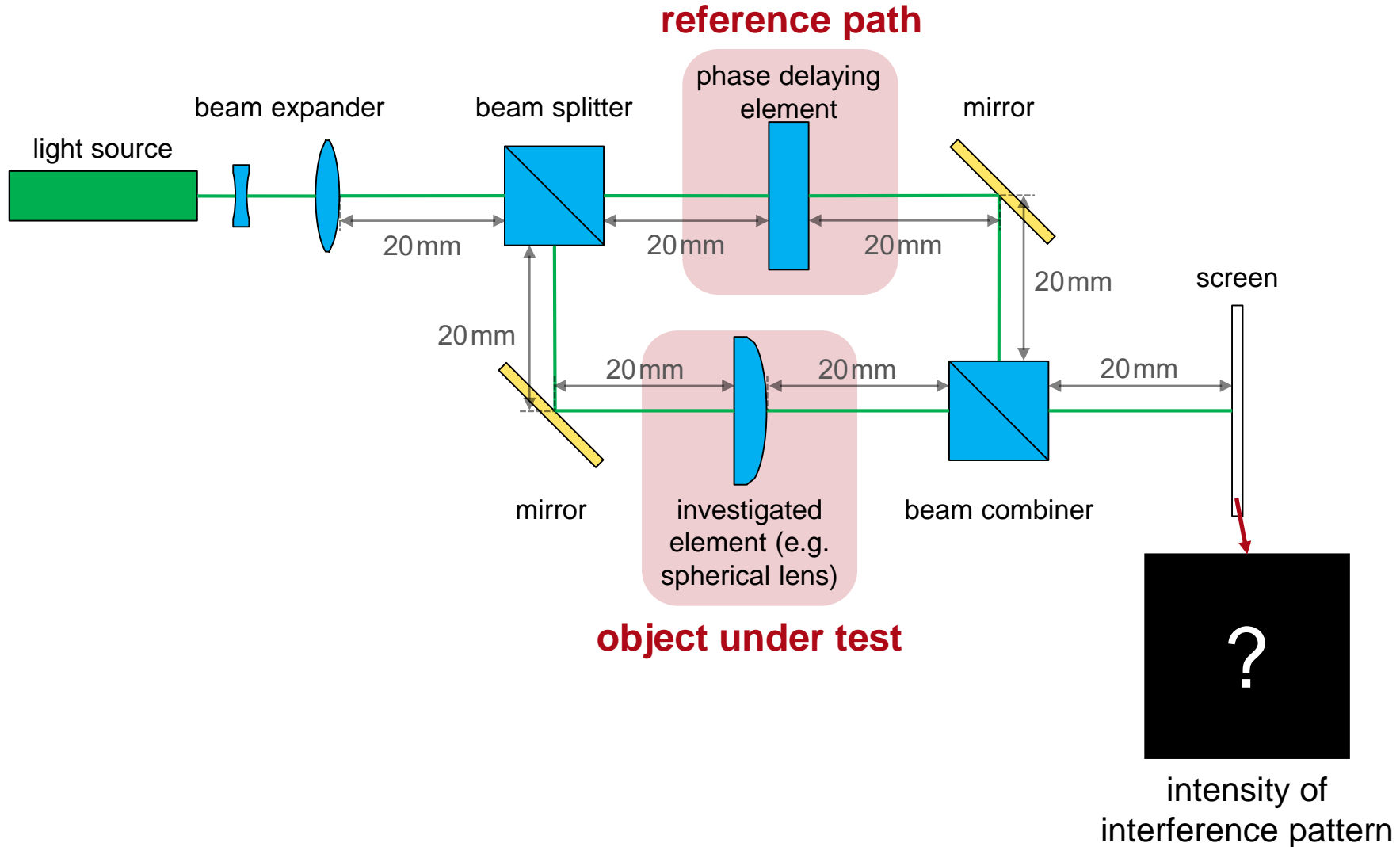


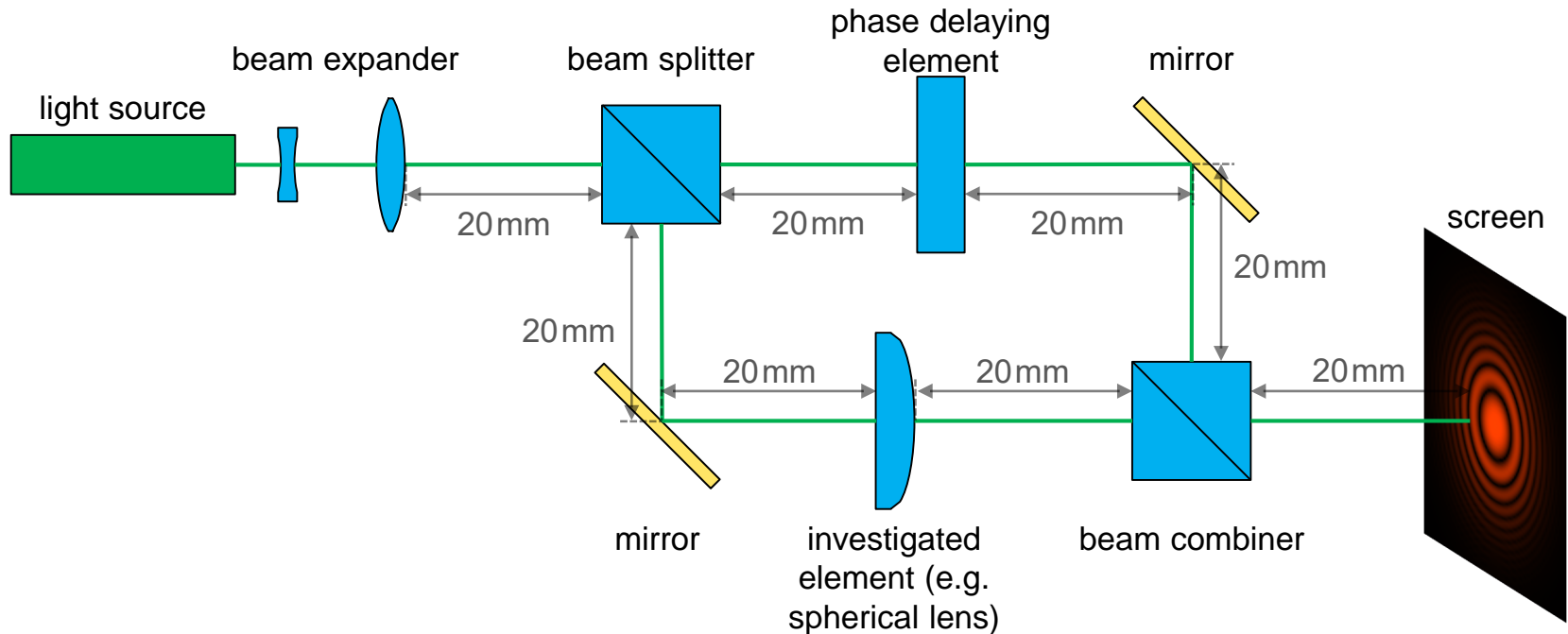
Optical Metrology > Interferometry

Mach-Zehnder Interferometer Using Coherent Light

Task/System Illustration

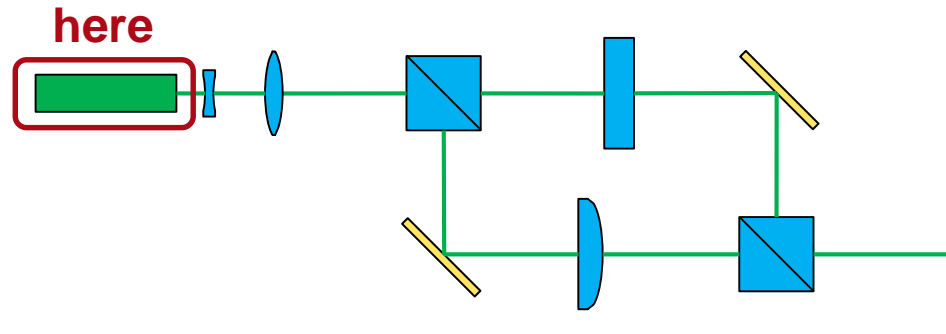
