

Lessons Learned

Eye Exposure to Specular Reflection

What happened?

A researcher was diagnosing a power loss from a Spectra Physics 3900 Ti-Sapphire (oscillator) that is pumped by a Spectra Physics Millennia eV DPSS laser. During this procedure, they noticed some leakage in the form of a slight green diffuse light being emitted from the end of the metal tube connecting the DPSS pump laser to the Ti-Sapphire laser. The researcher attempted to re-adjust the beam tube to eliminate the leakage to improve the beam tube alignment. As he touched the beam tube, it became dislodged from its mounting, striking the 532 nm laser beam as it fell, causing the laser beam to reflect for a brief moment in many directions until the tube fell completely to the table.

During the moment of reflection, both researchers saw a strong green light coming from the tube and immediately shut their eyes. Both researchers were wearing laser eye protection for the 850 nm wavelength Ti-Sapphire laser, but not for the 532 nm wavelength, which is normally enclosed by the beam tube. Both researchers received eye exams, and fortunately no eye damage was found.

What went right?

- The researchers immediately stopped work after the incident.
- The researchers immediately notified the campus Laser Safety Officer regarding the incident.

What should have been done differently?

- The researcher should have shuttered or turned off the 532 nm beam prior to adjusting the beam tube.

What was the cause of the eye exposure?

The cause of the exposure was the specular reflection of the laser beam off the beam tube when it dropped.

What corrective actions have been taken?

The researchers will replace the two piece beam tube with one that is anodized black and spring loaded. They will verify that it secured/anchored to the pump laser and oscillator. Laser users are to perform and document safety inspections of the laser system prior to each use and verify that engineering control items (beam stops, curbs, barriers, tubes) are in place and secured from movement before turning on the beam.

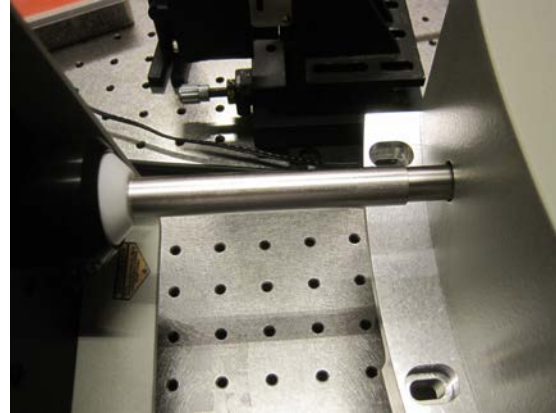


Photo 1 – Beam tube in place between DPSS laser (pump laser) and Ti-Sapphire oscillator (normal position).

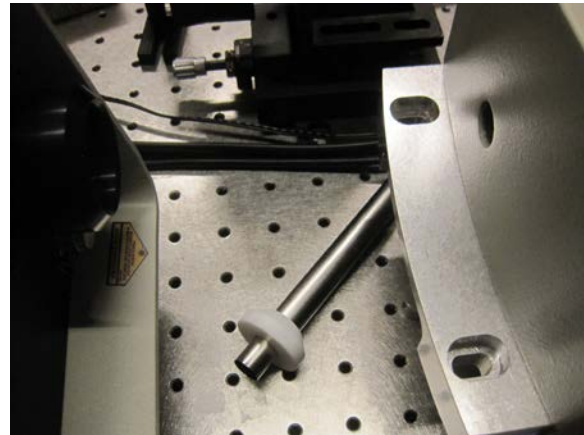


Photo 2 – Beam tube in dropped position

Lessons Learned

How can incidents like this be prevented?

All laser users with similar equipment should examine their laser setups for loose beam tubes and confirm that all equipment is securely mounted.

More information about Laser Safety can be found at the EH&S website ehs.berkeley.edu/laser-safety

For additional assistance, contact EH&S Laser Safety Officer at lso@berkeley.edu or (510) 642-9243