

Not Rocket Science: A JHU Lab Safety Case Study

LASER SAFETY: CLASS 4 POINTING LASERS

Many “pointing lasers” sold over the Internet are over-powered and dangerous. According to US law, laser pointers must be $< 5\text{mW}$ (Class 3R). Most “pointing lasers” are not properly marked, and some are actually Class 4, the most powerful type.

<http://www.nist.gov/pml/div686/pointer-032013.cfm>

A PhD candidate acquired two such lasers from the lowest-cost source (because of funding restrictions). The lasers were both one-watt Class 4 IR lasers (808 and 980nm). These are some of the most dangerous lasers available because the light is invisible but can still penetrate the cornea and lens of the eye to damage the retina. The lasers were supplied with laser glasses of unknown properties and provenance.

SOLUTION:

Using these lasers would have been an “imminent hazard” to the experimenter and anyone else nearby. These lasers should never have been brought on-campus.

Working with the student, the Laser Safety Advocate (part of the Lab Safety Advocate’s office) designed and built a simple cover and sample mount for the lasers so they could be operated safely, without the need to wear laser eye protection (Applying alternatives from American National Standard Z136.1 para 4.4.2.7.3).

The design of the fixture also improved the ability to control experimental variables. Cost to build the stand in the WSE 3-D printer was \$230, and the stand was available in one day.



RESULTS:

This solution allowed the student to complete his original research safely and in good order over the summer of 2015. Results of this experiment were part of his thesis defense presented in October 2015.

Contact Dr. Dan Kuespert, Laboratory Safety Advocate,
at 410-516-5525 or dkuespert@jhu.edu for
more information about this JHU Safety Note.

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Further, the apparatus could be treated as an inherently-safer Class 1 laser system, permitting the open lab area to be used by others without any eye protection necessary. Finally, the solution enabled the research group to validate their fundamental research hypothesis and justify purchase of a more powerful (and expensive) laser.

LESSONS LEARNED

Do not purchase lasers without consulting the Laser Safety Advocate! Unless you have determined your needs exactly and have highly specialized laser-safety training, you can put yourself and your fellow researchers at risk!

When planning a new experiment using lasers contact the Laser Safety Advocate, Mr. Niel Leon, at 913-302-8500. You and the LSA can work together to develop

- A more controlled experimental set up;
- That will cost less to build and operate; and
- That focuses on an inherently safer design.

If you have an existing experiment, whether it involves lasers or not, the Lab Safety Advocate can assist you to improve its safety, and often, it can be done less expensively and with higher scientific quality. See <http://labsafety.jhu.edu> for further information on laser safety.