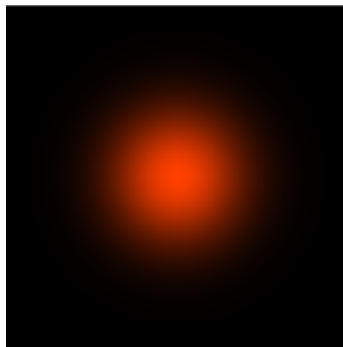


Highlights



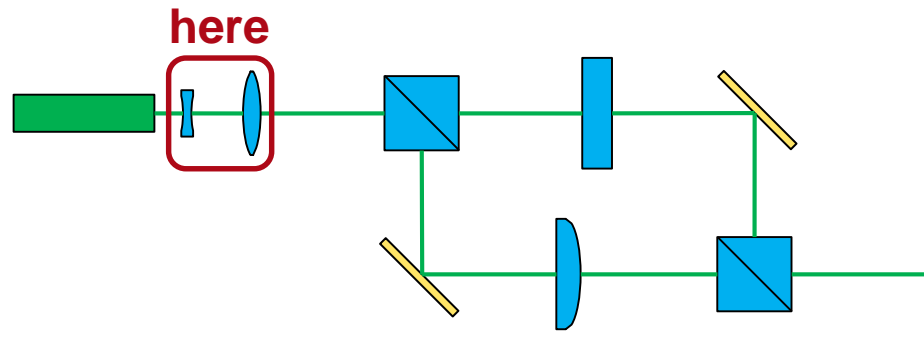
- simple switching from ray tracing analysis to fast physical optics modeling
- fast simulation of coherence effects and interference patterns

