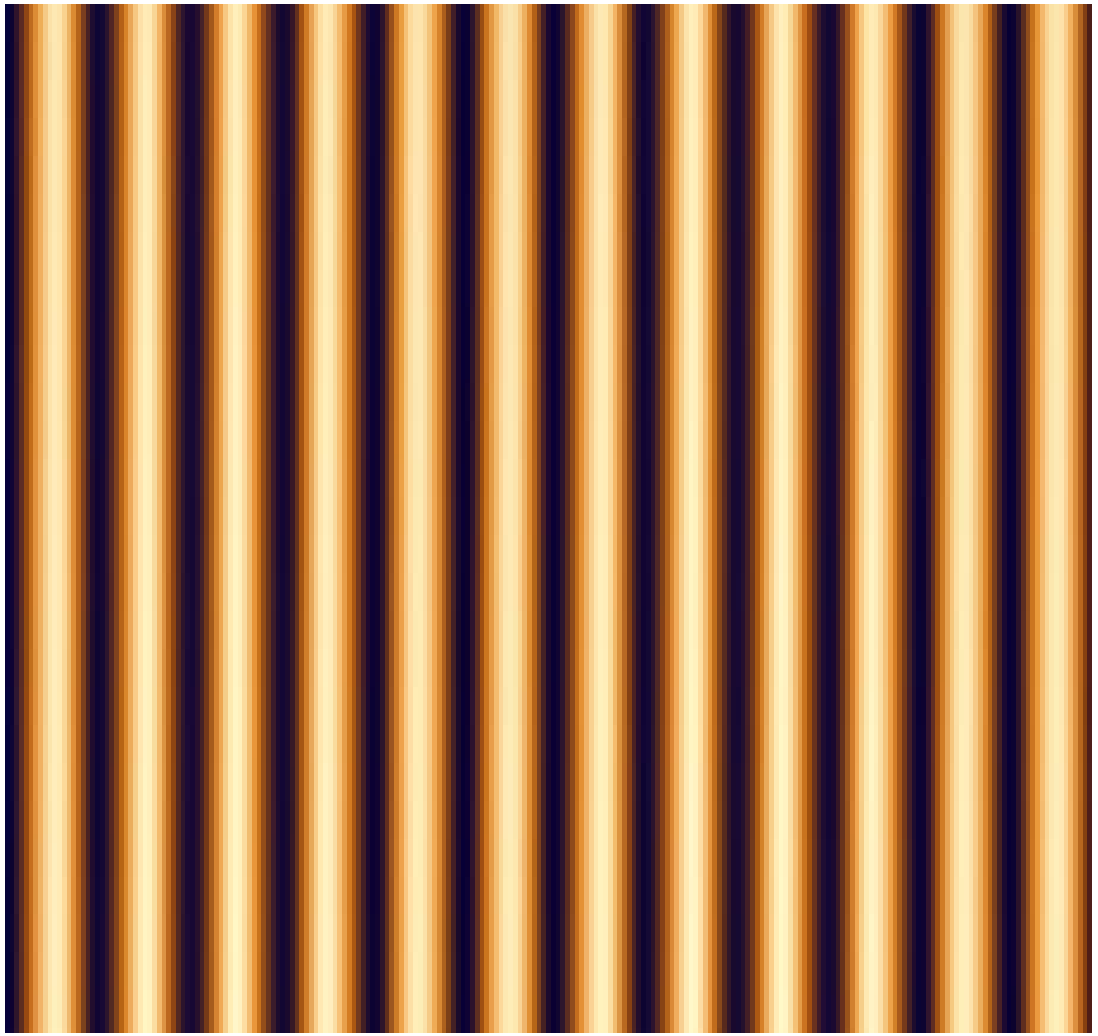
Microscopy System with Structured Illumination

