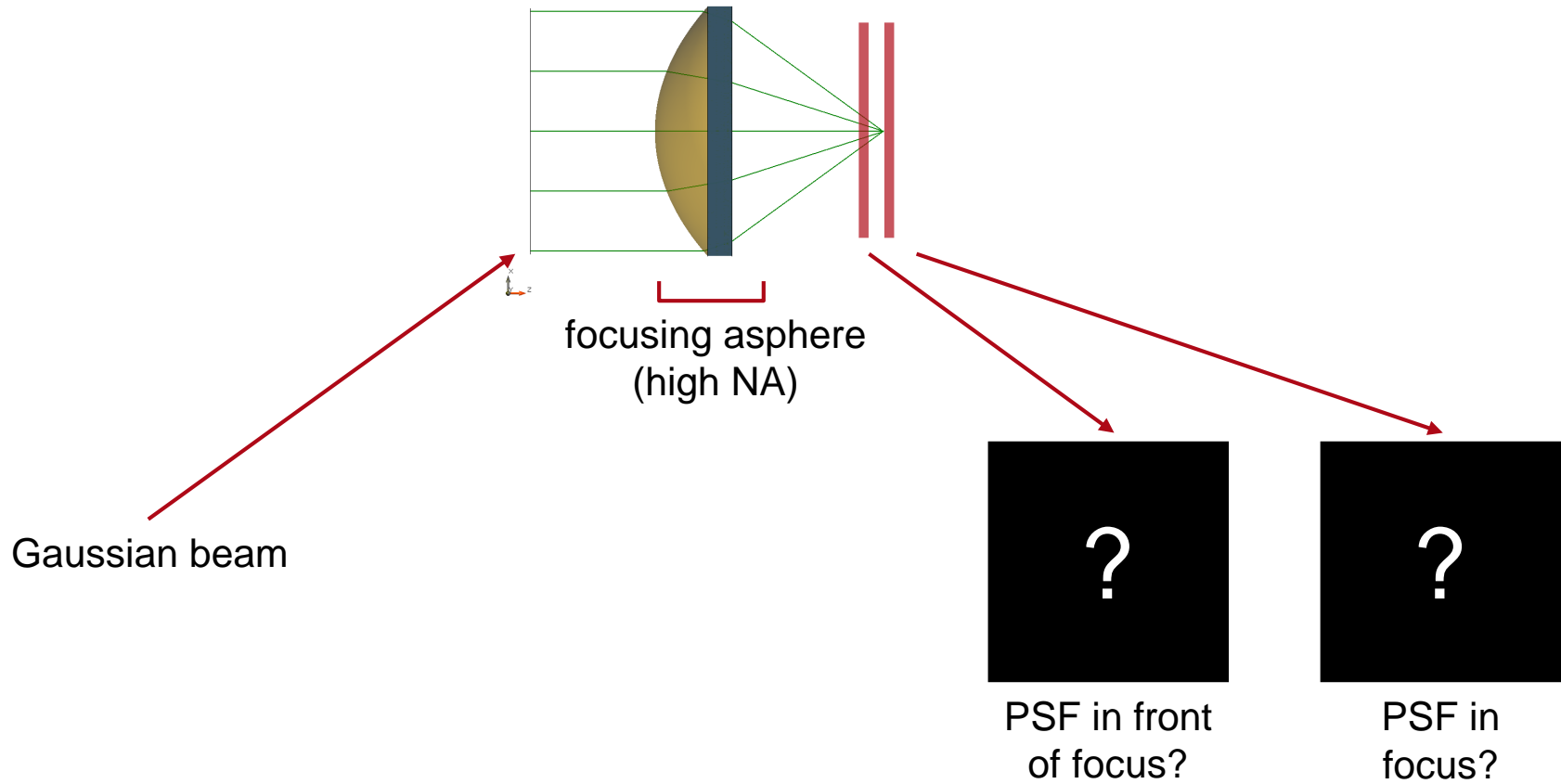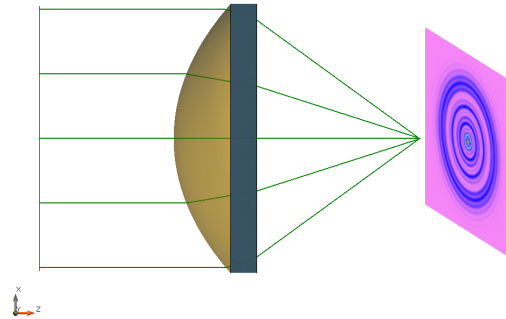Imaging Systems > Advanced PSF & MTF