Specification: Light Source



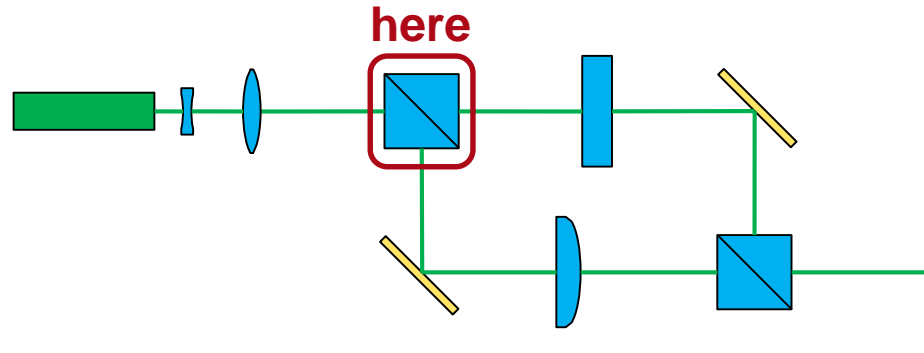
Parameter	Description / Value & Unit
type	Helium Neon laser modelled by Gaussian wave
mode/coherence	single Hermite Gaussian (0,0) mode
wavelength	632.816 nm
polarization	linear in x-direction (0°)
FWHM of beam divergence	0.05°
initial M^2 (x × y)	1.0 × 1.0

Specification: Beam Expander



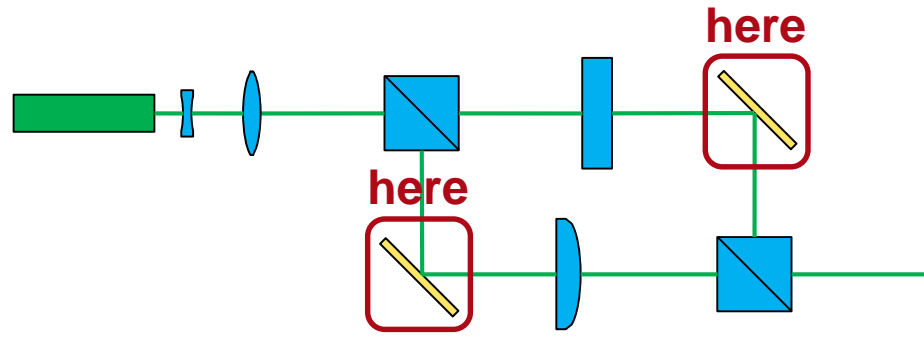
Parameter	Description / Value & Unit
type	Galilei type beam expander
eff. focal length lens 1	-20mm
eff. focal length lens 2	60mm
distance between lenses	39.164mm
magnification	3x

Specification: Beam Splitter



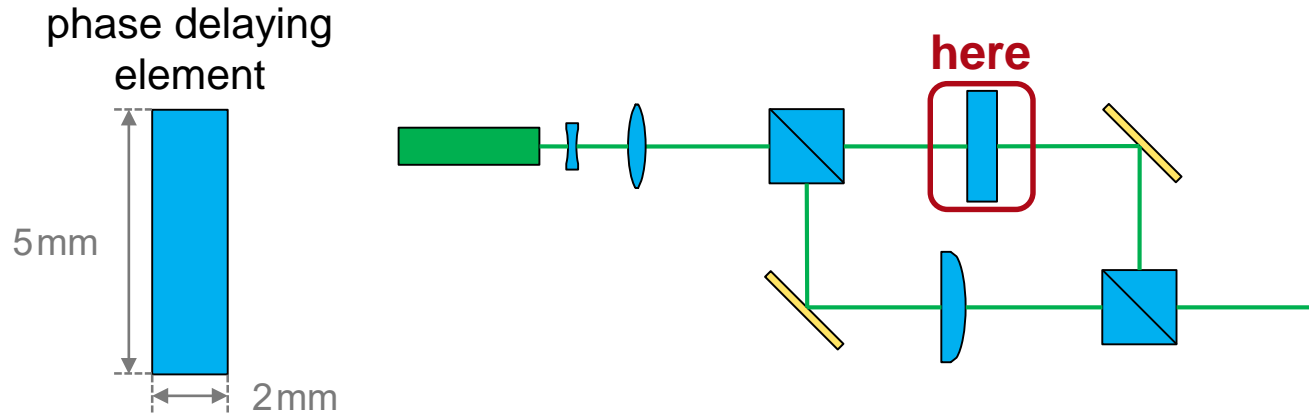
Parameter	Description / Value & Unit
type	ideal beam splitter
splitting ratio	50:50

