

# Laser Issues

## About LASER

- Laser

## Injury & Absorption

Retina injury occurs only with **380-1400 nm** wavelengths (where absorption occurs). The highest absorption occurs between the 400-800nm range. According to the power density flux (S), there is a maximum permissible exposure time (seconds) with the beam. A graph depicts this relationship. Exposure longer than this time is considered to cause damage.

$$S = P / (\pi \cdot r^2) \text{ where } S - \text{power flux density (W/m}^2\text{), } P - \text{Power (W), } r - \text{radius of the eye aperture (m)}$$

For example, permissible exposure time for a power flux density of 25 W/m<sup>2</sup> is 0.25s.

Some laser pointers in the market have power flux density up to 5000 W/m<sup>2</sup>. That would give a maximum permissible exposure time of less than 10<sup>-6</sup> seconds.

Green laser is most dangerous, as its not absorbed by the eye, so it causes retinal damage. Blindness! Cause you don't have time to close your eyes in time, and the laser acts very fast. Kids using green lasers can potentially blind pilots in airplanes. Laser could cause thermal damage for example on the skin. The hazard can be reduced by:

1. lowering the aperture, or
2. changing the beam direction

## Links

### Related articles

### External links

### Sources

- Lecture: Physical factors of environment (J. Rameš) 2011

### References

### Bibliography

- BENCKO CHARLES UNIVERSITY, PRAGUE 2004, 270 P, V, et al. *Hygiene and epidemiology. Selected Chapters*. 2nd edition. Prague. 2008. ISBN 9788024607931.

### Further reading