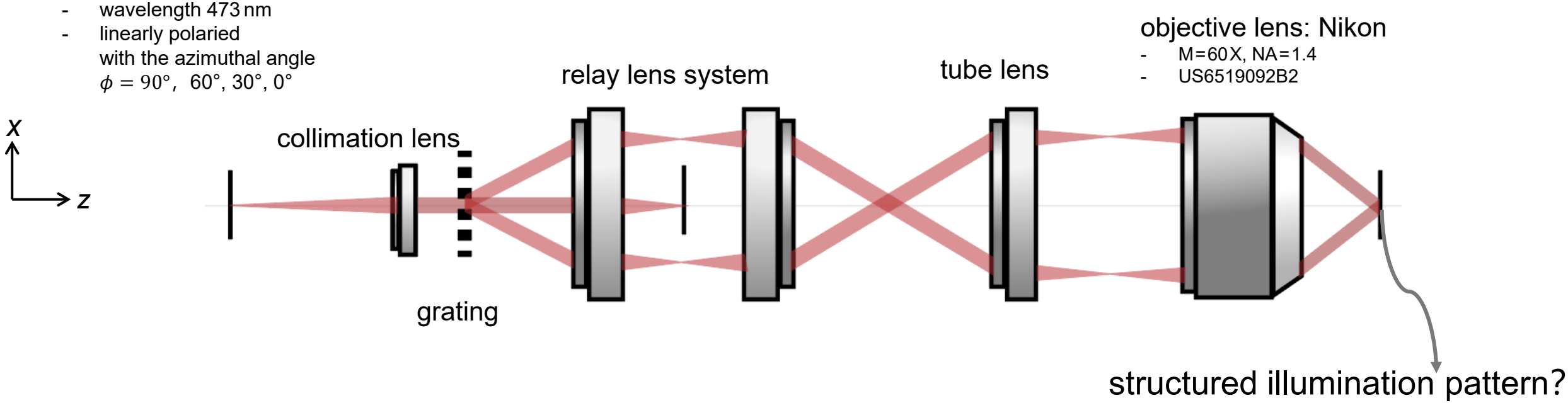
Abstract



The microscopy system with structured illumination for fluorescent samples can improve the resolution of the microscopy system by a factor of 2 compared with the resolution predicted by Abbe theory. VirutualLab Fusion provides a fast way to investigate the structured illumination pattern by the incident wave property. The polarization of the incident wave and its influence on the contrast of the structured illumination pattern is investigated.

