

Laser and High Power Light Source Safety

The Laser Safety Advisors, Tony Kelly, Richard Green and Marc Sorel (School Laser Safety Officer), are available to advise on all matters of safety relating to lasers.

All new users of lasers and high power light sources in the School should register with John Nelson and watch the laser-safety video owned by the University (now on DVD and kept by John Nelson). The laser-safety video should be made available to new users of lasers in the school within 1 week of the new user reporting to the laser-safety officer. The new user then completes the University's laser user registration form (at the end of this document). Records of all laser users are held by the University Radiation Protection Service. Existing users of lasers should view the video at least every 5 years to maintain their awareness of developing safety issues and best practice.

Staff must exercise the strictest control and take all necessary precautions when using lasers and other high power light sources. The necessary precautions are detailed in AURPO publication 'Guidance on the Safe use of Lasers in Education and Research' which can be downloaded from the Laser and Biological Safety section of the School website:

<http://www.gla.ac.uk/schools/engineering/informationforstaff/safety/laser%20and%20biological%20safety/>

Laser classifications have changed in recent years, so make sure you are aware of what power a particular label on a laser tube refers to.

The siting and use of lasers in the School should be discussed with one of the Laser Safety Advisors, and all new laser equipment should be registered with the School Safety Co-ordinator.

Research laboratory areas in which lasers are operating should have appropriate signage and preferably have illuminated warning signs outside them. Where these exist, it is important that these are switched on when the lasers are in operation, and are switched off when the lasers are inoperative.

In general, a laser should not be left operating in an unoccupied room unless an interlock system, which shuts off the laser in the event of an unauthorized entry, is installed.

Appropriate protective eyewear must be provided for each member of a laser group, and must always be readily available.

For laser radiation in the visible and near infra-red regions, the tissue at risk is generally recognized to be the retina of the eye. Your attention is therefore directed to the recommendations laid down in AURPO Guidance No. 7, "on the safe use of lasers in education and research" for maximum exposure of the cornea of the eye to laser radiation.

In view of the exceptionally low maximum values for exposure, the following basic methods of protection must be considered:

a) Complete containment of the laser installation.

- b) Screening of the operator.
- c) Direct protection of the eyes.
- d) Assessment of the installation for safety before the start of operations.
- e) The designation, instruction and medical control of staff for laser work.

Full recommendations for the safe operation of laser systems will be found in the Local Rules on laser safety that comprise the Codes of Practice for individual laboratories, but in brief these include:

Wear and ensure others in the room are wearing safety goggles appropriate to the laser wavelength and power. Wear opaque gloves (e.g. latex) when placing samples in laser beam. N.b. Class 4 lasers are particularly dangerous and so hands (or other parts of the body) should not be placed in their beams.

Ensure the laser warning sign and interlocks are active when the lasers are on.

Ensure all those present are aware of when lasers are on, and their light paths and possible reflecting surfaces.

Remove eyepieces from microscopes where direct or reflected laser light can pass through the objective. Use CCD or CCTV imaging to view substrates instead.

When designing new optical set-ups ensure laser light cannot leave the optical table or breadboard, or be directed towards the door.

When designing new optical set-ups avoid having beams that are angle upwards, towards eyelevel.

When using IR lasers, have an IR viewer and card available to locate beams.

Be aware of electrical safety surrounding the high voltages found on many laser tubes.

When appropriate, ensure laser chillers are on, and functioning efficiently. Keep water away from electrical connections.

LABELLING - See booklet entitled 'Radiation of Laser Products'.

LASER FIBRE OPTIC TRANSMISSION SYSTEMS: Laser products that employ fibre optic transmission shall have cable connections that require a tool for disconnection if the AEL for Class I is exceeded when disconnected and if such cable connections form part of the protective housing.

Consideration should also be given to incorporating mechanical beam attenuators at connectors if servicing is anticipated in an unsupervised area. A length of fibre optic cable may sufficiently attenuate the transmitted laser radiant power such that the length of cable itself forms part of the protective housing.

Checklist:

- Contact John Nelson to Register;
- Read AURPO guidance on safe use of lasers;
- View laser safety video (please return);
- Complete laser safety questionnaire;
- Sign registration form;
- Have supervisor sign form;
- Return form and questionnaire to John Nelson.

Laser Operator Registration Form:

Part A

Surname:

First Name(s):

Date of Birth:

Position (student, RA/staff):

Group/Supervisor:

Class(es) of Laser(s) to be used:

Have you been a designated laser operator in any previous employment/institution?
Yes/no

Have you ever attended a formal course in laser safety?
Yes/no

Part B

Declaration:

I have read and understood the AURPO guidance on the safe use of lasers, viewed the laser safety video and completed the laser safety questionnaire. I agree to abide by local systems of work provided in the laboratory.

Signed:..... Date:

Countersignatures:

Supervisor, laser safety officer, or deputy:

Signed:..... Date:

Laser Safety officer or deputy, process completed:

Signed:..... Date:

Laser Safety Questionnaire.

Name:

Supervisor:

To be completed after viewing laser safety training DVD/video

1: What are the classifications of the two most hazardous lasers?

Ans:

2: What are the main hazards associated with these lasers?

Ans:

3: Why are Class 4 lasers the most hazardous?

Ans:

4: What personal safety measures must be taken when working with high power lasers?

Ans:

5: What other hazards can be present in a laser laboratory environment?

Ans:

6: When working in a laser laboratory, what measures must be taken to ensure the safety of others?

Ans:

7: If there is an accident in the laboratory, what should be done?

Ans:

8: Apart from lasers, what other light sources can be dangerous, and why?

Ans: