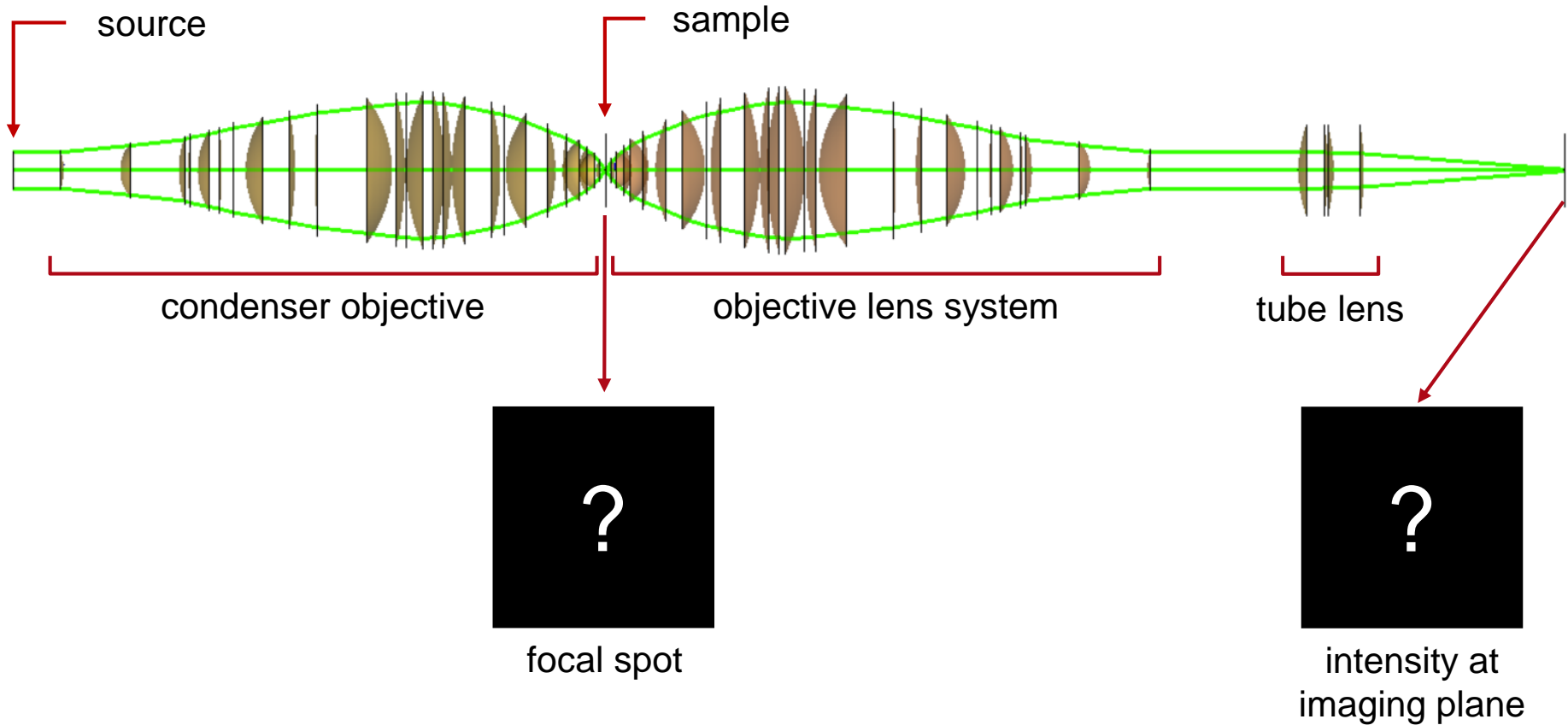


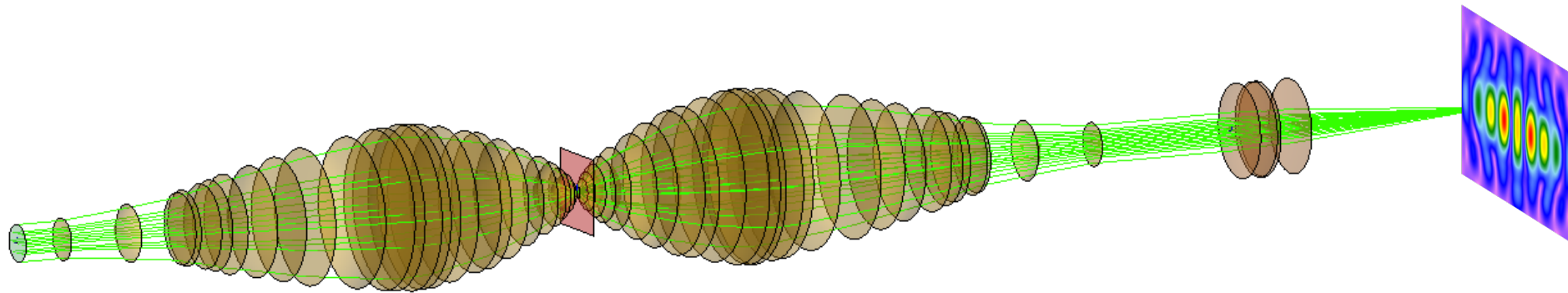
Optical Metrology > Microscopy

High NA Microscope Investigation of Polarization Effects

Task/System Illustration



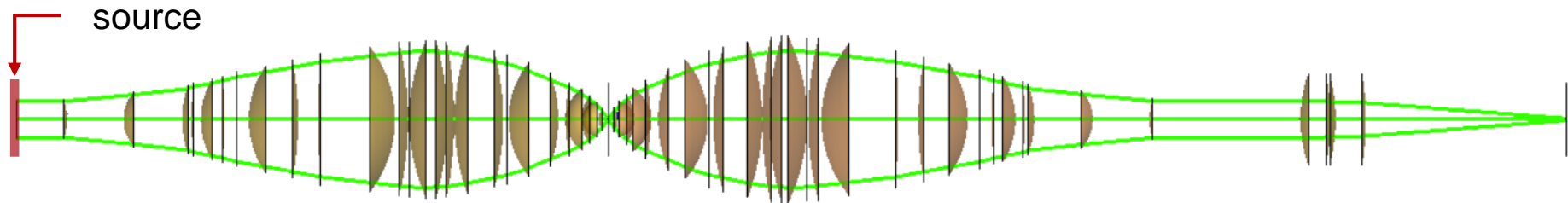
Highlights



- full vectorial analysis of gratings within microscope systems
- fast high-performance analysis for complex systems within seconds
- simple switching between ray tracing and physical optics modeling