Scenario

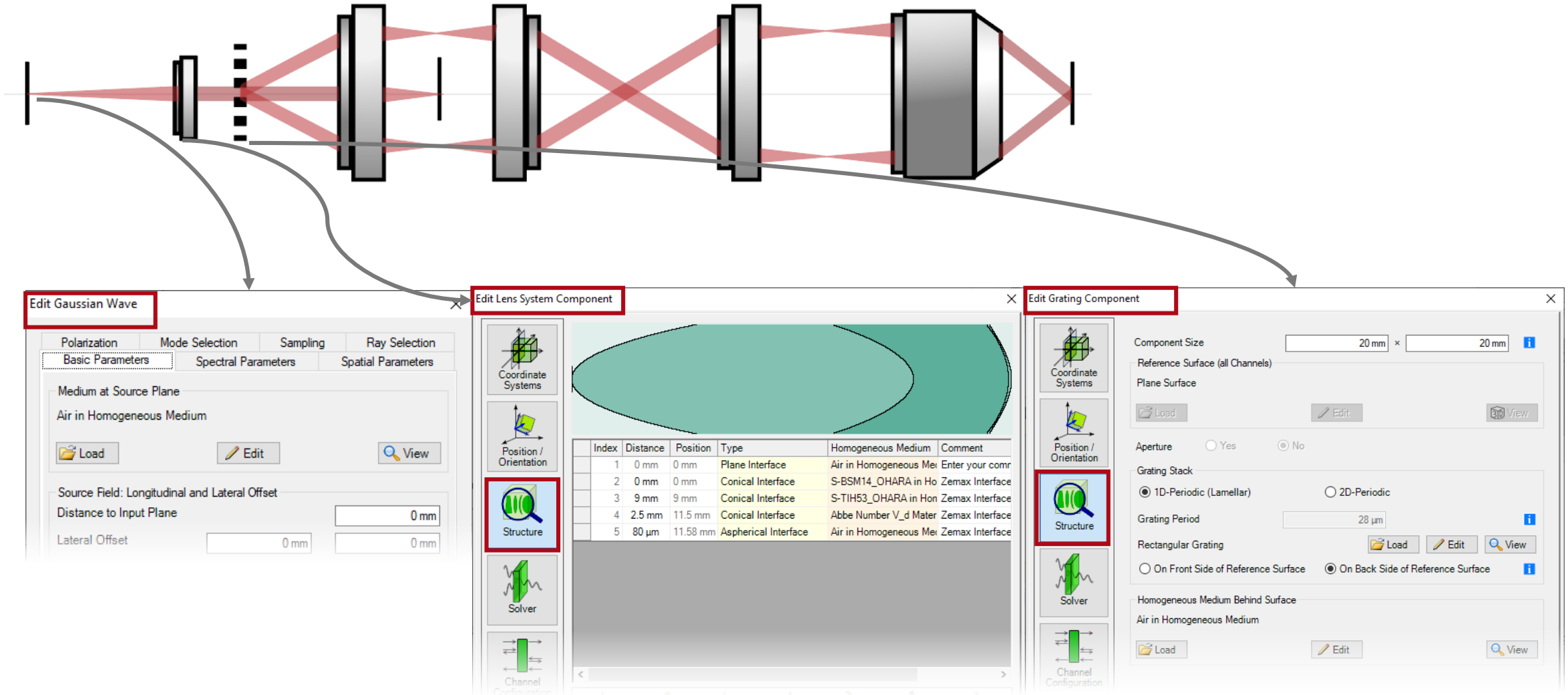
input plane wave
- wavelength 473 nm
- linearly polaried
  with the azimuthal angle
  $\phi = 90°,\ 60°, 30°, 0°$



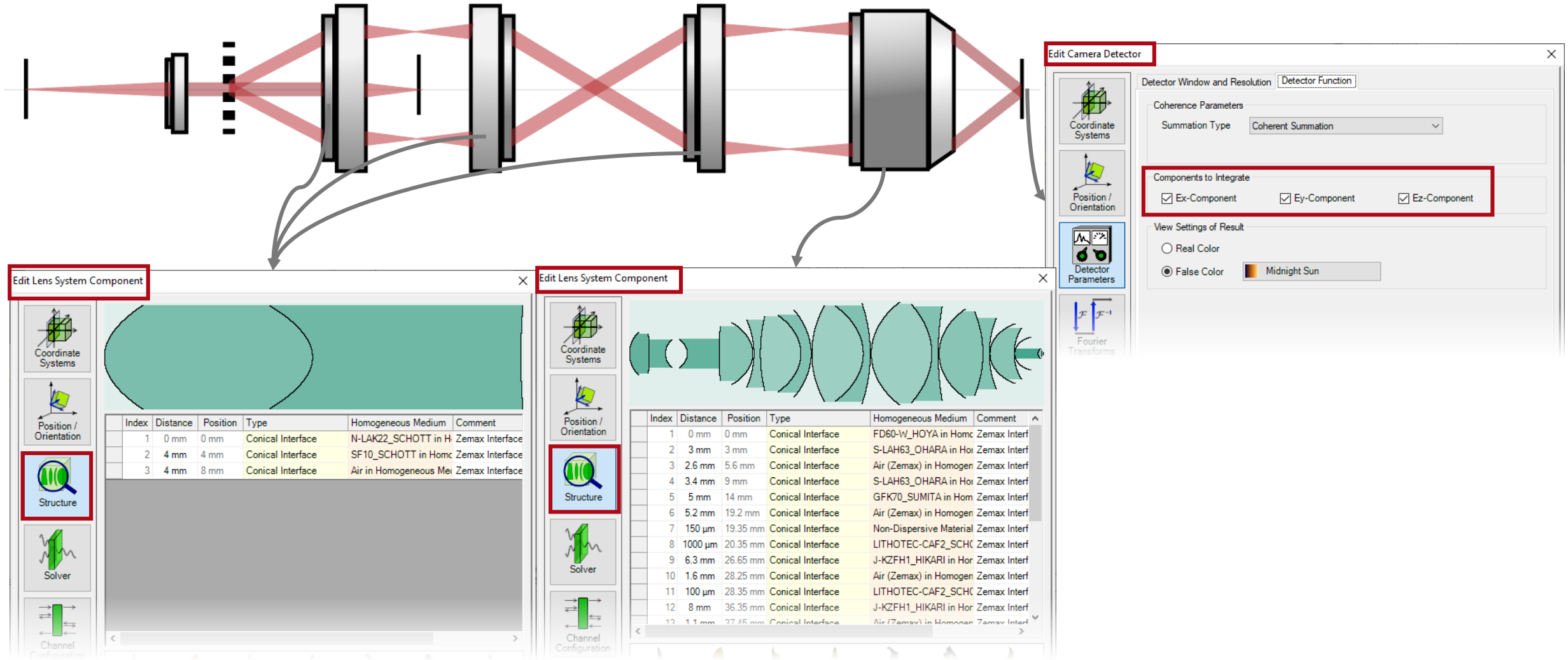
How is the contrast of the structured illumination influenced by the polarizations of the incident beam?

