High-NA Focusing by Off-Axis Parabolic Mirror
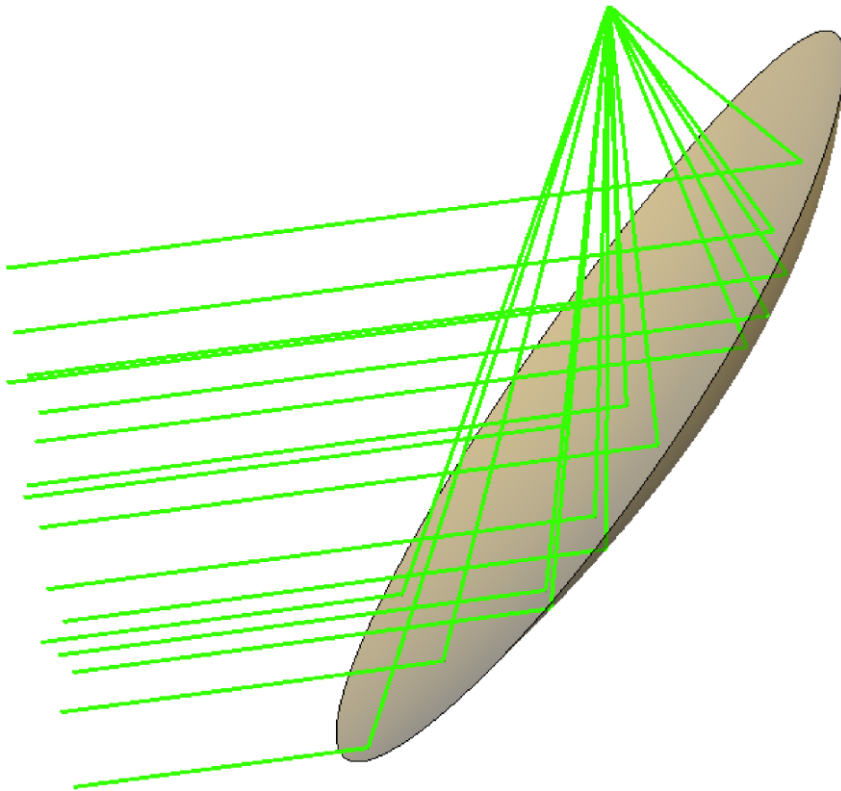