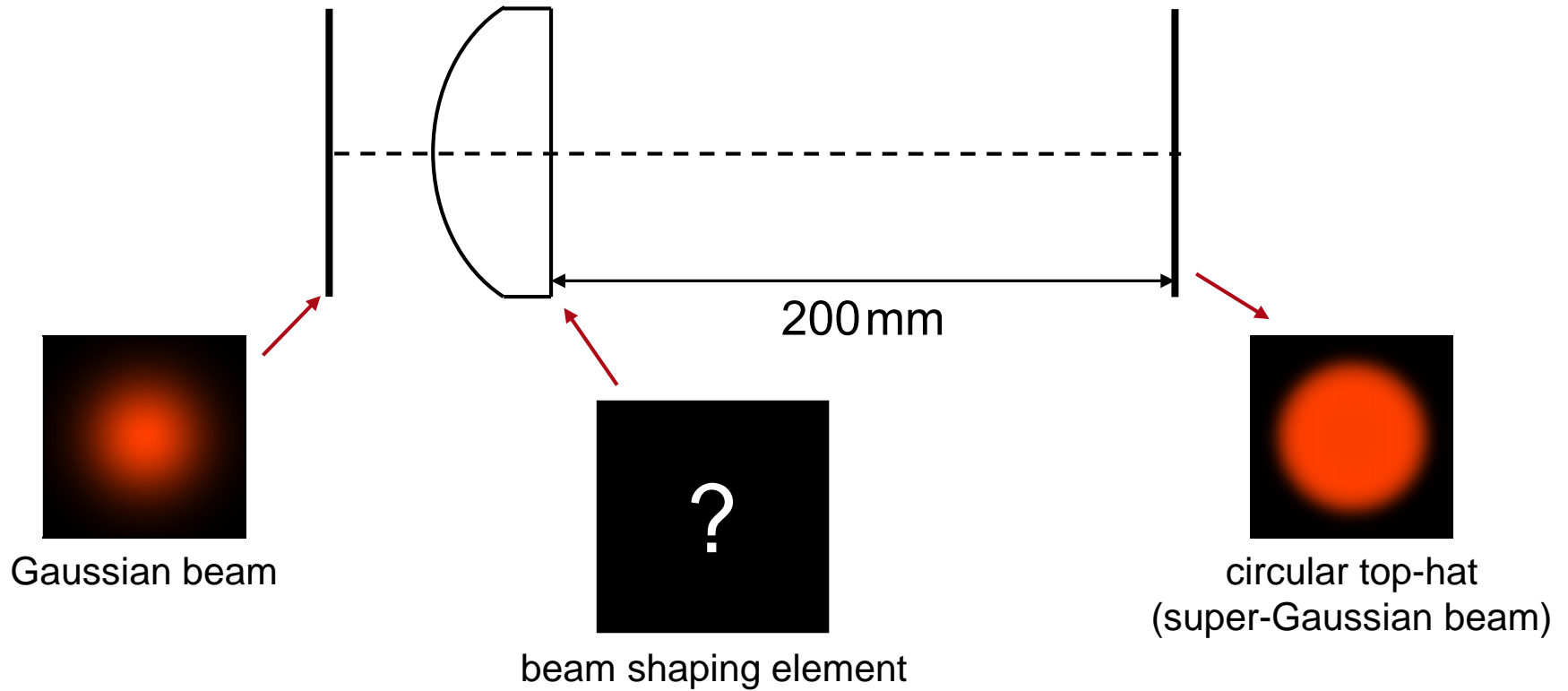


Light Shaping > Refractive Optics

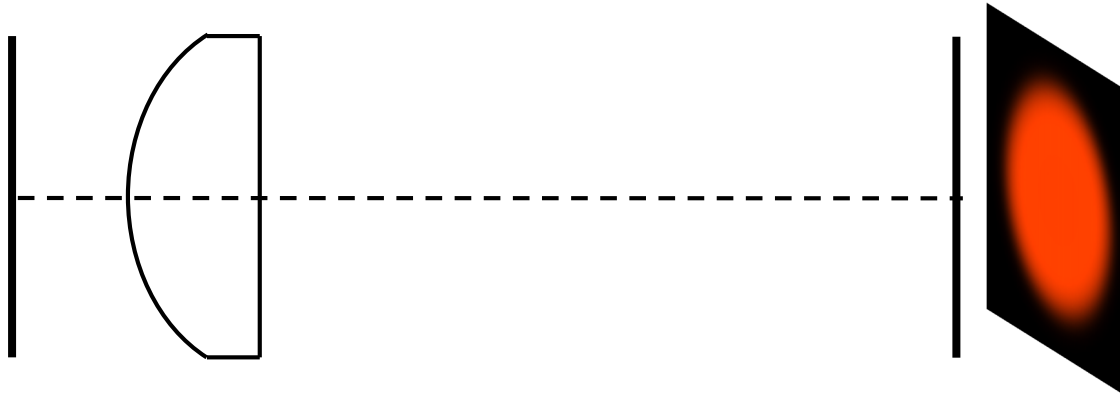
# Design of a Refractive Beam Shaper to Generate a Circular Top-Hat