- investigation of polarization effects

Specification: Light Source

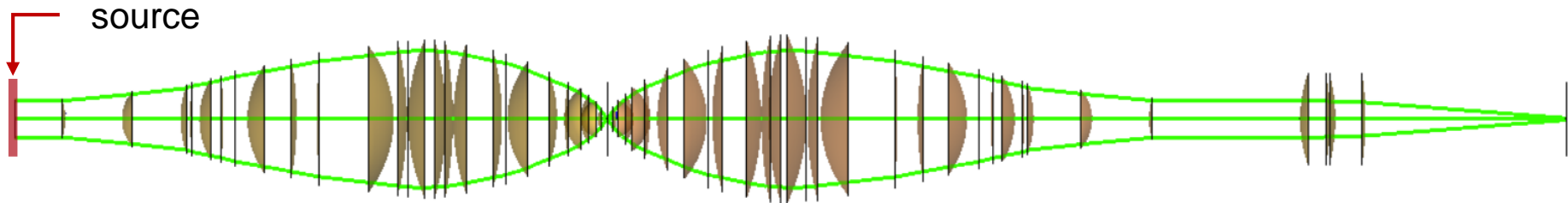
Azimuthally polarized beam



Parameter	Description / Value & Unit
type	combined Gaussian waves
wavelength	532 nm
Rayleigh length	4 m
distance to waist	5 m
Gaussian wave 1: polarization	linear in x-direction
Gaussian wave 1: mode	Hemite Gaussian (0,1)
Gaussian wave 2: polarization	linear in minus y-direction
Gaussian wave 2: mode	Hemite Gaussian (1,0)