Specification: Mirrors



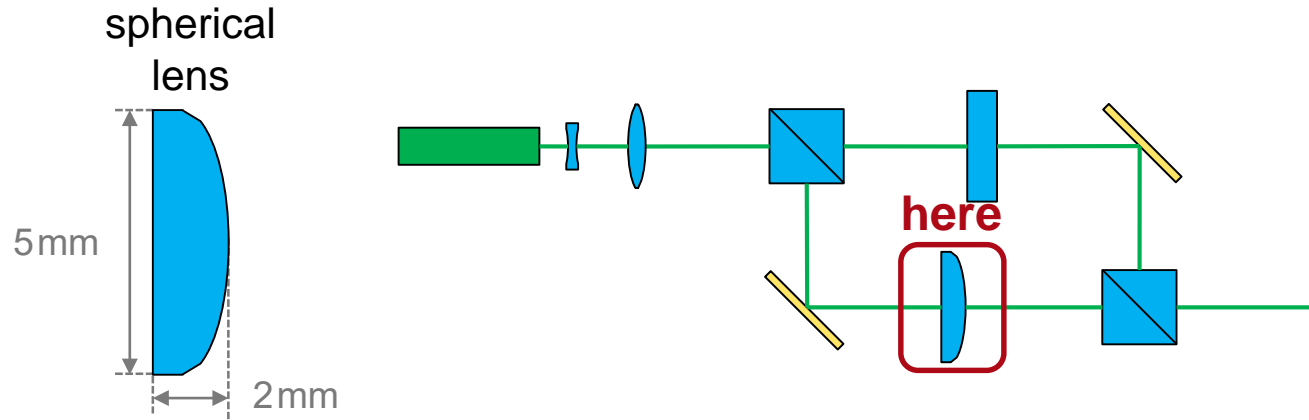
Parameter	Description / Value & Unit
type	ideal mirrors
reflectance	100%

Specification: Phase Delaying Element



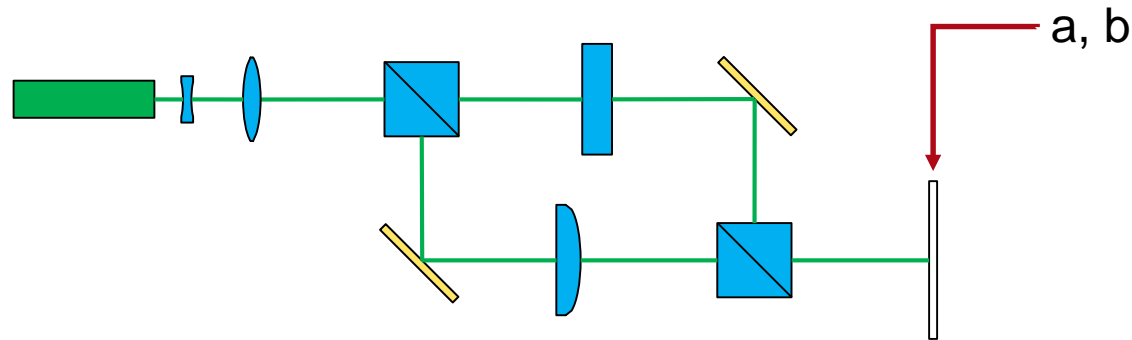
Parameter	Description / Value & Unit
type	glass plate with parallel surfaces
thickness	2mm
material	N-BK7

