THE UNIVERSITY of EDINBURGH
Health & Safety Department

RP COP110: Safe Use of Laser Pointers and Similar Devices

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1 Introduction

Small battery powered lasers are becoming increasingly popular, cheaper and more widely available in the UK; especially with the internet allowing easy access to a global market.

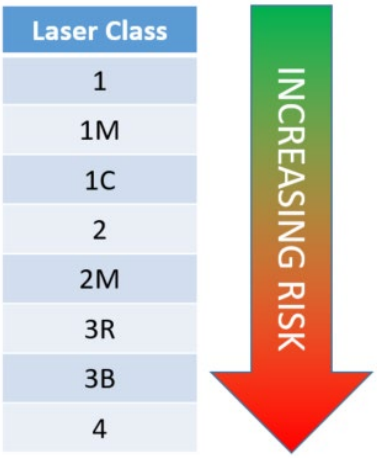
In most cases, these small battery powered lasers are used as laser pointers for presentation or teaching/demonstration purposes. However, there has been an increased use in lasers in products marketed as toys or novelty items. In some cases these are being bought by parents for their children to play with or being bought by teenagers themselves.

Recent studies have shown that there has been a significant increase in eye injuries to children and young people from the misuse of laser pointers[1]. Some cheap lasers bought from overseas suppliers may also be up to 80 times more powerful than the label suggests[2].

This Code of Practice aims to give staff and students more information about laser pointers, why they can be dangerous, how to ensure they and their families use them safely and what the arrangements are for the use of laser pointers at the University.

[1] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3930284/
[2] https://www.rospa.com/home-safety/Advice/Product/Laser-pointers

2 Why are they dangerous?



The British Standard for Laser Safety (BS EN 60825) classifies lasers in 8 classes with Class 1 being the lowest risk and Class 4 the highest risk.

Lasers used in laser pointers should only be Class 1 or Class 2. What this means is that, when used correctly and in line with manufacturer's guidelines, they should not cause harm to those using them.

Class 2 lasers emit radiation in the visible region of the electromagnetic spectrum (400nm to 700nm) so the eye's 'blink reflex' acts as a 'protection' mechanism if the laser is accidentally viewed. If the blink reflex is removed, for example if the eye is held open, then it is possible for the eye to become damaged; even with a laser that has been deemed 'safe' to use.

Some manufacturers, especially those outside the EU, may provide false information about their products to allow them to supply their products to the EU and UK markets; particularly through large online retailers like Amazon or eBay. For example, they may state that their product is a "Powerful 1mW Green Laser" (i.e. within Class 2) when actually the power can be significantly higher. In many cases, the labelling provided by these overseas manufacturers can be false, misleading or even completely non-existent.

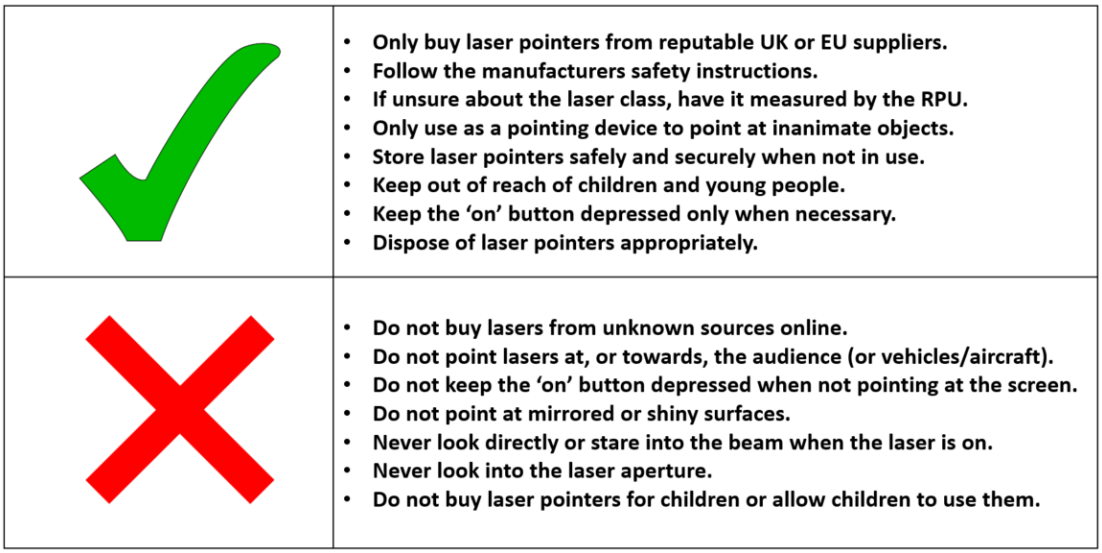
Typically laser pointers are sold as visible lasers with the laser generally emitting red coloured light (630nm – 670nm), green coloured light (532nm) or blue coloured light (around 445nm). The response of the human eye is wavelength dependant and peaks at around 555nm with the response decreasing as you approach the upper and lower wavelengths of the visible region. As a result, the eye can be up to 30 times more responsive to green laser light than red laser light making the green lasers particularly more hazardous at low radiant powers. Viewing green laser light, even on a presentation screen, may leave an unpleasant 'after-image' on the retina.

