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Caution – Beam Crossing Ahead

Getting a laser beam from one point to another can be anything but straightforward.

By Ken Barat, LBNL

There are times when a laser beam needs to cross between tables or even go from one room to another. This presents an interesting traffic-flow and safety challenge to both the laser safety officer and laser user. Fortunately it is a challenge that has several solutions

But the simplest solution may not be the best one. For example, the simplest way to get a beam from one optical table to another is just to put a sturdy tube around it. That's a permanent solution, and it completely contains the laser beam. While this is laser safe, there can be egress issues if it blocks a walkway. One comment this author often hears is, "We can just duck under the tube." The fire marshal, as well as the laser safety officer, might have issues with this. Especially in the case of a darkened lab, a blocked walkway can present a hazard of its own.

One good solution is to transport the beam from Point A to Point B through a fiberoptic cable, when that is possible. One should easily be able to run the fiber up and over any walkway or down through a conduit on the floor. An important concern often overlooked with fibers is a label at the termination end indicating disconnection may expose one to laser radiation.

Suppose there's an experiment that is usually confined to a single optical table, but sometimes needs to expand to a second table. It's inconvenient to install a permanent tube between the tables, so some sort of temporary arrangement is desirable. I have often seen people casually lay a beam tube across support arms, and remove it when it's not needed. The problem with this approach is that there's no mechanism to prevent the beam from crossing if somebody's forgotten the tube, or if the tube gets knocked out of place.

A better solution is a mechanism that only allows the beam to cross when the beam protection is in place. A swing shutter, or a guillotine and swing arm, are examples (Figures 1 and 2). Another alternative is a sensor, maybe a little microswitch, that activates a shutter to block the beam path if the beam tube is removed.

Of course, there can be low-power beams that don't really need containment at all. There is no possibility of physical harm should somebody interrupt the beam. Even in these cases, though, the beam interruption is likely to disrupt the experiment. So I always suggest some sort of simple awareness device, like a sign, a swing gate, or a chain across the path.

What about the case of a beam going from one room into the next? Here, the hazard is people in the second room being surprised when the people in the first room turn the laser on. To prevent that, the wise move is to let staff in the second room control beam entry. One approach is a shutter that can only be opened from the second room. A worthwhile safety addition is an illuminated light or LED to indicate shutter status.

In conclusion, when beams need to cross walkways and or enter distant rooms, awareness and beam control are necessary and solutions exist.

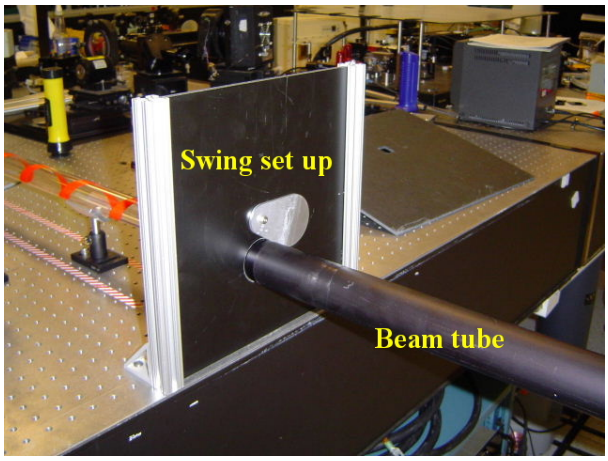

Figure 1. If the beam tube is not in place, the little metal shutter swings down to block the beam (which is traveling left to right in this photo.)

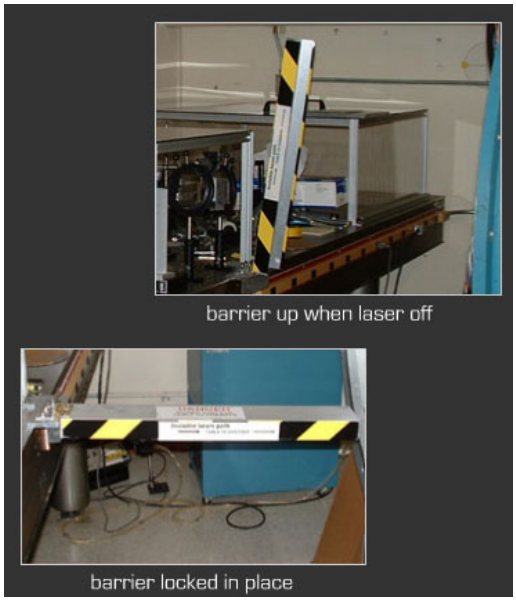

Figure 2. The laser is on the table to the left, and the beam tube is attached to that table with a hinge. When the tube is up, it blocks the beam. When the tube is down, it transports the beam to the adjacent table.

Meet the Author

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