Specification: Investigated Object



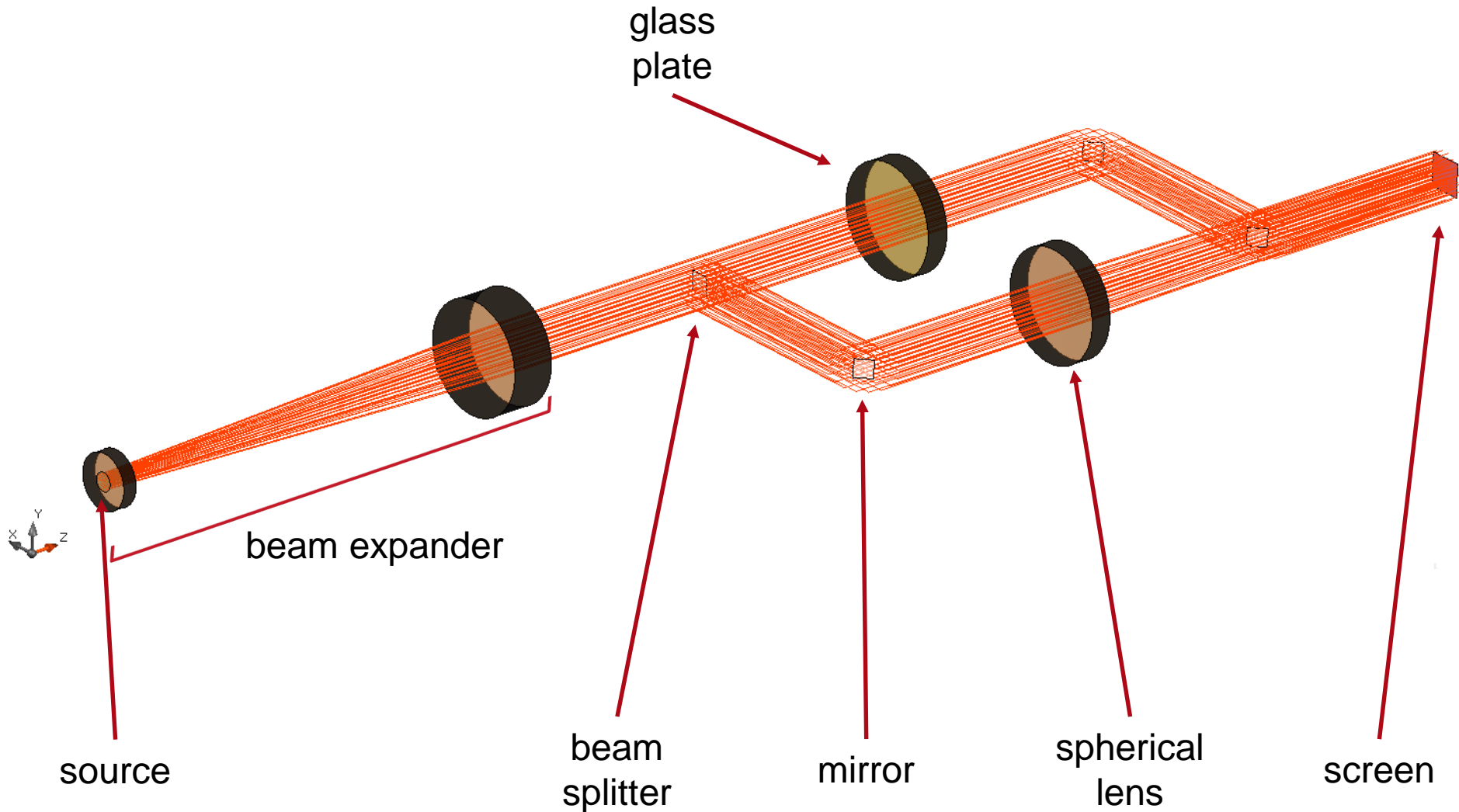
Parameter	Description / Value & Unit
type	plano-convex spherical lens
radius of curvature	100 mm
material	N-BK7

