



Laser Safety Lessons Learned

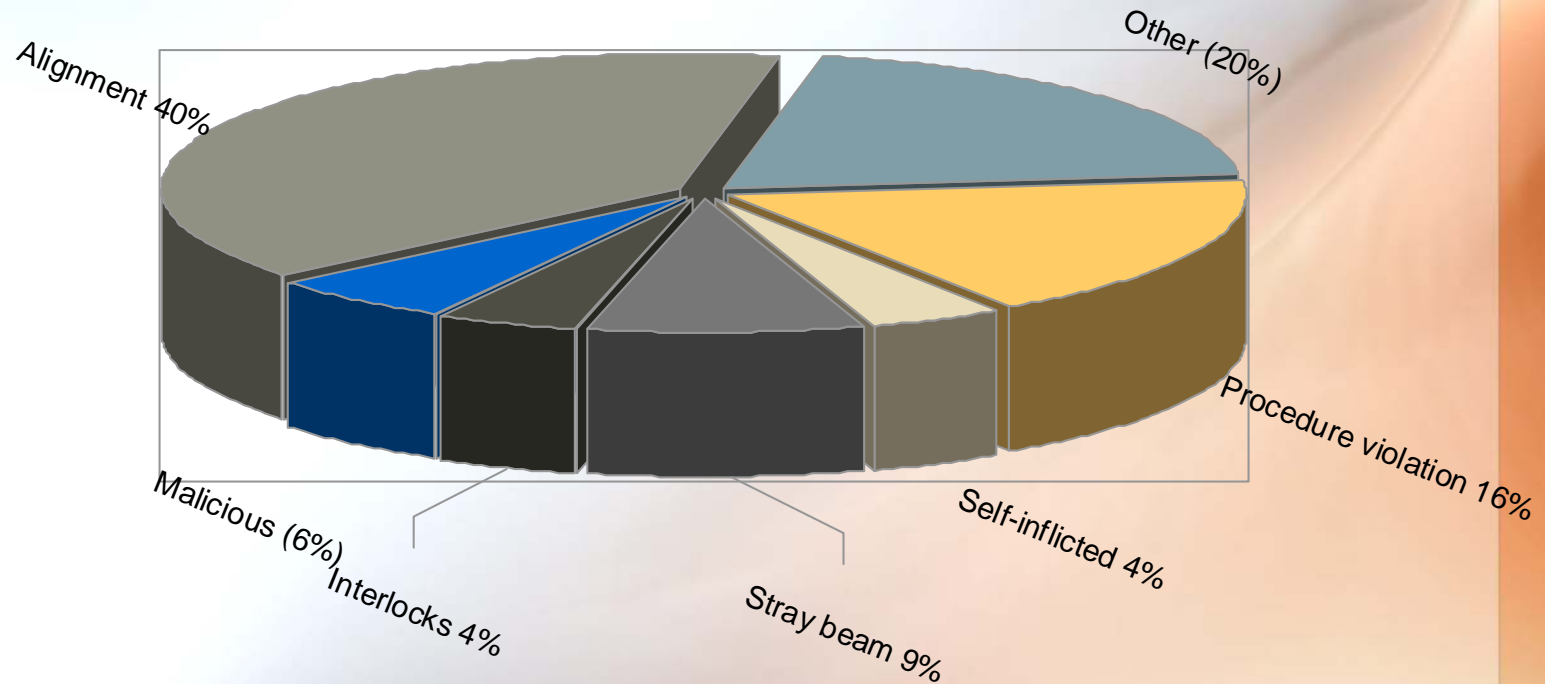
Office of Science
November 19, 2004

Laser Safety Lessons Learned

Chicago Office Safety and Technical Services

**Justin T. Zamirowski
Acting Director**

Laser Safety Lessons Learned



Laser Incidents for DOE and Rockwell Laser Industries, Inc. Data Bases

Laser Safety Lessons Learned

French Experience

- **55 Accidents over 11 years**
 - **39 Exposed to laser beam**
 - All during alignment without laser eyewear
 - 27 permanent eye injury
 - **Accidents either inexperienced person or highly experienced (5-10 yrs working with lasers)**

