DLS should be consulted for further advice on individual experimental configurations.

#### Laser Beam path Design – Good Practice

All lasers, beam steering optics (mirrors etc.) and sample housings (cryostats etc.) must be firmly fixed in position so that the beam cannot be accidentally knocked out of alignment. As far as is reasonably practicable, all laser beams are to be enclosed.

#### Horizontal laser beams

Laser beam paths should be confined to a single horizontal plane below eye level. Your experimental configuration should be based around this design concept. Optical tables must have fitted side screens around their edges in order to prevent laser beams from accidentally leaving the confines of the optical table. Side screens are to extend above beam height and be of a material suitable for absorbing the laser wavelength and power (e.g. matt black painted aluminium).

#### Vertical laser beams

Vertical laser beam configurations (especially periscope type arrangements) present high potential risks to personnel. In recognition of this the Department has designed the necessary components for a periscope system that adheres to good design principals. These periscope components, for use by staff and students, are normally stocked in the main workshop of the Clarendon Laboratory. Please ask the head of the workshop for further details. If it is necessary to construct a periscope that does not use these components you must ensure that your design follows the same good design principals. If in doubt you should consult with the DLS.

All periscope or vertical beam arrangements must be safety inspected by the DLS prior to first use.

The DLS should be consulted for further advice on individual experimental configurations.

## **2) Administrative Controls on Lasers**

### **Lasers brought into the Department of Physics for first use.**

Supervisors of groups or areas where laser work is to be undertaken must inform, and take safety advice from, the DLS whenever a laser is being ordered for use within the Department of Physics.

Any dates of intended visits by laser installation engineers should be given to the DLS as soon as possible. On arrival, the laser is to be registered by the group supervisor with the DLS and placed in the experimental configuration that incorporates all recommended safety features. ***Prior to first use of the laser***, the DLS will inspect safety aspects of the laser experimental configuration.

The DLS will ensure that all laser labelling (Department of Physics registration and BS EN 60825) is correct and that the correct laser documentation and laser door signs appear at the laboratory entrance.

*It should be emphasised that personnel, including laser installation engineers, are not permitted to turn on the laser system until this safety inspection has been completed satisfactorily and the laser registration form signed accordingly by the DLS.*

### **Existing lasers being reinstalled or undergoing significant change to their configuration.**

The DLS must be informed, ***prior to first use***, of any significant changes to the experimental configuration of any laser system. All such changes must be safety inspected by the DLS before work with the system can continue.

### **Ongoing safety procedures in laser areas**

The DLS will inspect the safety of all laser systems annually or sooner if significant changes to the system have been made during that period. The laser registration form will be signed accordingly by the DLS after each inspection.

The group supervisor in conjunction with the DLS will update the information contained on the laser registration forms annually or following significant changes to the experimental system.

### **Administrative Controls on Personnel**

Only registered and authorised personnel that have undergone the following induction screening and training are permitted to work with lasers or within laser areas in the Department of Physics.

#### **Health Screening**

Supervisors must ensure that prior to laser work commencing all potential laser users within their areas complete the Laser Safety and Eye Health Declaration form. Medical advice from the University Occupational Health Service may be obtained where appropriate.

Please note that personnel *not* working with lasers or in designated laser areas within the Department confirm this on the same form.

#### **Induction Training and Information**

Supervisors must ensure that prior to laser work commencing all potential laser users within their areas have:

- a) Attended a laser safety talk given by the Departmental laser Supervisor or the University Safety Office, and
- b) Received and understood the information given in the Department's local rules entitled 'Working Safety with Lasers, and

c) Received and understood all risk assessments for the work.

### **3) Personal Protective Equipment (PPE)**

All filters and equipment used for personal eye protection against laser radiation should be to specification EN207 or to specification EN208 where procedures involve adjustment work on lasers and laser systems.

Additional PPE e.g. gloves, laboratory coats/overalls etc., correct for the laser wavelength and power, should be worn whenever there is risk of damage to the skin e.g. scattered ultraviolet light can cause erythema (sunburn) and cataract formation.

### **Chemistry**

Most laser dyes and saturable absorber chemicals are toxic and the solvents used in their preparation flammable. Supervisors must ensure that adequate risk controls are in place for the storage; use and disposal of such chemicals (see the section on Chemical Safety in this handbook).

All laser dye and saturable absorber premix solutions should be prepared in a fume cupboard with the worker wearing appropriate PPE for the chemical techniques and risks involved i.e. laboratory coat/overall, correct type of gloves to give protection against the chemicals being used and suitable eye/face protection. Disposal of all laser dye and saturable absorber solutions etc. including any such contaminated materials (paper tissues/blue roll etc.) must be made through the University's chemical waste disposal scheme operated by the University Safety Office, 10 Parks Road, Oxford. The instructions and application form to dispose of any unwanted, but identifiable, non-radioactive chemical can be found on the Health and Safety website:

<http://www2.physics.ox.ac.uk/staff/health-and-safety>.

NB. A risk assessment under the Control of Substances Hazardous to Health is required for all work with laser dye and saturable absorber chemicals (see University Policy Statement [S6/14](#) COSHH).

### **Additional Hazards**

#### **Electricity**

High voltages and currents are a common feature in a variety of items of laser equipment e.g. laser heads and power supplies etc.. All work involving repair, modification or building of such equipment can only be undertaken by personnel authorised to do so as detailed in the Department of Physics - Implementation of the Electricity at Work Regulations (1989).

#### **Manual Handling**

Items of laser and associated equipment are often bulky and/or heavy. Ensure that a risk assessment has been completed by a Department of Physics manual handling assessor before any attempts are made to move such equipment (contact Building Services initially for assistance and advice).

#### **Liquid Refrigerants**

Many laser systems use liquid refrigerants for cooling. Information and training in the use and handling of liquid refrigerants in the Department of Physics is available from the Cryogenic Group in the Clarendon Laboratory. A risk assessment will be required for working with liquid refrigerants, contact your supervisor or the Physics Area Safety Officer for details.

**Compressed Gases**

Various compressed gases are used in laser experiments to either supply the lasing medium itself or for use in associated equipment. Advice on the storage and use of compressed gases supplied in cylinders can be obtained from Building Services and the Chemical/COSHH Officer for the Department.. A risk assessment is required for using compressed gases within the Department of Physics, contact your supervisor or the Physics Area Safety Officer for details.