Specification: Detectors

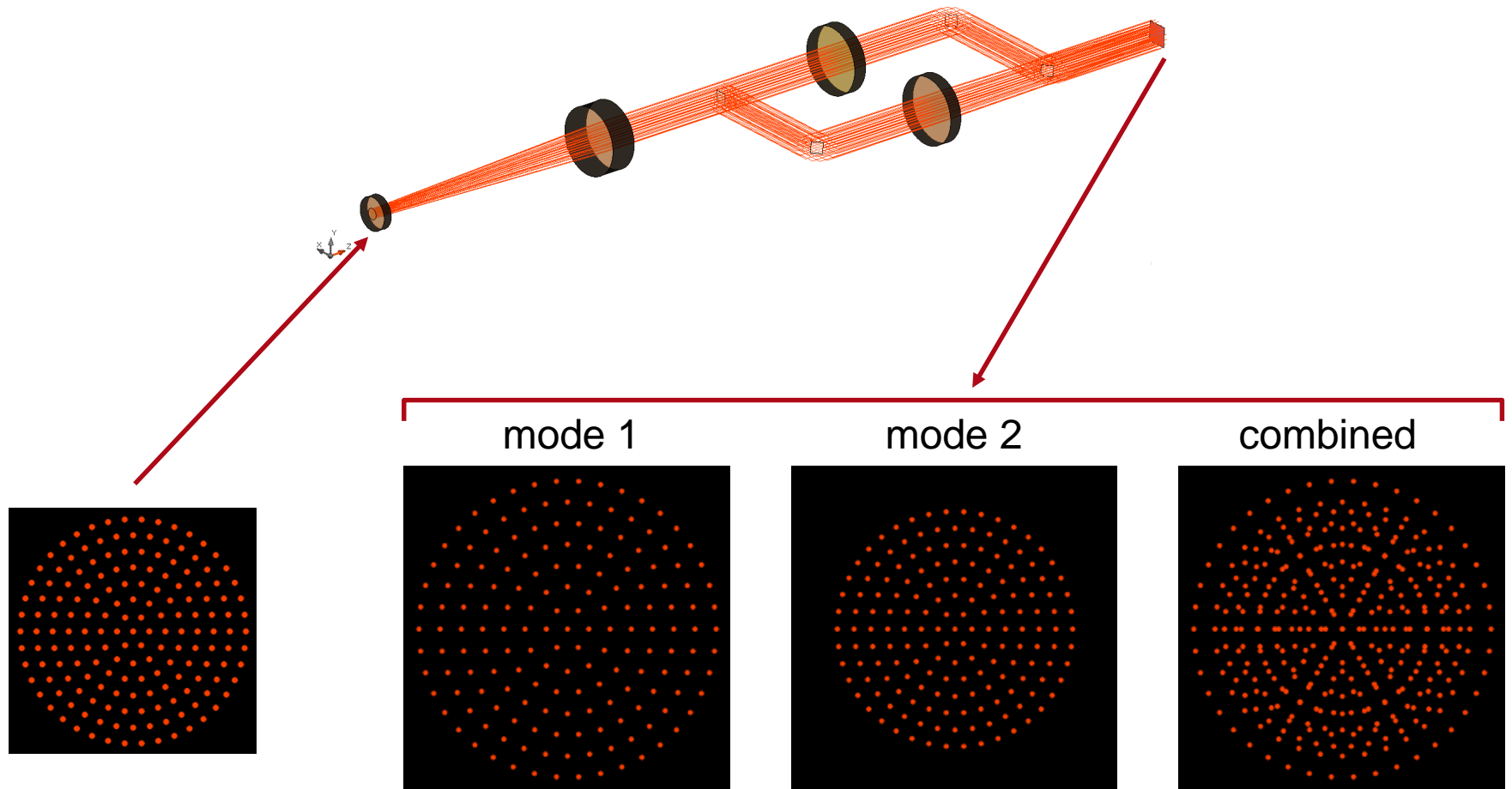


Position	Modeling Technique	Detector/Analyzer
full system	3D ray tracing	3D ray tracing system visualization
a	ray tracing	spot pattern
b	field tracing	2D intensity and interference pattern (false and real color view)

