Thorsten Weber

From: Greta Toncheva <gitoncheva@lbl.gov>
Sent: Wednesday, June 6, 2018 7:05 AM
To: GIToncheva@lbl.gov
Subject: laser beam skin exposure

Dear Laser Users,

In the last few months we had two occurrences where misdirecting the laser beam caused hazardous situation.

1. In the first case, a visitor researcher intercepted the beam with a filter at an angle and misdirected the beam toward another researcher across the table. The second researcher reported viewing a brief bright light through his goggles.

   Everyone involved had appropriate for the wavelength and energy laser protective eyewear. No injury was observed. Lessons learned were distributed.

Laser parameters:

- Full parameters: Ti:Sapphire, wavelength 810 nm, energy 1 mJ, pulse duration 220 ps (uncompressed) - 30 fs (compressed), pulse rate 1 kHz.
- Parameters at the moment of event: energy 8 uJ, pulse duration 35 fs, pulse rate 1 kHz.

2. The second recent case involved operating a flip beam block. The researcher reached to remove the block before the laser beam was shuttered. The researcher thought he had communicated with another researcher and understood that the beam was blocked using a shutter, but the communication was not sufficiently clear and the other user had not in fact blocked the beam. This resulted in first-degree skin burn on the back of the hand.

   Everyone involved had appropriate for the wavelength and energy laser protective eyewear. Lessons learned will follow.

Laser parameters:

- Nd:YAG, wavelength 532 nm, energy 6 J, pulse duration 35 ns, single shot, 1 HZ.

In my role as the LBNL laser safety officer, I would like to bring your attention to these cases, remind you about basic safety while working with laser beams and encourage you to implement the following recommendations:

- **Each person must verify for themselves that the state is safe** (using approved IR cards, foam, cameras or other approved method) before taking action, regardless of communication.
- Everyone must at all times be aware of safe and unsafe areas and the configuration of beam blocks and shutters. Everyone must pay full attention to the task on hand.

- When inserting, removing, changing optical elements, or intercepting the beam, **laser beam must be blocked.** Consider installing cameras or other means to confirm beam absence.
- **Do not reach into laser beam path** without being 100% sure that it is safe. Neither with your hand or other body parts, nor with parts of equipment.
- Before enabling the interlock or starting up a laser, or sending any laser beam into any area, one must ensure that all personnel in the area are aware, have appropriate PPE, and that the beam is safely controlled.
- **Communicate your intentions and confirm that it is safe to proceed.** Update the existing procedures to include clear language. Communication is a part of the administrative controls and should be evaluated during the hazard assessment.
- **Consider installing automated/motorized beam blocks, filter holders, and physical indicators** of beam block status when the operations require routine, repetitive inserting/removing of beam blocks or intercepting the beam for diagnostics, and fully enclosing the beam path.
- The operation managers and work leads should revisit the work practices if or when students and/or visitors are allowed to work on new or high power systems.

Here are a few links to examples of motorized and manual filter mounts:

https://www.thorlabs.com/newgrouppage9.cfm?objectgroup_id=1447
https://www.thorlabs.com/newgrouppage9.cfm?objectgroup_id=3962
https://www.newport.com/c/optic-flip-mounts
https://www.thorlabs.com/thorproduct.cfm?partnumber=SWC

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