Laser Safety Lessons Learned

- **National Safety Council**
 - 37.2 % laser accidents alignment
- **Rockwell Laser Industries, Inc**
 - 36.7 % laser accidents alignment
- **DOE**
 - 47 % laser incidents in alignment
 - 64% laser eye injuries from alignment
 - SC 80% laser eye injuries from alignment

Laser Safety Lessons Learned

Office of Science Laser Incidents*

Facility	Date	Event Summary	Individual Involved	Cause
Argonne National Laboratory	September 21, 2004	While aligning the diagnostics by introducing beam onto a table while aligning the optics for an ultrafast Ti:Sapphire class 4 laser (800 nm), an experimenter raised his laser safety eyewear to rub his eye and an undetected beam struck his left eye.	Scientist	The user was not authorized to extract beam onto a table. A Laser Standard Operating Procedure had been submitted, but was still being reviewed. The laser configuration on the table had not been inspected or approved by the Laser Safety Officer and Division Director.
Brookhaven National Laboratory	September 9, 2003	The user was attempting to repeat an alignment procedure while view viewing the beam with an inspection mirror. The graduate student injured the retina of both eyes.	Graduate Student	The user was not wearing laser eyewear. The user was also uncertain of the alignment procedure but proceeded to conduct the alignment for an operation which he did not have authorization or experience.
Lawrence-Berkeley Laboratory	March 14, 2003	A user's eye was struck by a specular reflection of an Nd: YAG laser during alignment.	Graduate Student	The user was not wearing laser eyewear. He was not aware of changes made to optical beam path.
Argonne National Laboratory	October 26,2001	A user's eye was struck by a reflection of a Ti: Sapphire laser during alignment.	Visiting Researcher	The user was not wearing laser eyewear during alignment of the laser system while the system was at full power.
Brookhaven National Laboratory	September 1, 2000	A Class IIIb laser was being Operated without being reviewed or approved.	Scientists	A team of users had set up an Argon Ion laser without review or approval for its operation.
Brookhaven National Laboratory	August 6, 1999	During a DOE Laser Safety Audit a Class IV laser interlock failed when tested.	Scientist	A short in the interlock system was not identified during an interlock test during the previous month.
Argonne National Laboratory	July 27,1999	A Class IIIb He-Ne laser was operating unattended within a Laser Controlled Area without proper interlocks.	Scientist	A Class IIIb laser was substituted for a Class II laser without appropriate interlocks being installed.
Argonne National Laboratory	April 20, 1999	Laser beam reflected during laser welding operation ignited ceiling tiles	Welders	The hazards of the laser welding operation were not fully analyzed.
Brookhaven National Laboratory	April 2, 1999	A laser interlock on a hutch door was defeated by the User to allow opening the door to observe the operation of the laser	Scientist	The user failed to follow the interlock procedure.
Ames Laboratory	November 5, 1997	A Class IIIb laser was found operating unattended in alignment mode in an unsecured area.	Scientist	The users failed to follow procedures established for this laser operation.

