**Laser Code of Practice**

Department of Electronic and Electrical Engineering,

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The following rules apply to anyone using laser sources and being present in a room where a laser is being used.

These rules apply to all staff, students and visitors no matter where they are working including work outside of the department.

Anyone observing infringements of these rules must endeavour to report the incident and offending persons to the laser safety officer at the earliest opportunity provided this does not result in any danger to themselves.

1) All items of metallic, or reflective, jewellery, rings, watches, bracelets, etc. must be removed before entering the laboratory. This is to avoid the possibility of a laser beam being reflected into your or someone else's eyes. The items must be placed in a place concealed from the laser such as a lock box, pocket or handbag. It is not sufficient to place them on the optical table. Do not use metallic pens and do not store them in a shirt pocket. You must memorise this rule and follow it at all times. You should not need reminding of this!

2) Any other items on the person which may reflect the laser into someone's eye must be removed or concealed in such a way that there is no possibility of the reflective item being revealed by the cover falling off or by falling out of the concealment. This includes such items as reflective cuff buttons, very long pendant metallic earrings, necklaces, pendants, gold medallions. This also includes the college security card either on a chain or clip which must be removed each time you enter the laboratory.

3) The laser must be switched off while alterations to the experimental set-up are made such as removal of fibre, lenses or mirrors, during which time there is the possibility that a stray beam might be reflected into the eye.

4) Lasers must never be switched on until they are firmly secured to the optical table. No laser must be on when unsecured and all optical components must be fixed securely to a stable surface such as lenses and fibre.

5) Never look directly into a laser beam. Do not align optics or view images by eye looking into the laser beam either directly, or via a mirror or in line with hand held filters or ground glass screens; There is always the possibility that the screen will fall over and the beam will pass straight into the eye.

6) Behave responsibly and use common sense at all times. Do not wave a laser beam through the air and do not enter a laboratory when a laser warning sign is on. It is also important that your eye blink reflex is working correctly when you are working with lasers so do not work with lasers when intoxicated. If you have drunk any alcohol or consumed any other intoxicant or medicine or have an illness you must not use any lasers as your eye blink reflex will be impaired.

7) In the case of a visible laser if a bright reflection is noticed at any time from, for example, the edge of a lens, every attempt should be made to avoid looking at it. For lasers of power 5mW or less, if one uses a piece of paper giving a diffuse reflection to show where the beam path is, take care not to look at the reflected light except with a brief glance. Shiny paper or glossy paper must never be used.

8) Do not work at or bend over to beam height as there is a possibility that the beam will enter your eye.

9) Do not use or work in a room where there is a laser beam unless specifically authorised by the laser safety officer.

10) No one may use a 0.5mW Class II rated laser unless they have been trained, examined and approved by the laser safety officer. Under no conditions should an undergraduate or MSc student be permitted to use a laser with a rating higher than 0.5mW. Users of 0.5mW Class II HeNe 633 nm lasers must wear suitable laser safety spectacles. A minimum of 2 pairs of laser safety spectacles rated for the laser wave length and power must be provided in the laboratory.

11) No-one may use, or be in a room where there is a beam from a 5mW Class IIIb rated laser unless they have been specifically authorised to do so by the laser safety officer. Authorisation will not normally be given unless the person has first proved himself or herself to be responsible in their use of a 0.5mW laser. Users of a 5mW Class IIIb laser are expected to wear suitable spectacles. A minimum of 3 pairs of laser safety spectacles rated for the laser wave length and power must be provided in the laboratory.

12) Infra-red lasers pose a very severe danger as the beam is invisible and may be entering your eye without your knowledge, causing serious damage. Therefore no one may use or be in a room where there is a beam from an infra-red laser unless they have been specifically authorised to do so by the laser safety officer. Authorisation will not normally be given unless the person has first proved himself or herself to be responsible in their use of visible lasers. It is essential that users of infrared lasers always wear suitable goggles when the beam is on. Totally blocking goggles must be provided.