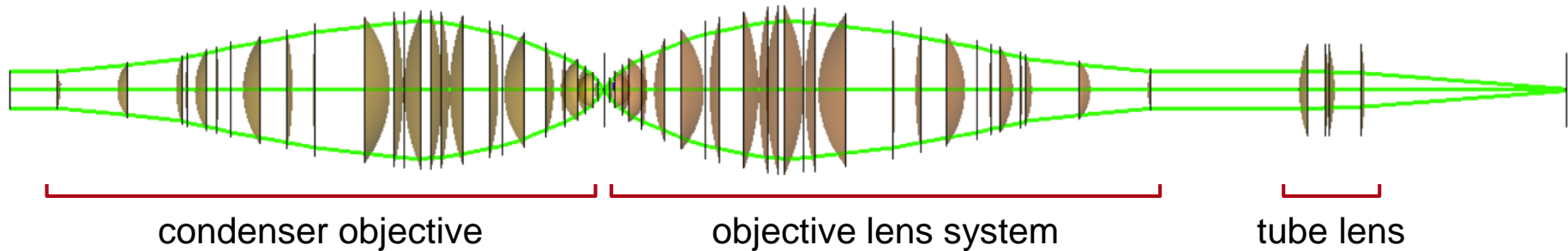
Specification: Light Source

Radially polarized beam



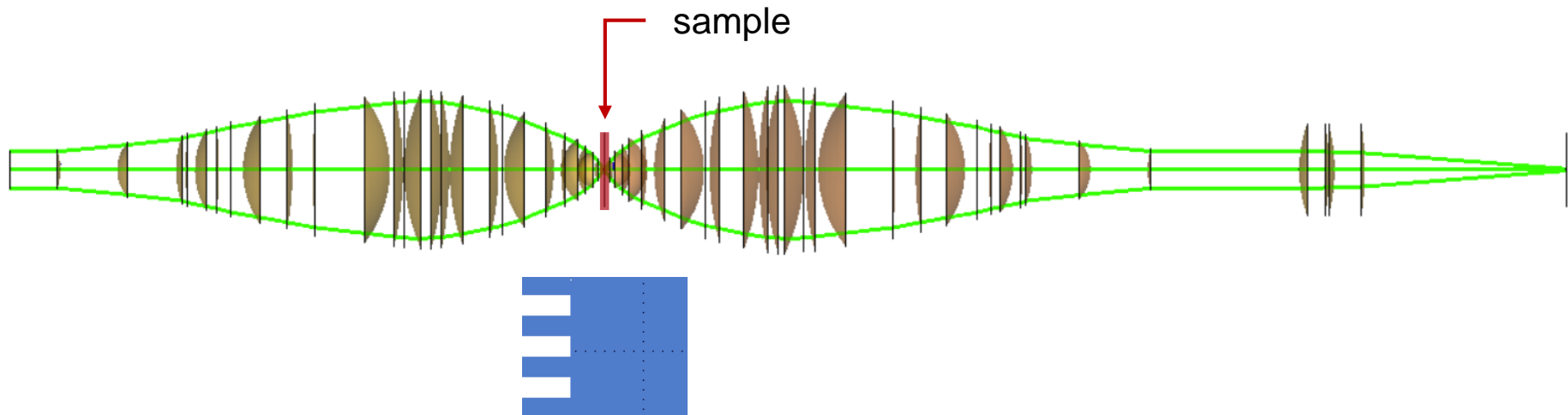
Parameter	Description / Value & Unit
type	combined Gaussian waves
wavelength	532 nm
Rayleigh length	4 m
distance to waist	5 m
Gaussian wave 1: polarization	linear in x-direction
Gaussian wave 1: mode	Hemite Gaussian (1,0)
Gaussian wave 2: polarization	linear in y-direction
Gaussian wave 2: mode	Hemite Gaussian (0,1)

Specification: Lens Systems



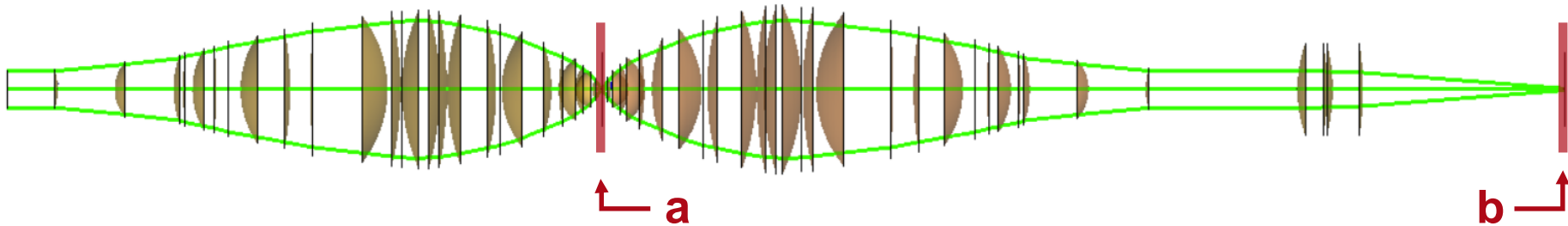
Components	Parameter	Description / Value & Unit
condenser objective	NA	0.85
	number of lenses	16
objective lens system	NA	0.85
	number of lenses	16
tube lens	NA	0.15
	number of lenses	2