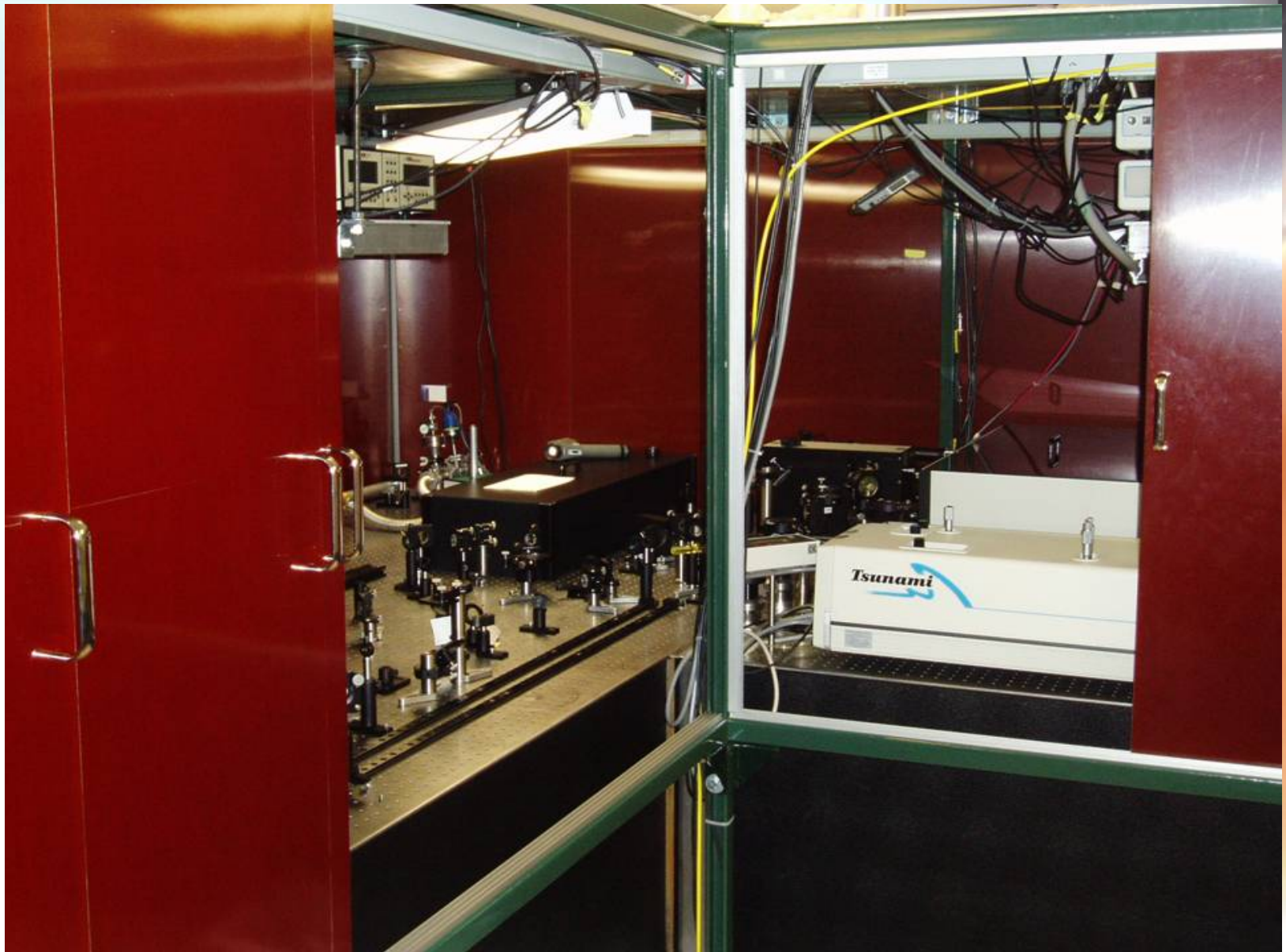
* Incident information obtained from CAIRS and ORPS databases