Advanced PSF Calculation in a High NA Lens System

Task/System Illustration

Gaussian beam

focusing asphere
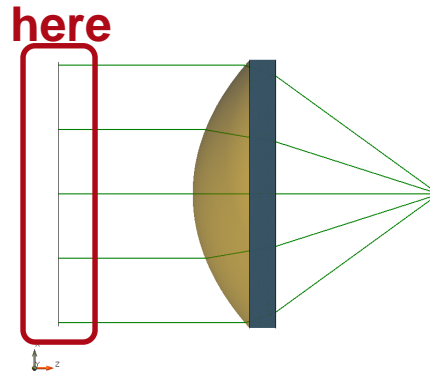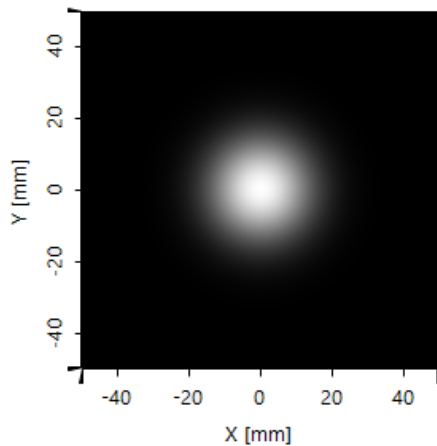(high NA)

PSF in front
of focus?

PSF in
focus?

Highlights

- fast calculation of 2D PSF of high NA lens systems

- calculation of 2D PSF for arbitrary amplitudes

- evaluation of 2D PSF for not fully illuminated apertures

Specification: Light Source

here

Parameter	Description / Value & Unit
mode/coherence	single Hermite Gaussian (0,0) mode
wavelength	532 nm
polarization	linear in x-direction (0°)
FWHM of beam divergence	< 0.01°
initial M^2 (x × y)	1.0 × 1.0

Specification: Focusing Lens

here
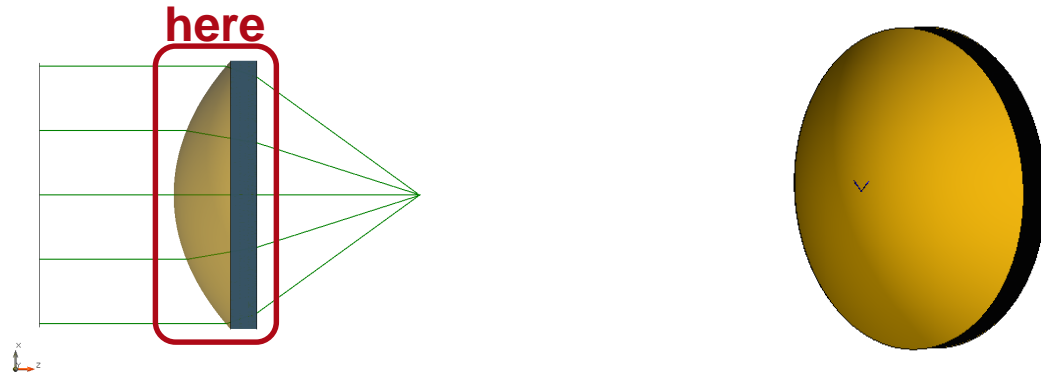
| Parameter	Description / Value & Unit
type	aspherical lens (Asphericon AHL50-40)
diameter	50 mm
numerical aperture (NA)	0.54
effective focal length	40 mm
material	S-LAH64

Specification: Detectors
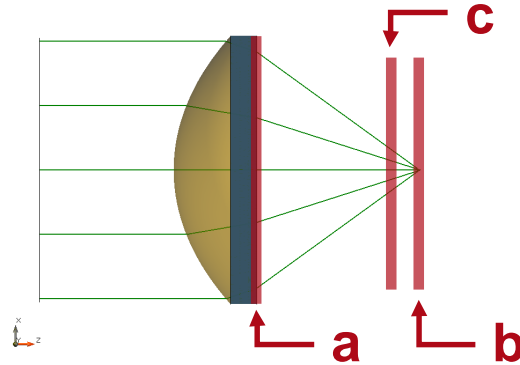
| Position	Modeling Technique	Detector/Analyzer
full system	3D ray tracing	3D ray tracing system visualization
a	field tracing	2D intensity in exit pupil (false color view)
b	field tracing	2D PSF in focal plane (false color view)
c	field tracing	2D PSF in front of focal plane (false color view)

