

Introduction to Lasers, ECE 520.482

A problem: laser spot on the Moon

The problem is formulated in terms of diffraction theory of Gaussian beams found in the class notes

<http://striky.ece.jhu.edu/~sasha/COURSES/Gauss.diffraction.pdf>

You are given a Gaussian beam with the wavelength λ and of size (radius) a and *plane phase front* at the original point; assume propagation in vacuum.

Find out what is the radius a needed to attain a *minimal* size (radius) ρ_{\min} of that beam at an arbitrary distance z from the original point along the axis of propagation; also, what is ρ_{\min} ? Consider also a specific case of $\lambda = 1 \mu\text{m}$, and $z = 300,000 \text{ km}$, i. e. a laser spot on the Moon.