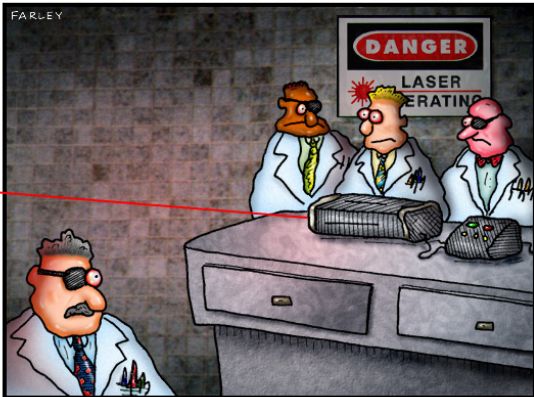


Laser Safety in the Physics 15c Lab

DOCTOR FUN

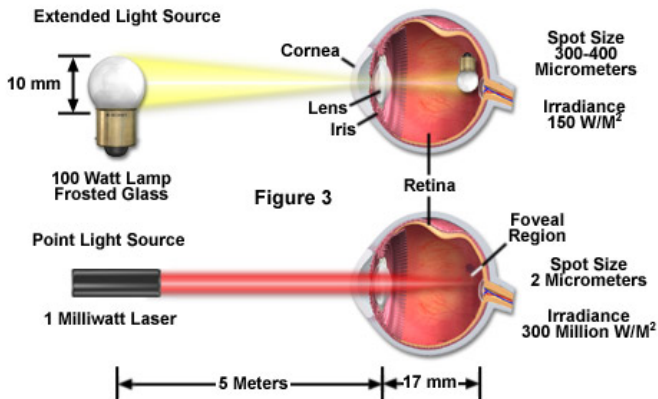
26 June 97



Peer pressure in the laser lab

Small, collimated beams can damage the retina

Extended and Point Source Power Density at the Retina

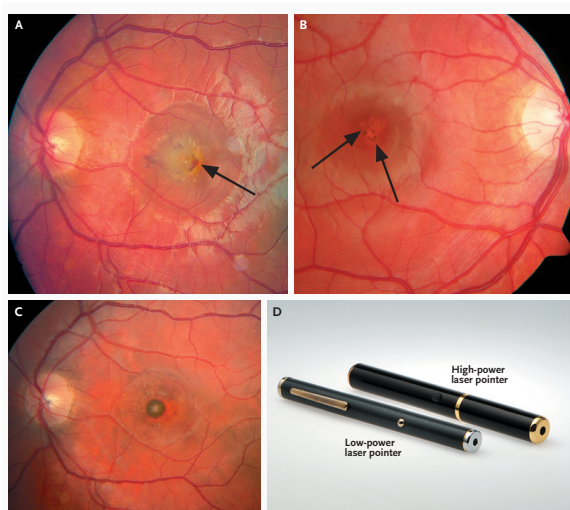


<http://www.microscopyu.com/articles/fluorescence/lasersafety.html>

Small, collimated beams can damage the retina

	total power (W)	angular size (mrad)	intensity on screen (mW/mm ²)	intensity on retina (mW/mm ²)
100 W light bulb @ 1 m	100	60	0.008	0.02
sun viewed from earth	4×10^{26}	9	1	100
10 mW visible laser	0.01	<1	1	30000

Burned retinas cause loss of visual acuity or worse



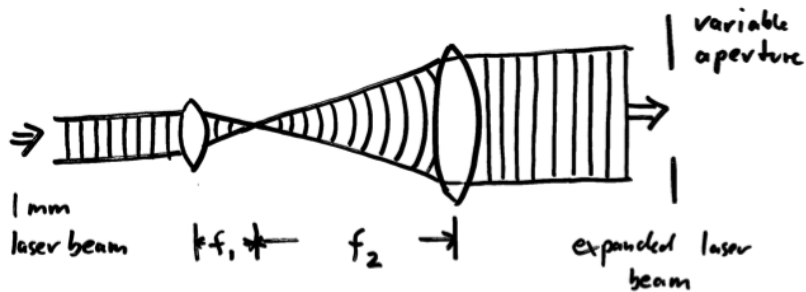
(Wyrsh *et. al.*, *N. Engl. J. Med.* 2010)

Safety classifications: does the blink reflex protect you?

Class	Max power (mW)	Notes
2	1	Visible only
2M	1	Max power in 7 mm spot @ 10 cm
3R	5	

- ▶ Lasers in these categories unlikely to cause injury if not viewed through optical instruments
- ▶ *Higher-power lasers require the use of laser goggles!*

HeNe lasers in this lab: modified to class 2M



- ▶ Neutral density (ND) filters further attenuate intensity

Safety tips

These lasers are relatively safe, but learn good habits:

- ▶ Confine the beam to your table
- ▶ Keep eyes and shiny objects (watches, jewelry) away from beam
- ▶ Block the beam before adding/removing optical components