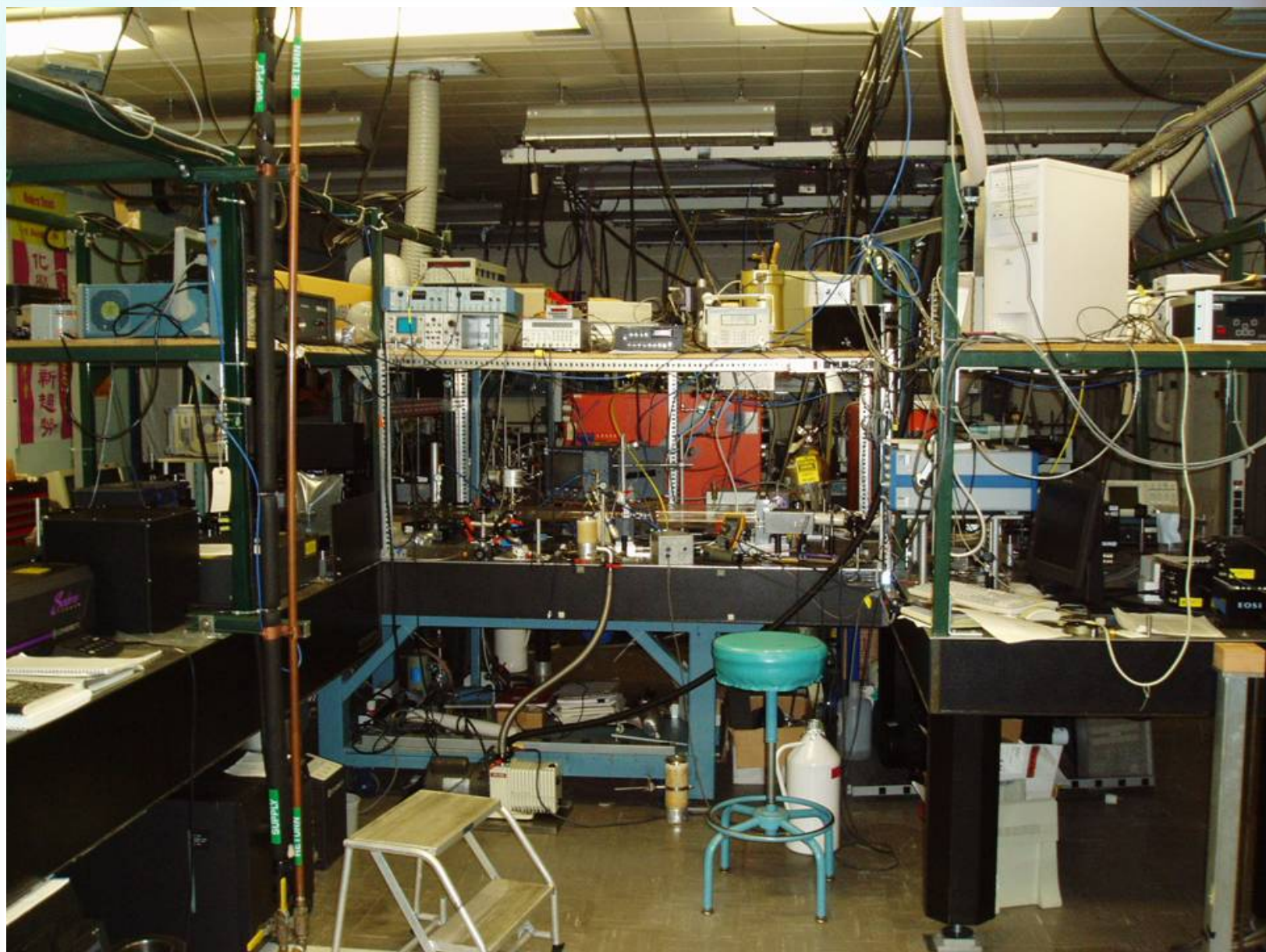
Laser Safety Lessons Learned

- **DOE Experience**
 - 34 incidents 1983 – 2004
 - SC 18 (10 eye injuries from laser strike)
 - Other PSOs 16 (13 eye injuries from laser strike)
 - each has dye splashed into eyes