Result: 3D Ray Tracing

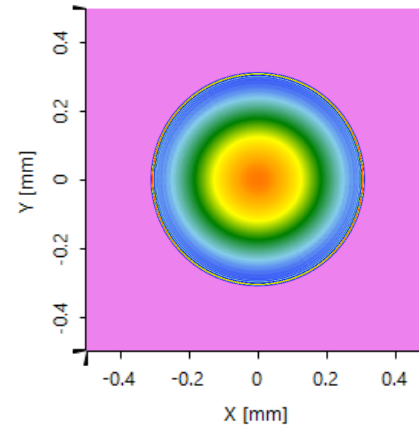source plane

focusing asphere
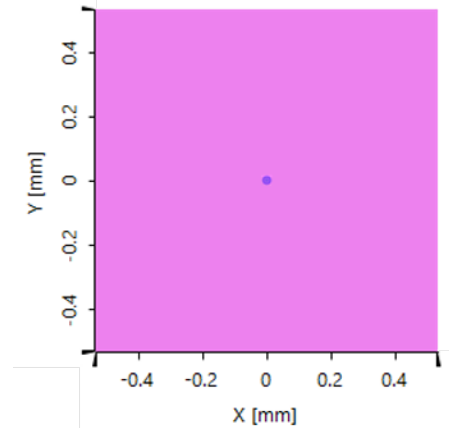
focal plane
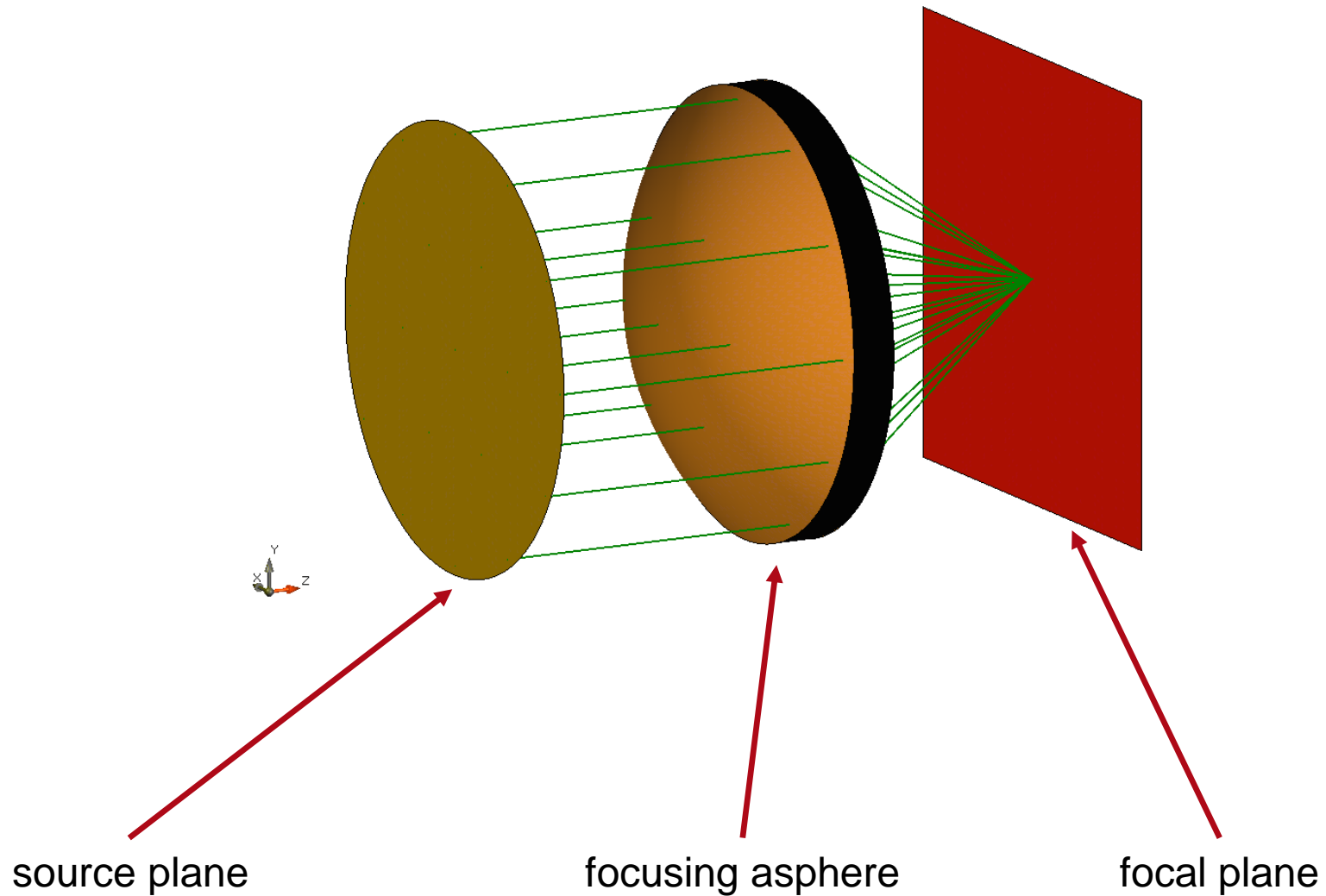
Result: Field Tracing
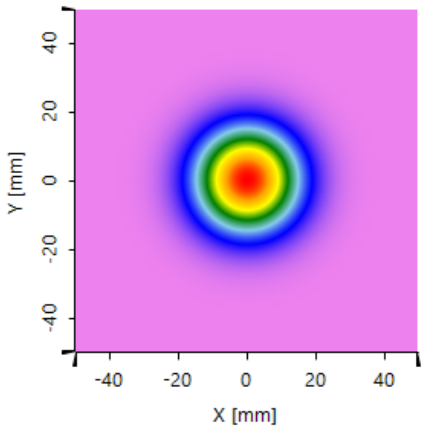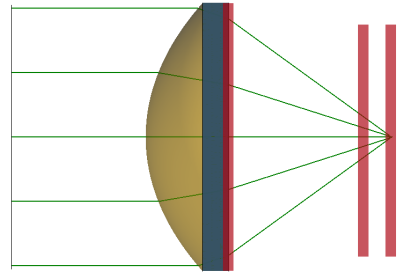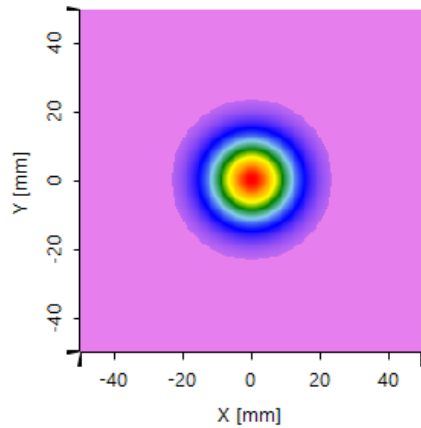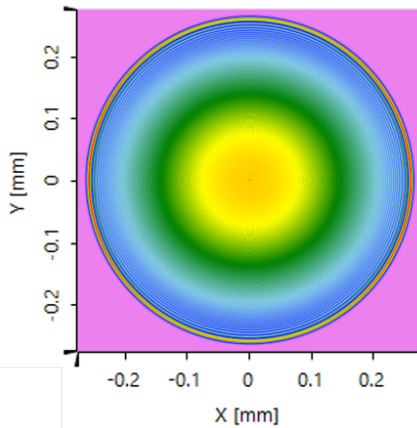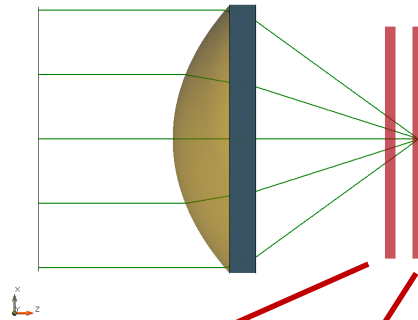