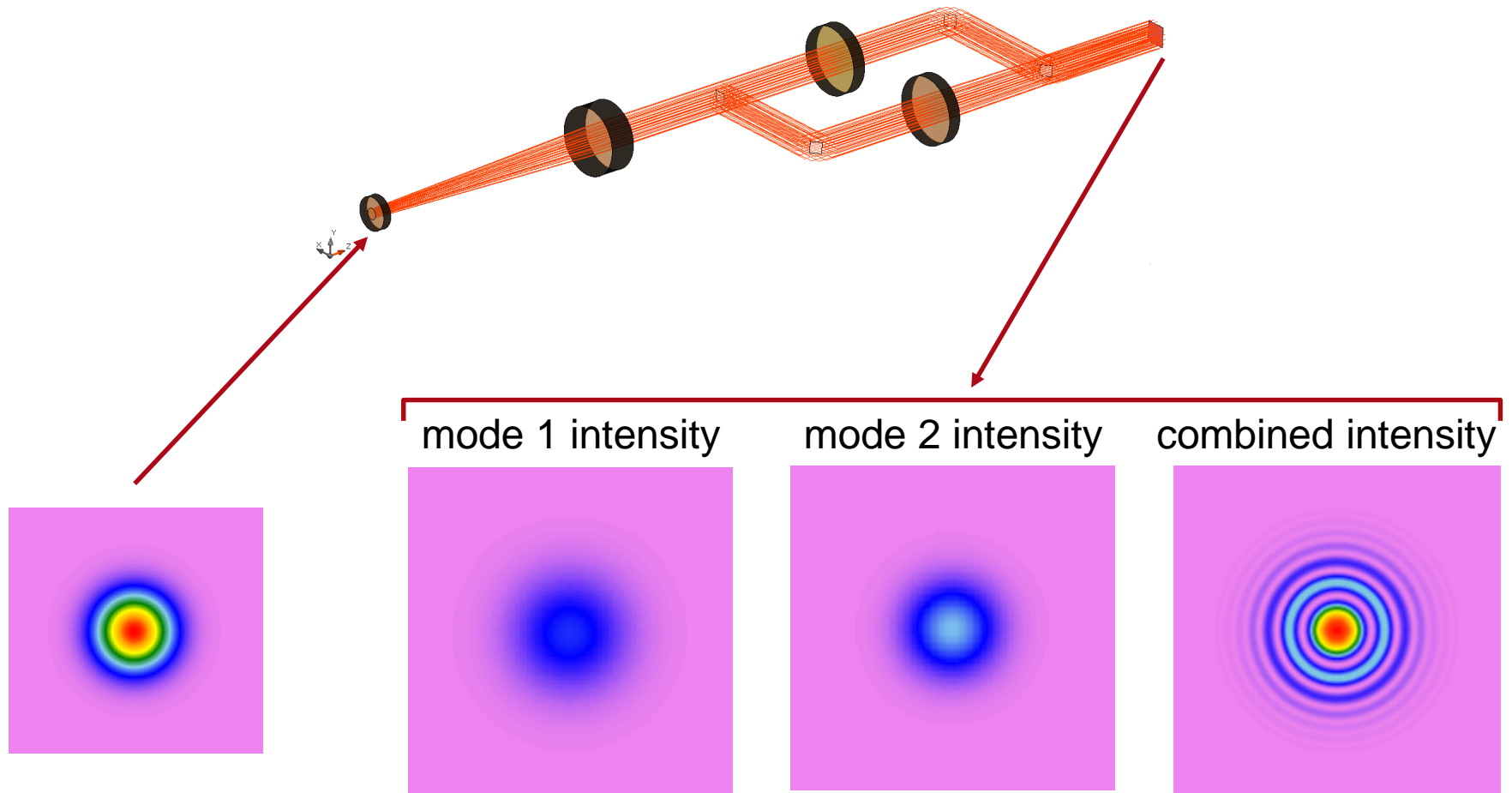
Result: 3D Ray Tracing



Result: Ray Tracing



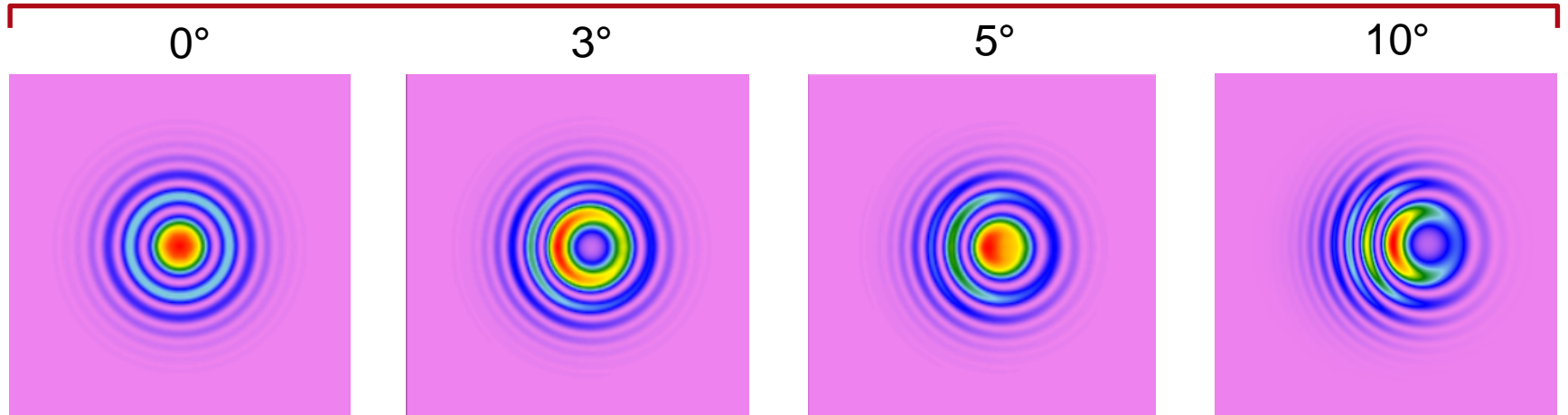
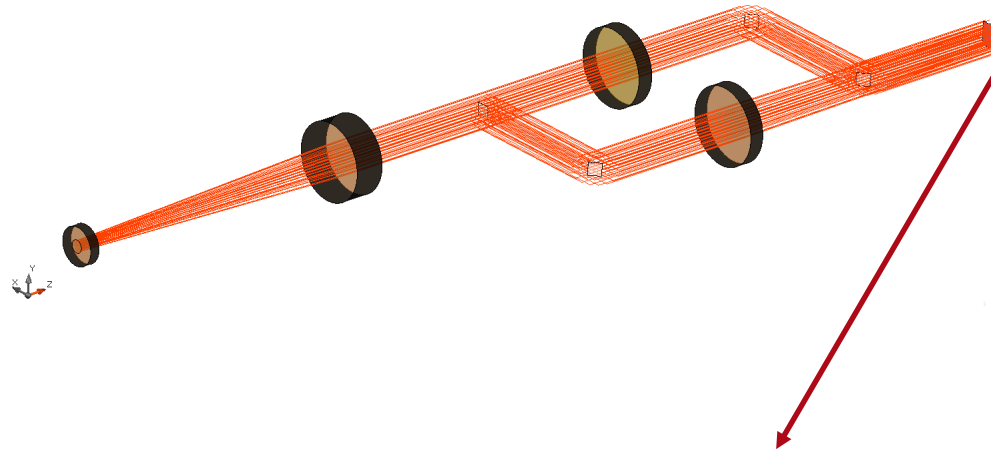
Result: Field Tracing (false color view)