# Task Illustration



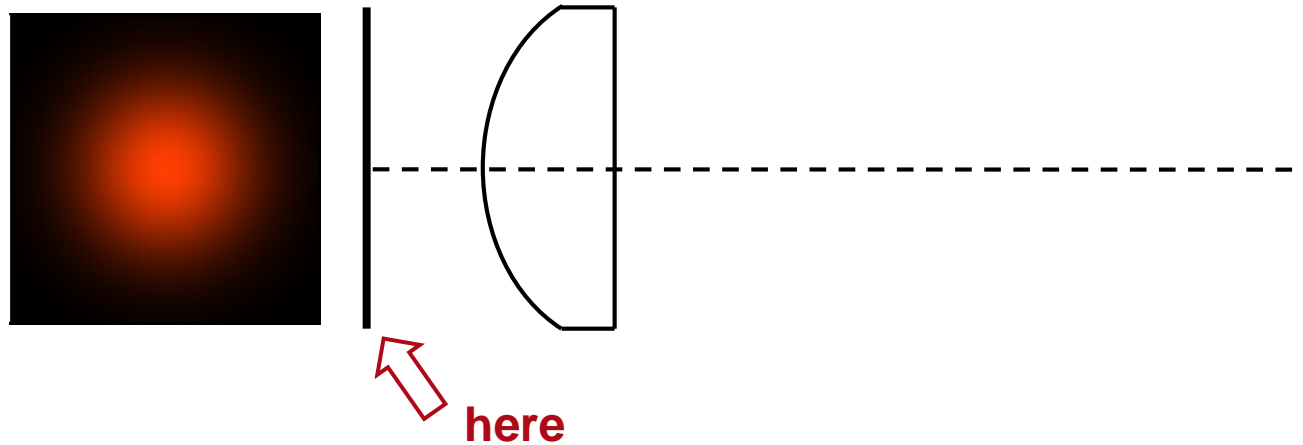
# Highlights

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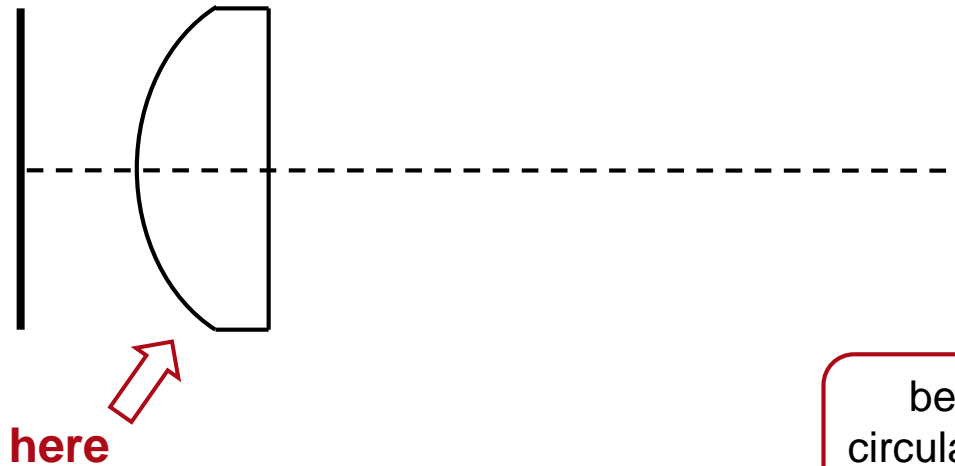
user-friendly guided design of a beam shaping element to shape a Gaussian laser beam into a circular top-hat

# Specification: Light Source



Parameter	Description / Value & Unit
type/number	Gaussian beam
coherence/mode	single Hermite Gaussian (0,0) mode
wavelength	632.8nm
beam diameter ( $1/e^2$ )	8mm×8mm

# Specification: Beam Shaper Element



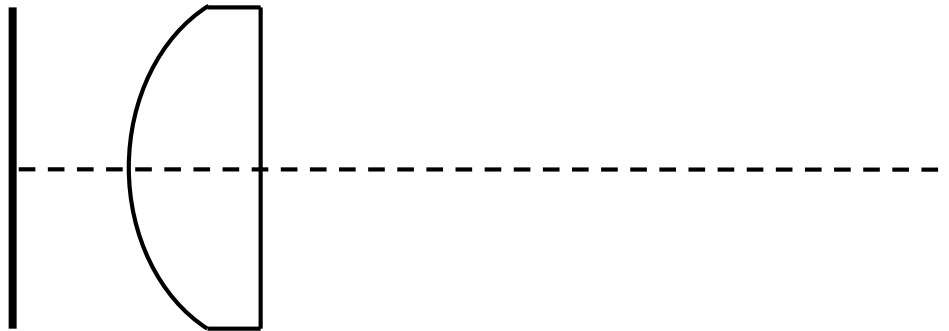
Parameter	Value & Unit
name/type	aspherical lens
material	N-BK7
thickness	5 mm
size (diameter)	23 mm
distance to detector	200 mm

