

ACRHEM – Laser Primer

Assignment 3

28-08-09

2 weeks to submit ☺

- For $N(x) = N_0 \exp(-\frac{kx^2}{p^2})$ evaluate -
 - $\int_{-\infty}^{\infty} N(x) dx$
 - $K = \int_0^a N(x) dx$
 - Plot the graph - K vs a
- When you perform the knife-edge experiment the beam waist is calculated as 25%-75% difference. How do you correlate it with the definition of spot size?
- Can you suggest any other method(s) to determine the spot size of a laser? Describe. Compare the accuracy of this method to the knife-edge method.
- A laser beam has a spot size w . What will be the transmitted power if this beam passes through an aperture of radius – (a) w (b) $\frac{\pi w}{2}$ and (c) $\frac{3w}{2}$
- A Gaussian beam of wavelength 800 nm is measured to have a wavefront curvature of 3 m and is known to have a beam waist of 0.75 mm. At that location, how far is the beam from its minimum?
- The beam of an Ar ion laser in TEM₀₀ at $\lambda = 514.5$ nm with an output power of 1 W is sent to a target at a distance of 100 m from the beam waist. If the beam waist is 2mm, calculate the spot size, radius of curvature of the phase front, and energy density at the target position.