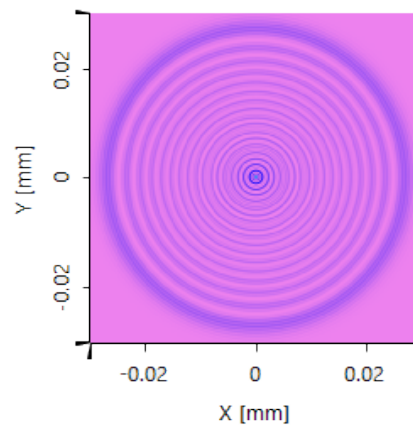input field   intensity in exit pupil   intensity in front of focus   focal spot
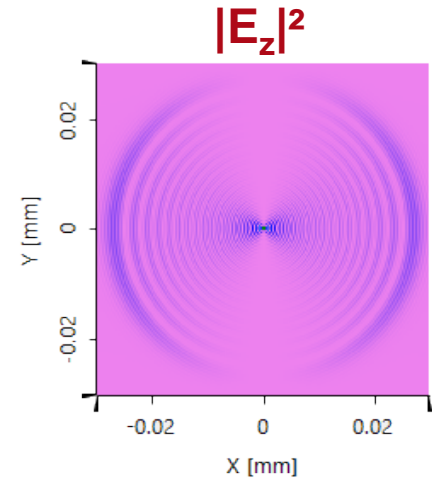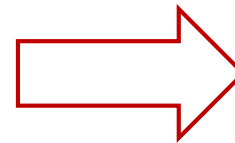
Result: Field Tracing in Detail

intensity in front of focus

focal spot

slightly asymm. due to strong E_z

$|E_z|^2$

Document & Technical Info

code	APM.0001
version of document	1.0
title	Advanced PSF Calculation in a High NA Lens System
category	Imaging Systems > Advanced PSF & MTF
author	Stefan Steiner (LightTrans)
VL version used for simulations	7.0.0.28

Specifications of PC Used for Simulation	
Processor	i7-4910MQ (4 CPU cores)
RAM	32GB
Operating System	Windows 10