Building the System in VirtualLab Fusion

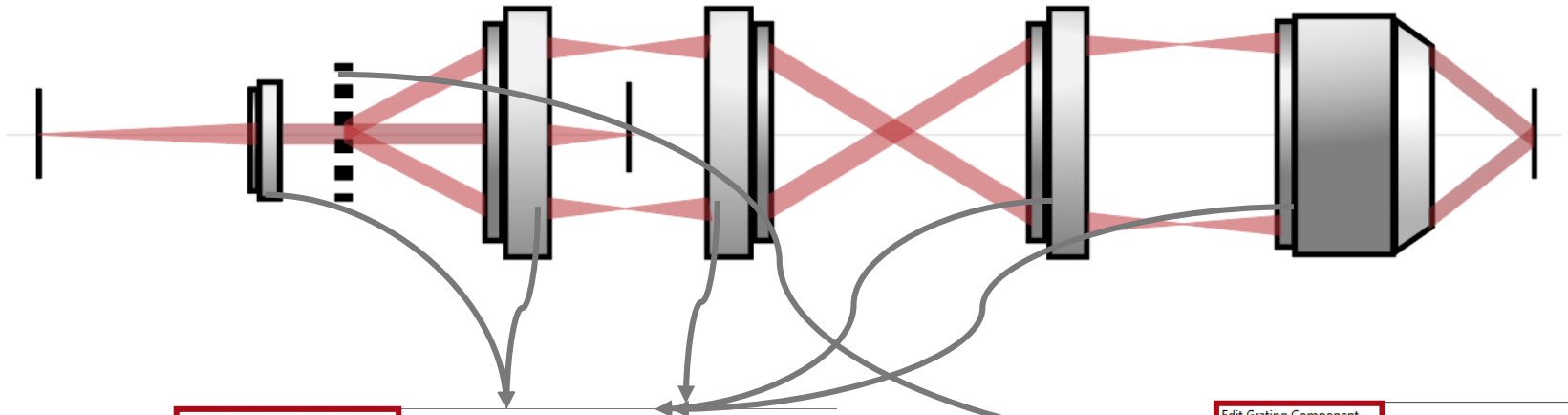
System Building Blocks

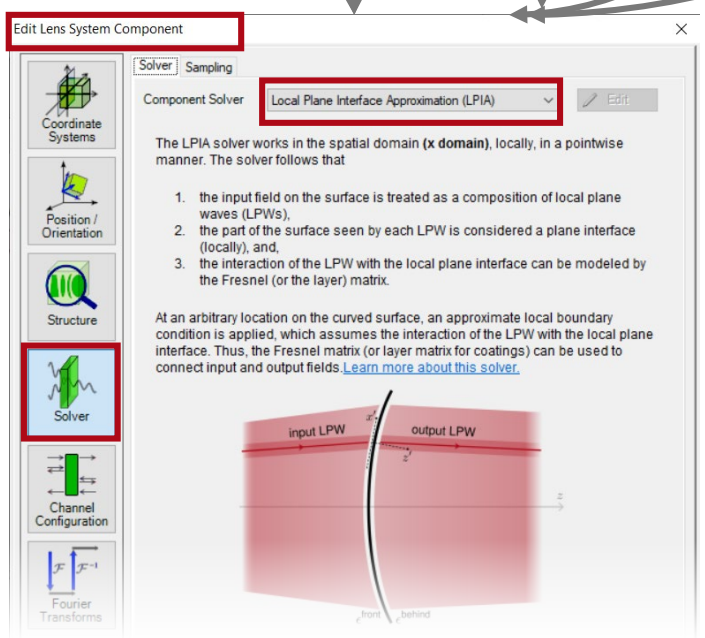


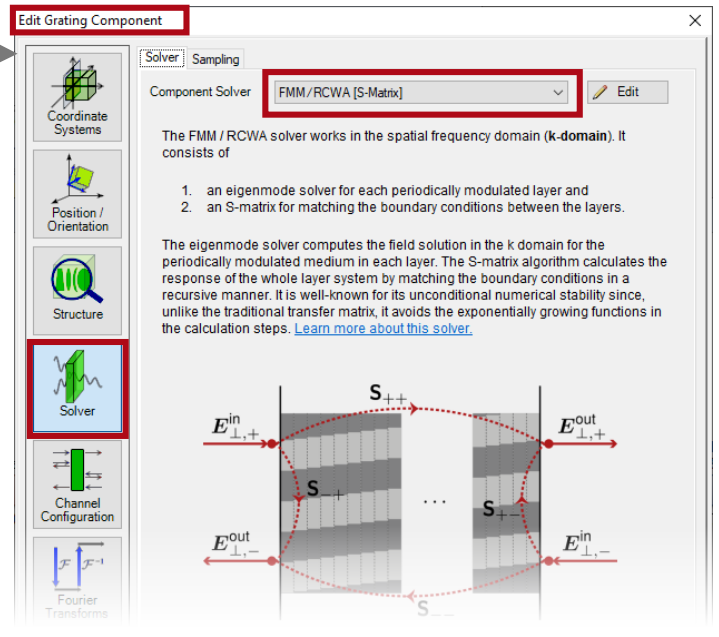
System Building Blocks