Specification: Sample Structures



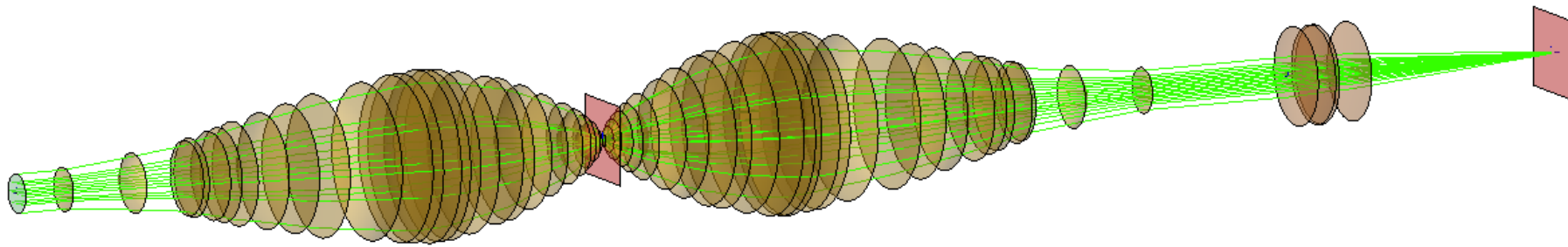
Parameter	Description / Value & Unit
type of grating profile	rectangular
grating periods	600 nm
duty cycle	0.5
grating height	610 nm
grating material	fused silica

Specification: Detectors



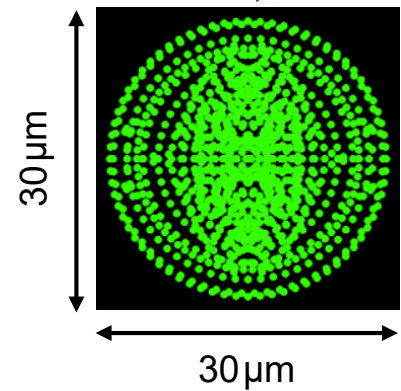
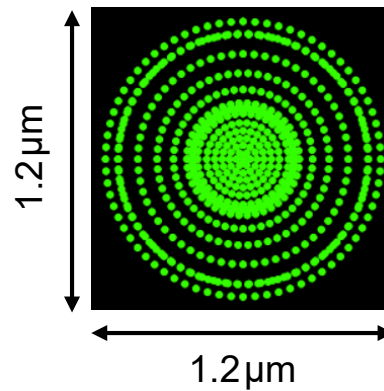
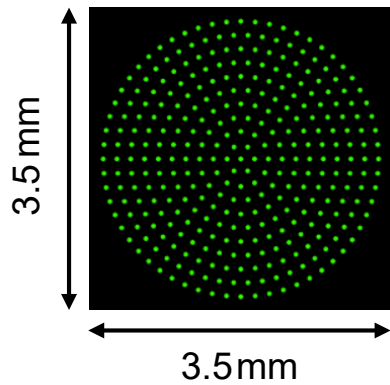
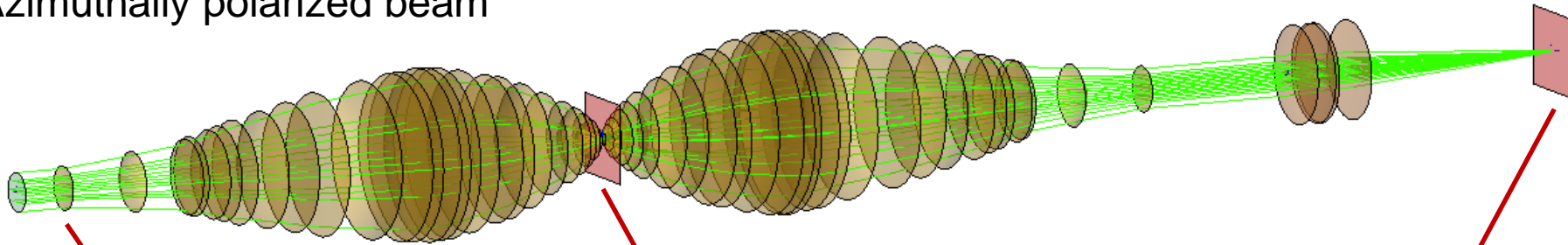
Position	Modeling Technique	Detector/Analyzer
full system	3D ray tracing	3D ray tracing system visualization
a	ray tracing	2D ray tracing dot diagram
	field tracing	2D field amplitude and intensity
b	ray tracing	2D ray tracing dot diagram
	field tracing	2D field amplitude and intensity