Some laser pointers may be manufactured as Class 3R laser products. These products, if classed correctly, have a power output up to 5mW which is enough to cause damage even for accidental viewing of the beam. They must not be used as laser pointers at the University.

As well as the points made above, laser pointers can be dangerous particularly because persons, especially children, may not understand the potential dangers from them.

3 How to use them safely

When used correctly, laser pointers can be used safely. The simple graphic below illustrates some key steps that should be followed by all persons when using laser pointers. This is reproduced in Appendix 1 as a larger version.



4 Laser Pointers used at the University

Laser pointers used on University premises should only be Class 1 or Class 2. If these have been bought from a reputable UK supplier, and are labelled appropriately, then a degree of confidence can be applied that they are safe to use if manufacturer's instructions are followed on their safe use.

Hazardous lasers used at the University must first be registered with the Radiation Protection Unit (RPU) and then a risk assessment carried out for their use. Laser pointers which are Class 1 or Class 2 do not need to be registered and their use can be included in the general risk assessment for the area or work.

If you are concerned about whether your laser pointer is safe, the University RPU can measure the power output of most laser pointers safely. Staff may

also wish to have any laser pointers they have at home for personal use checked too. Contact details for the RPU can be found in the 'further information' section of this CoP.

The University RPU can also dispose of Staff members unwanted laser pointers safely though the University's Waste Electrical and Electronic Equipment (WEEE) route.

5 Useful Resources

There are lots of other useful resources for staff and students regarding the safe use of laser pointers and similar devices. These are shown below.

5.1 Laser Pointer Safety Poster

The University has produced a Laser Pointer safety information poster which can be used to highlight the dangers of laser safety pointers. The poster can be downloaded here for display in University areas (e.g. health and safety noticeboards):

http://www.docs.csg.ed.ac.uk/Safety/rpu/signs/Laser_poster.pdf

Thanks go to Imperial College London for the original design.

5.2 Public Health England

Public Health England (PHE) have provided a useful video on the dangers of lasers, particularly laser pointers. See the link below (You Tube):

https://www.youtube.com/watch?v=mOs1i4Wxdh4

PHE are also considered the UK experts in non-ionising radiation safety. Visit their website for further information on laser safety:

https://www.phe-protectionservices.org.uk/nir/

5.3 The Laser Misuse (Vehicles) Act 2018

This act of parliament makes it an offence to shine or direct a laser beam towards a vehicle (including airplanes) or air traffic facility. The maximum penalty is imprisonment for up to 5 years; typically offenders can also face fines of several thousand pounds.

https://www.legislation.gov.uk/ukpga/2018/9/contents/enacted/data.htm

6 Further Information

Further information on laser pointers and other matters relating to ionising and non-ionising radiations can be obtained from the Radiation Protection Unit of the Health and Safety Department. Contact: radiation@ed.ac.uk.

7 Appendix 1: Laser Pointer Safety – Dos & Don'ts

	• Only buy laser pointers from reputable UK or EU suppliers. • Follow the manufacturers safety instructions. • If unsure about the laser class, have it measured by the RPU. • Only use as a pointing device to point at inanimate objects. • Store laser pointers safely and securely when not in use. • Keep out of reach of children and young people. • Keep the 'on' button depressed only when necessary. • Dispose of laser pointers appropriately.
	• Do not buy lasers from unknown sources online. • Do not point lasers at, or towards, the audience (or vehicles/aircraft). • Do not keep the 'on' button depressed when not pointing at the screen. • Do not point at mirrored or shiny surfaces. • Never look directly or stare into the beam when the laser is on. • Never look into the laser aperture. • Do not buy laser pointers for children or allow children to use them.