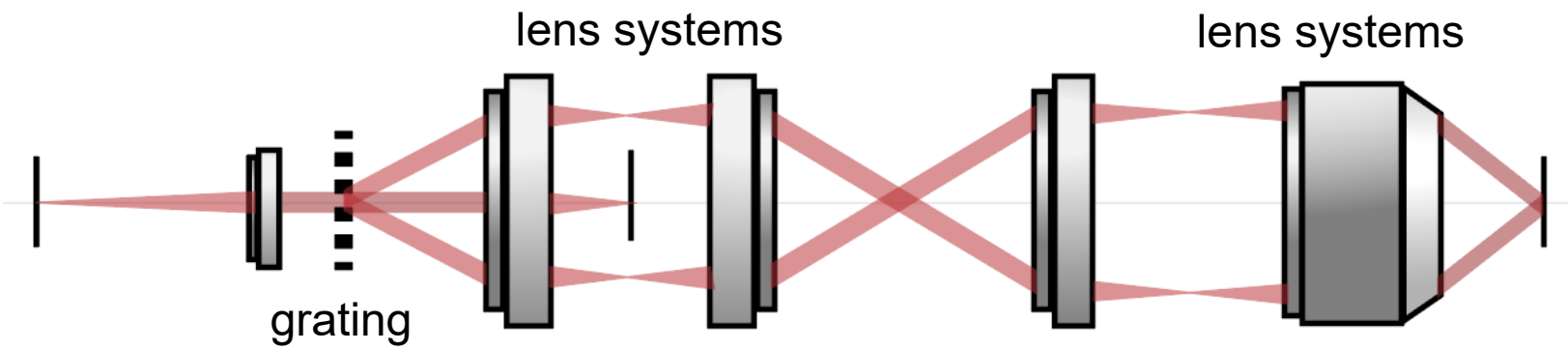
Solvers for Components







Summary

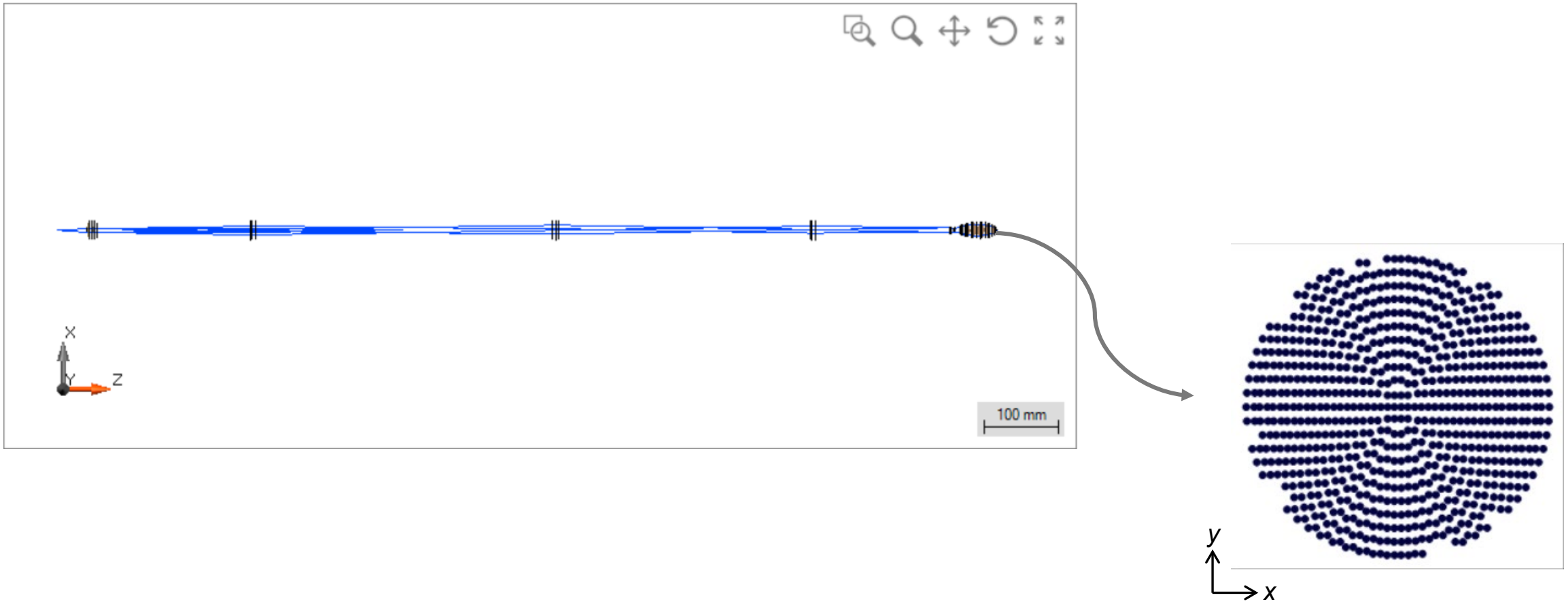


Components	Solvers
lens systems	Local Plane Interface Approximation (LPIA)
grating	Fourier Modal Method (FMM)