Result: 3D Ray Tracing



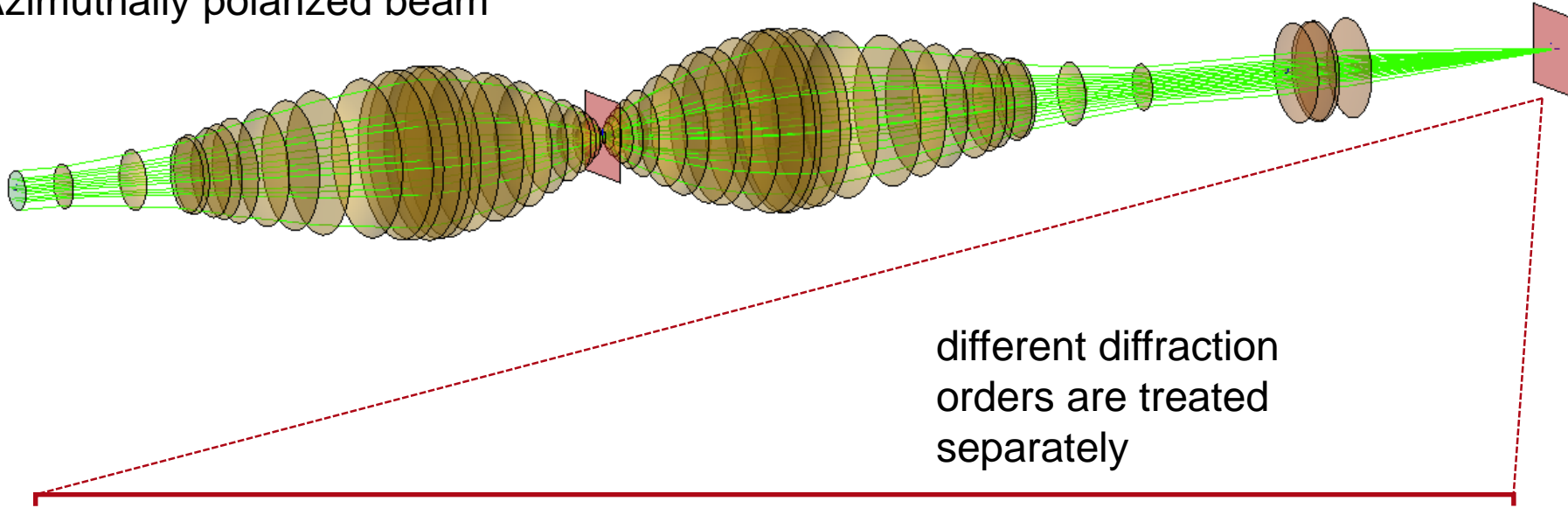
Result: Ray Tracing

Azimuthally polarized beam

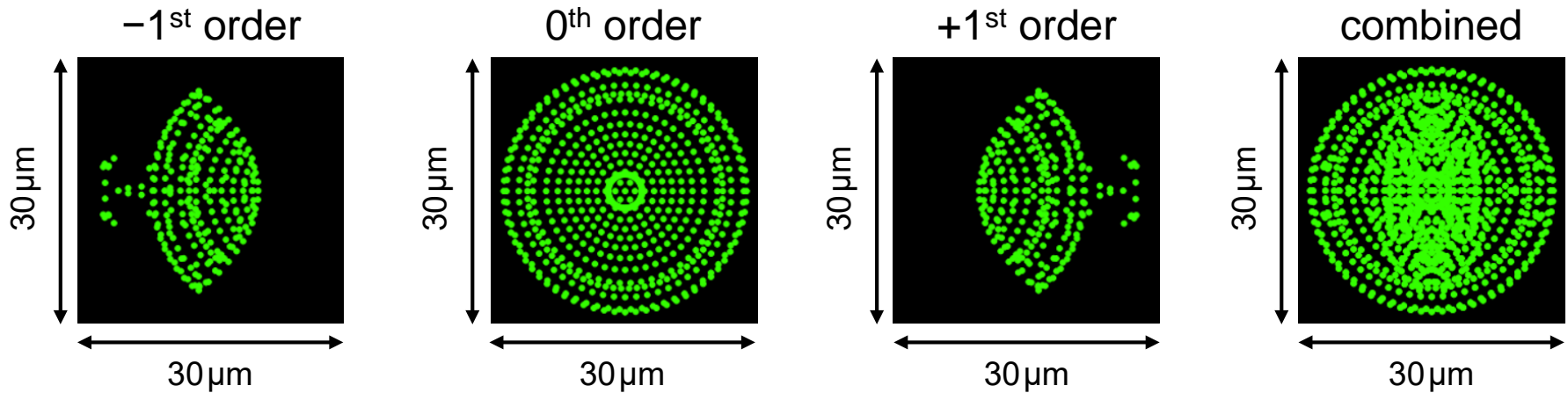


Result: Ray Tracing Diffraction Orders