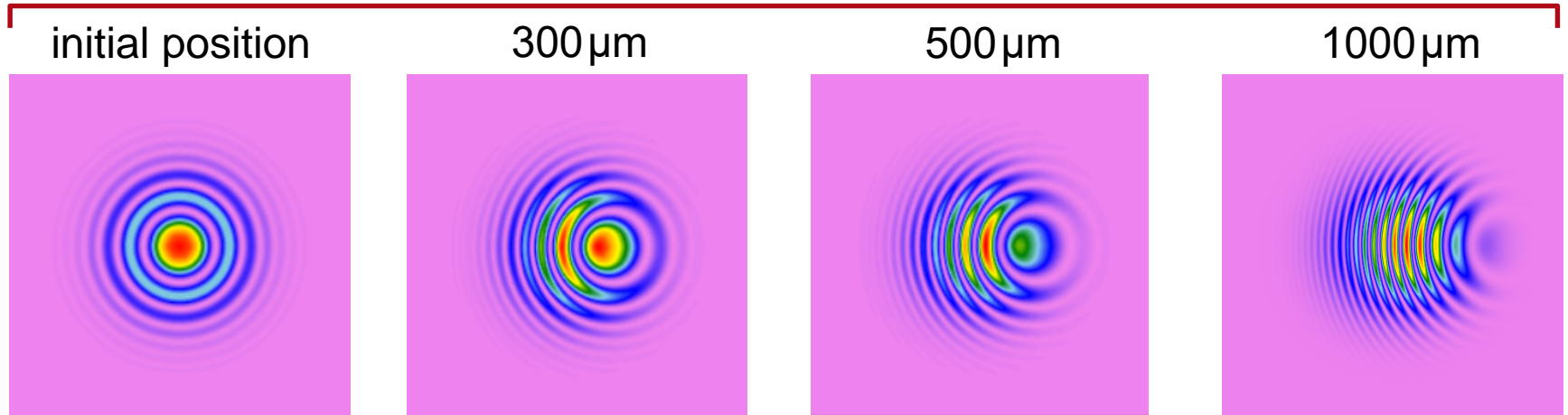
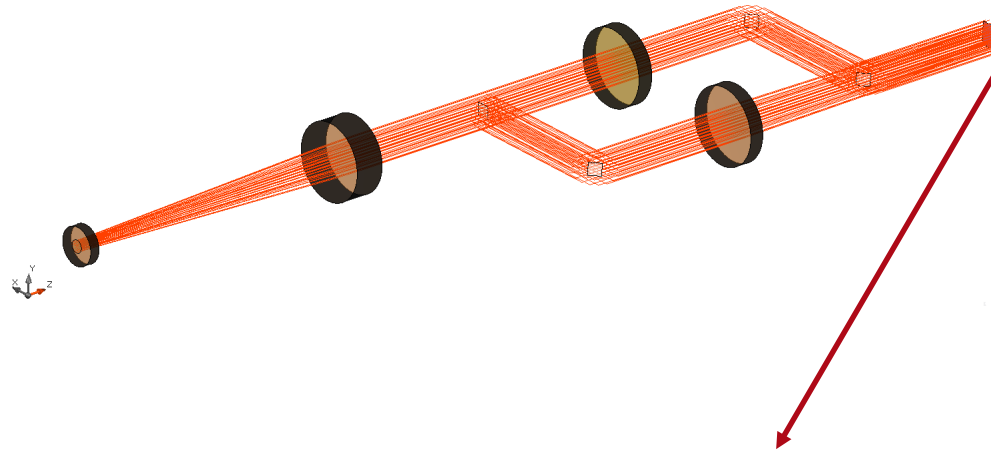
Result: Field Tracing (real color view)



Result: Field Tracing for Tilted Lens



Result: Field Tracing for Lateral Shifted Lens



Document & Technical Info

code	IF.0001
version of document	1.0
title	Mach-Zehnder Interferometer Using Coherent Light
category	Optical Metrology > Interferometry
author	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