Geometric-Optics Simulations

by Ray Tracing

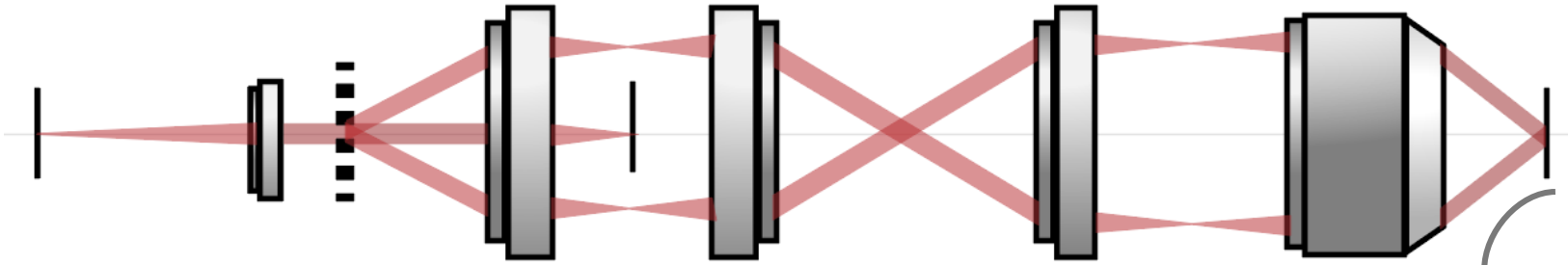
Results: Ray Tracing



Fast Physical-Optics Simulations

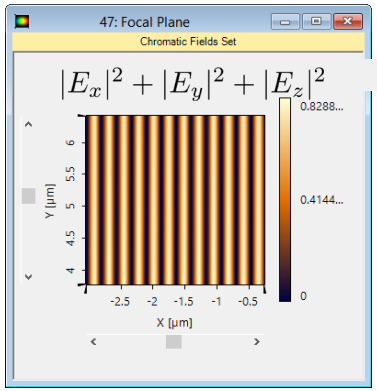
by Field Tracing

Structured Illumination Pattern at Focal Plane

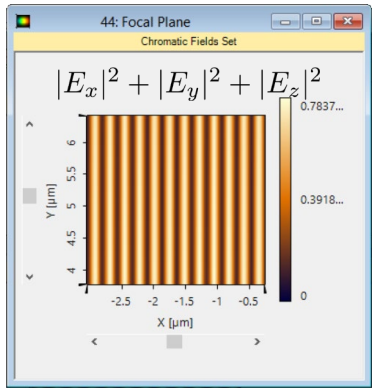


Contrast is decreasing as the azimuthal angle decreases.

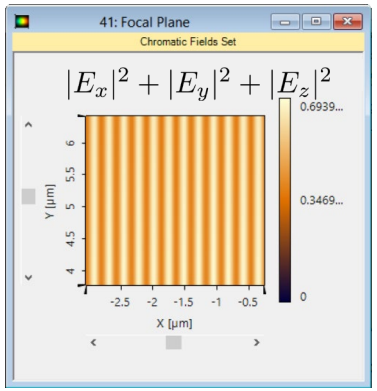
$\phi = 90°$



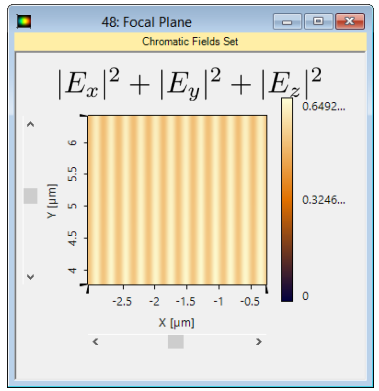
$\phi = 60°$



$\phi = 30°$



$\phi = 0°$



Document Information

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further reading	- Debye-Wolf Integral Calculator - Analyzing High-NA Objective Lens - Resolution Investigation for Microscope Objective Lenses by Rayleigh Criterion