Azimuthally polarized beam

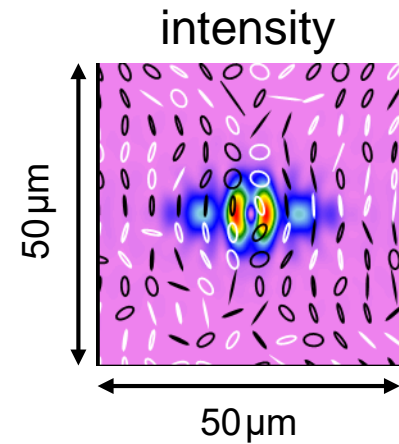
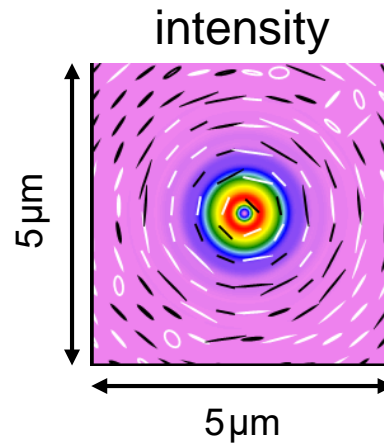
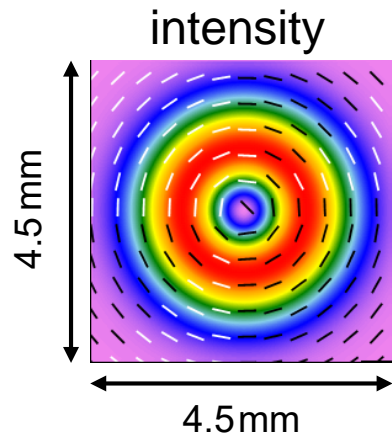
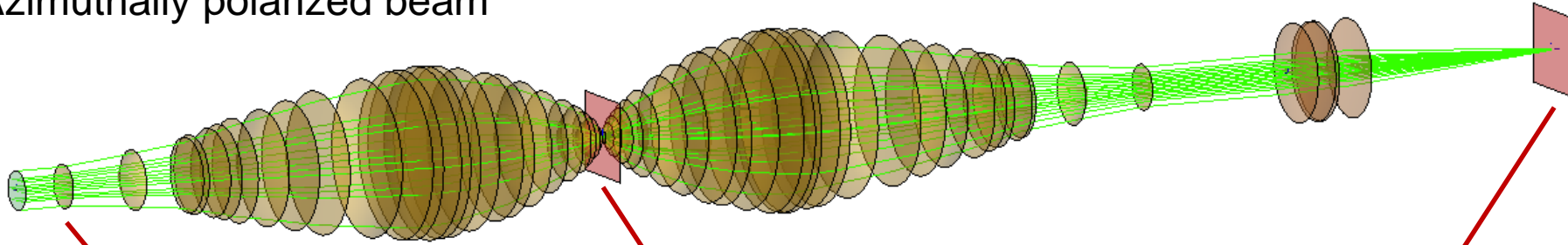