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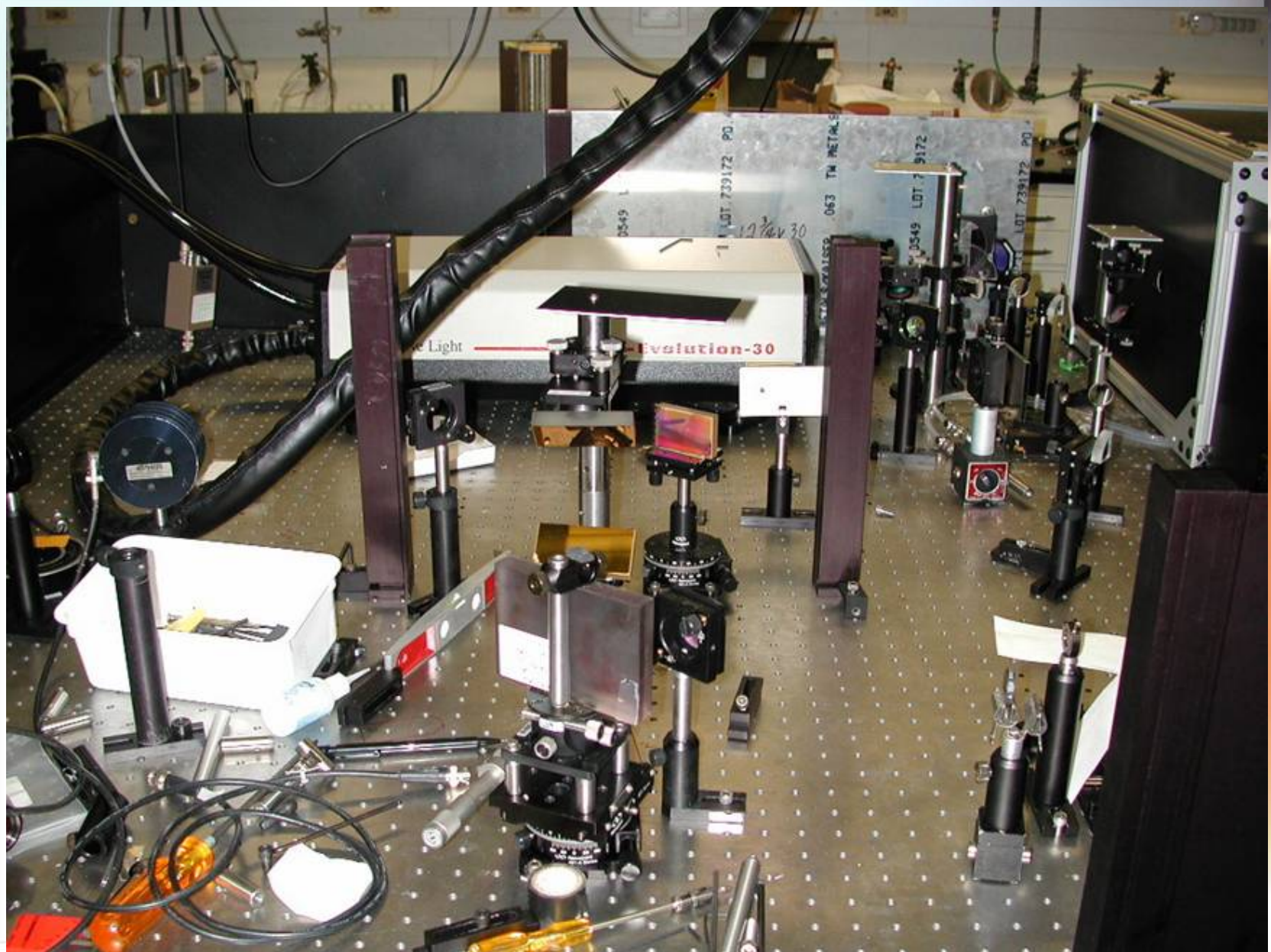














Final Message

- **Proper Laser Eye Protection is imperative!**
- **Know the hazards and appreciate the risks!**
- **Alignment work planning very important.**
- **We have many examples to study.**
- **Never assume!**