# Specification: Desired Target Pattern



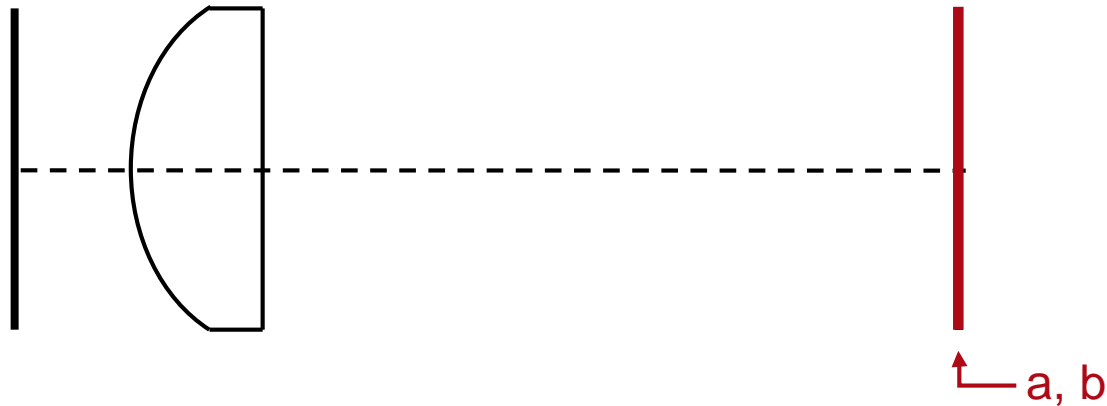
Parameter	Description / Value & Unit
type/number	top-hat (super-Gaussian wave)
wavelength	632.8 nm
beam diameter ( $1/e^2$ )	$400\mu\text{m} \times 400\mu\text{m}$
edge width	$40\mu\text{m}$

# Specification: Definition of Merit Functions



Parameter	Description / Value & Unit
conversion efficiency	> 90%
signal to noise ratio (SNR)	> 22 dB
maximum relative intensity of stray light	< 10%

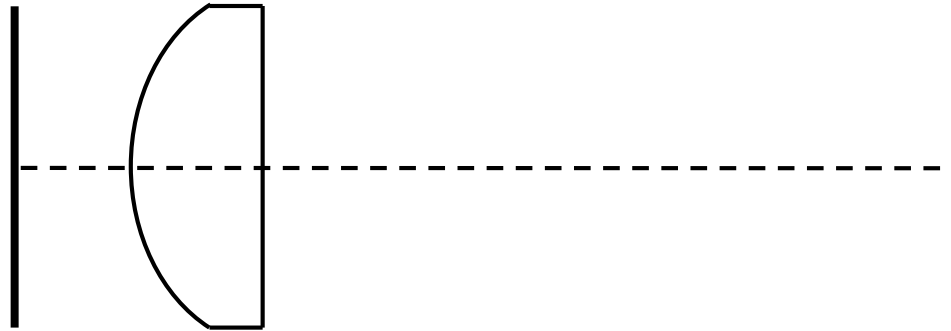
# Specification: Detectors



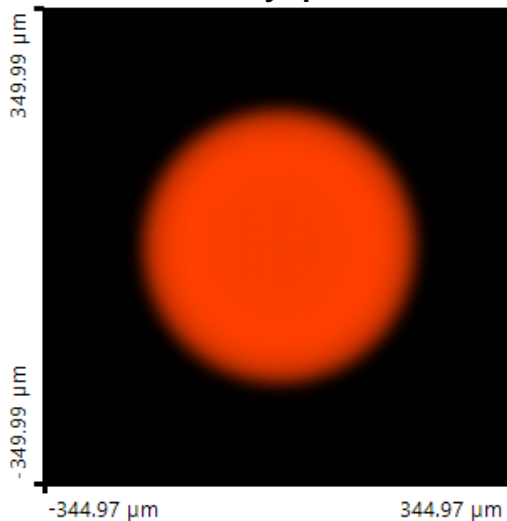
Position	Modeling Technique	Detector/Analyzer
a	field tracing	intensity pattern
b	field tracing	merit function (desired design performance)



# Results: Shaped Beam & Conversion Values



intensity pattern



merit function detector

Parameter	Value & Unit
conversion efficiency	90.24%
SNR	22.35dB
stray light	10.87%

# Document & Technical Info

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code	RO.0001
version of document	1.2
title	Design of a Refractive Beam Shaper to Generate a Circular Top-Hat
category	Refractive Optics (RO)
created by	Huiying Zhong
used VL version	7.0.0.29

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## Specifications of PC Used for Simulation

Processor	i7-5600U (2 CPU cores)
RAM	12GB
Operating System	Windows 10

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