different diffraction orders are treated separately



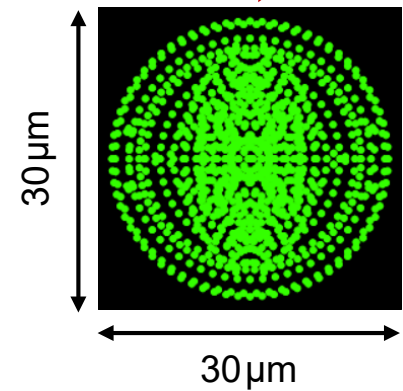
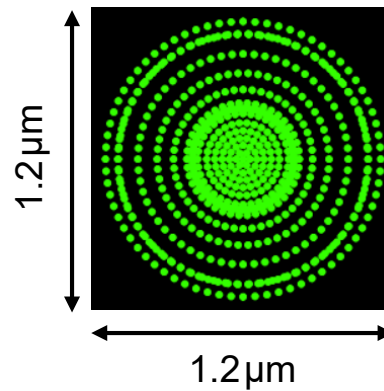
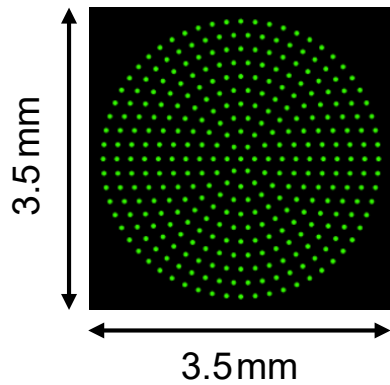
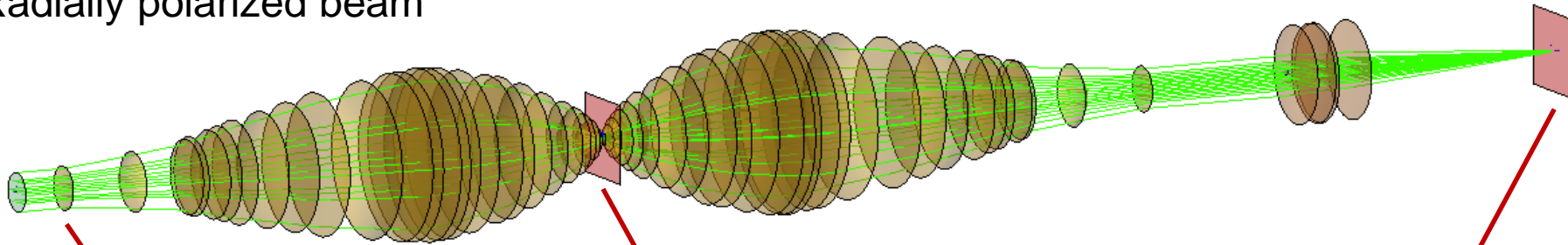
Result: Field Tracing

