

Beam Diameter (continued)

Gaussian beams, Central irradiance $\neq$ average irradiance

Recall, MPE is determined by averaging the incident power of the beam over an area defined by the limiting aperture of the eye.

Visible Light,
Diameter of a fully dilated pupil is 7mm

Non-Visible Radiation,

Wavelength Range	Exposure Time	Aperture Diameter
180nm to 400nm	1nsec to 250 msec	1.0 mm
180nm to 400nm	250 msec to 28,800 sec	3.5 mm
400nm to 1400nm	1nsec to 28,800 sec	7.0 mm
1400nm to 100 μ m	1nsec to 250 msec	1.0 mm
1400nm to 100 μ m	250 msec to 28,800 sec	3.5 mm
100 μ m to 1000 μ m	1nsec to 28,800 sec	11.0 mm

If the diameter of your Gaussian beam is similar to the limiting aperture for your wavelength, the irradiance can be calculated using a Top-Hat approximation:

$$E_0 = \frac{4 \Phi}{\pi [\max(q, D_f)]^2}$$

where,

Φ is the total radiant power of the beam

q is the beam diameter (1/e points)

D_f is the limiting aperture at the appropriate wavelength