13) Take great care to check that the goggles you are putting on are for the correct wavelength and are of a suitable optical density to provide protection. The safety spectacles for the 0.5mW nominal 633 nm HeNe laser are of a similar colour and shape to those for the 5mW nominal HeNe laser but are slightly lighter in colour. Do not confuse them for it is dangerous to wear the former spectacles with the more powerful laser. Always check the labelling on the laser. These safety spectacles are not suitable for use with infra-red lasers although they can appear to be of a similar colour.

14) On no account should an experiment be set up where the path of the laser is directly towards the entrance door. Images or stray reflections must never fall on the entrance door. A person entering unexpectedly must not stand any chance of getting a laser beam in their eye. This includes children or short people whose eyes may be level with the beam height.

15) In any experiment stray beams must never be allowed to fall onto walls. Every such beam must be blocked by a suitable screen, which will not fall over. The screen must be matt and must be able to absorb the power.

16) All experiments will be designed so that the beam always travels horizontally at a constant height above the floor. Lenses and mirrors can be used to change beam heights but must be used with the utmost care. The mirrors on the must be secured firmly. If at all possible do not use periscopes.

17) The room or enclosure lights will be kept at the brightest possible, which is compatible with the experiment being performed successfully. If they must be dimmed this must be for as short a time as possible and must be raised as soon as possible. This is to ensure that the pupils of the eyes of the personnel present will be as small as possible to avoid a laser inadvertently entering.

18) No one may use any laser until he or she has read and memorised these rules AND has been examined verbally by the laser safety officer and has passed the examination. The laser safety officer reserves the right to ban anyone from using his lasers and may require them to cease work and retake the laser safety examination. If you act in a dangerous fashion you will not be allowed to continue laser experimental work and if your project fails as a result you will only have yourself to blame.

19) Great care must be taken to keep all liquids out of the holes in the optical tables as these are easily damaged.

20) The laboratory must be kept tidy during working and definitely afterwards. The labs must always be left in a clean state. At the end of the project all equipment borrowed from other groups must be returned. The lab area in which you were working must be tidied before submission of your final report for project students.

21) If you break any component you must report this to owner via an e-mail. The same applies it you chip a components such as a lens, neutral density filter or beam-splitter.

23) Never put your fingers onto the surface of any optical component. There should be no fingerprints, grease or dirt on any lens, mirror and fibre. Use powder free and lint free gloves or finger cots if you want to handle components.

24) When you leave an experiment setup with exposed optical components i.e. lenses mirrors etc. cover each of the components with a plastic bag to prevent dust.

25) Read and follow the laser safety guidance given at

<http://www.ucl.ac.uk/estates/safetynet/guidance/lasers/guidance.pdf>

26) Never remove the cover off any laser, especially the Argon\Krypton lasers currently residing in rooms 908 and 910, said lasers are particularly dangerous (class 4). Not only is there the risk of electrocution due to the high voltages and the possibility of a water leak from cooling pipes but the laser beam does not only travel in a horizontal direction within the cavity. At the ends of the laser tube are Brewster windows and at one end one beam travels downwards and at the other end a beam **travels vertically upwards** so if you were to lean over the laser you would be burnt and blinded. If you need to remove the cover of the laser you must first obtain the permission of the laser safety officer. You will only be allowed to remove the cover under the direct supervision of the laser safety officer. After you have removed the cover and adjusted the internal optics safely under supervision the cover must be replaced before use. This work cannot be done alone. Do not allow anyone else to take the cover of the laser off even if they seem confident unless you have the laser safety officer’s specific approval.

27) If you wish change the laser type used in any laboratory i.e Infra-red to Ultra-violate you must obtain the correct laser safety goggles and alter any signs.

28) Lasers must not be left on if the room is left unoccupied even for short periods. The utmost care must be taken to ensure that there is no chance of fire or anyone entering the lab while a laser is on. A sign must be put outside of the door stating lasers are used with the class of laser.

Updated by Andrew Moss – December 2015