Azimuthally polarized beam



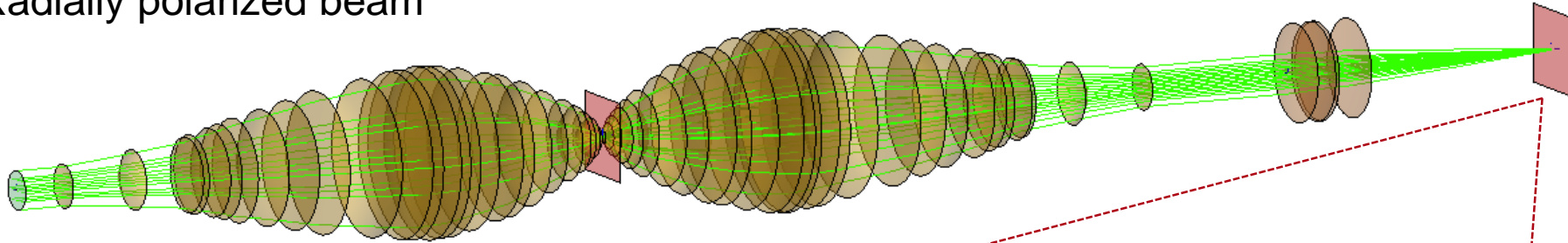
Result: Ray Tracing

Radially polarized beam

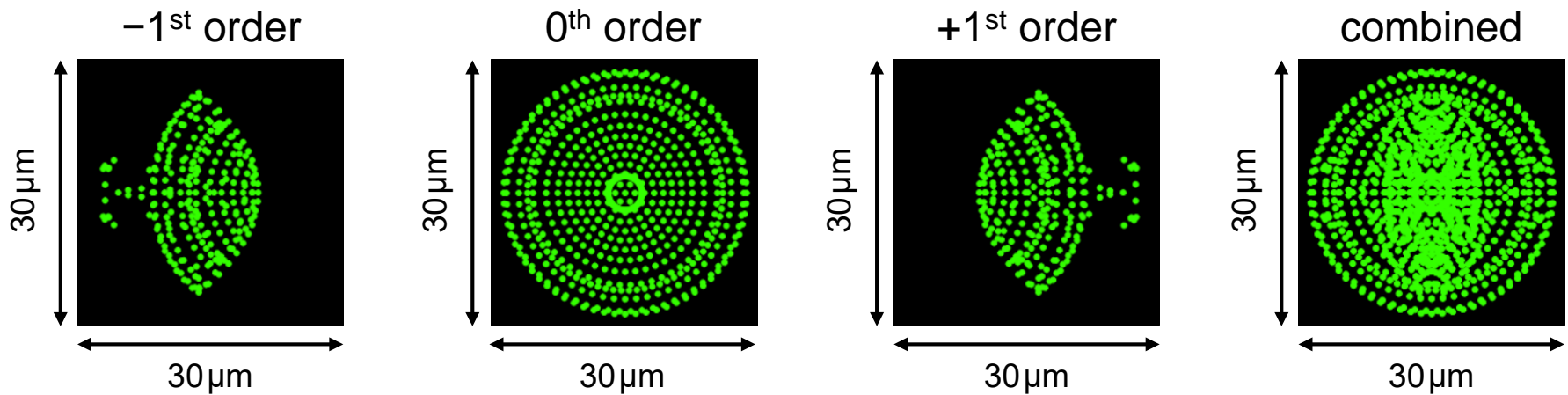


Result: Ray Tracing Diffraction Orders

Radially polarized beam

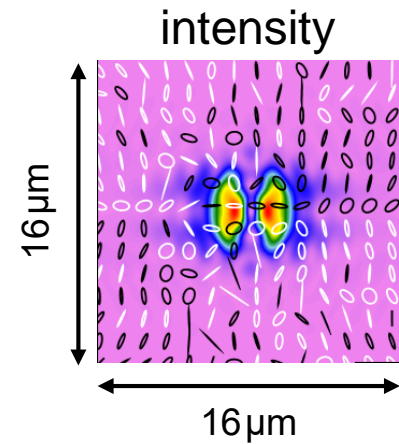
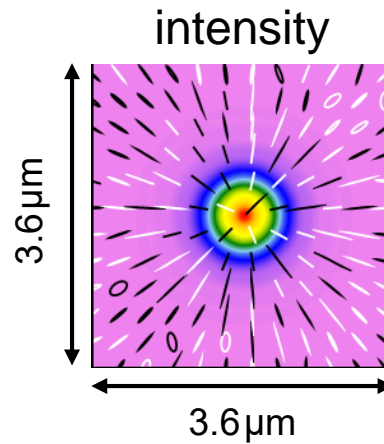
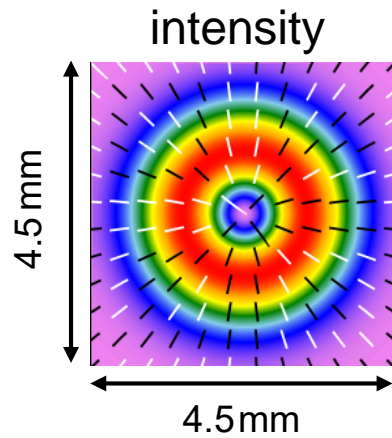
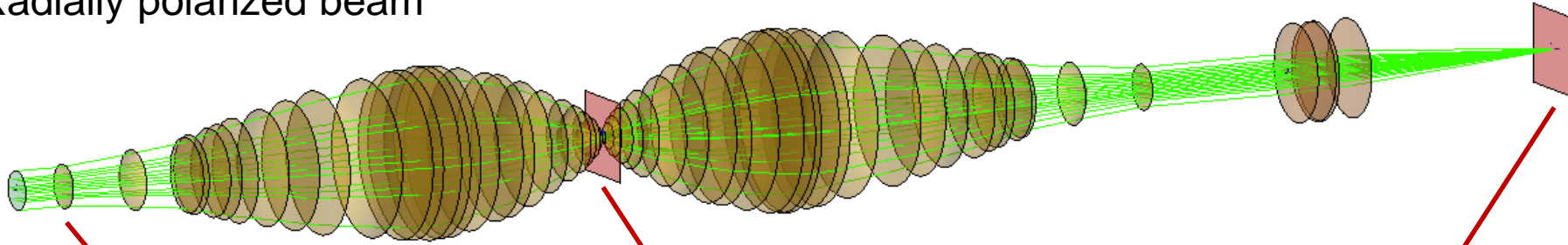


same result as for azimuthally polarized beam



Result: Field Tracing

Radially polarized beam



Document & Technical Info

code	MIC.0003
version of document	1.0
title	High-NA Microscope with Azimuthally and Radially Polarized Beams
category	Optical Metrology
created by	Rui Shi (LightTrans)
used VL version	7.0.0.29

Specifications of PC Used for Simulation

Processor	i7-4700MQ (1 CPU cores)
RAM	16 GB
Operating System	Windows 8