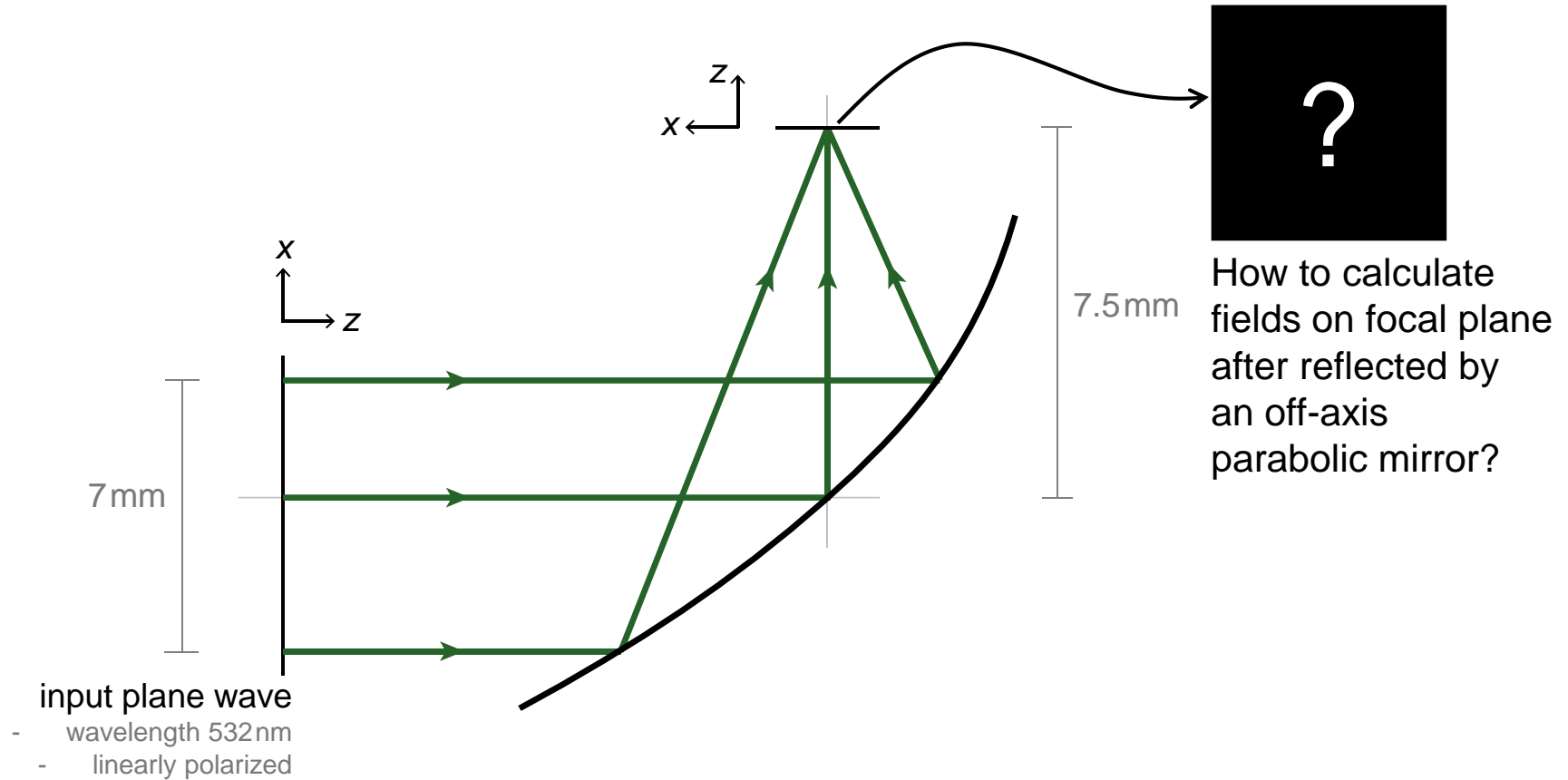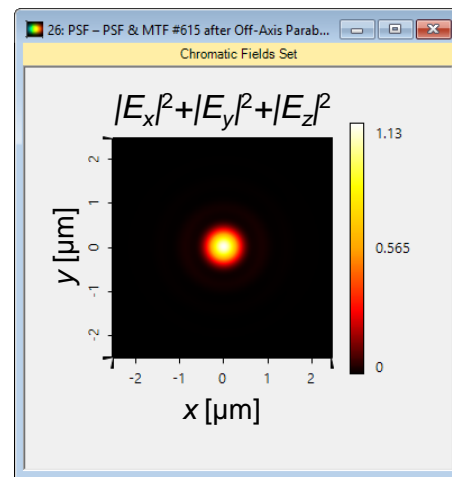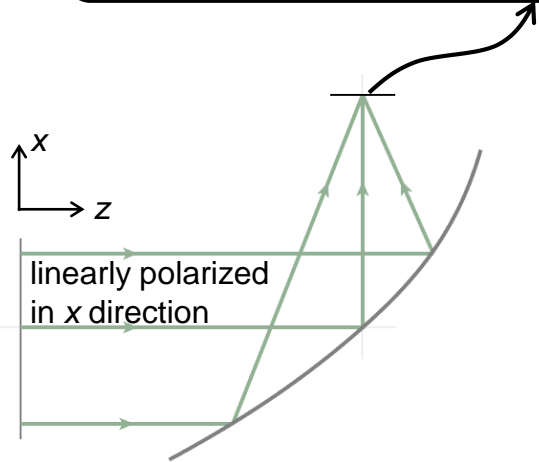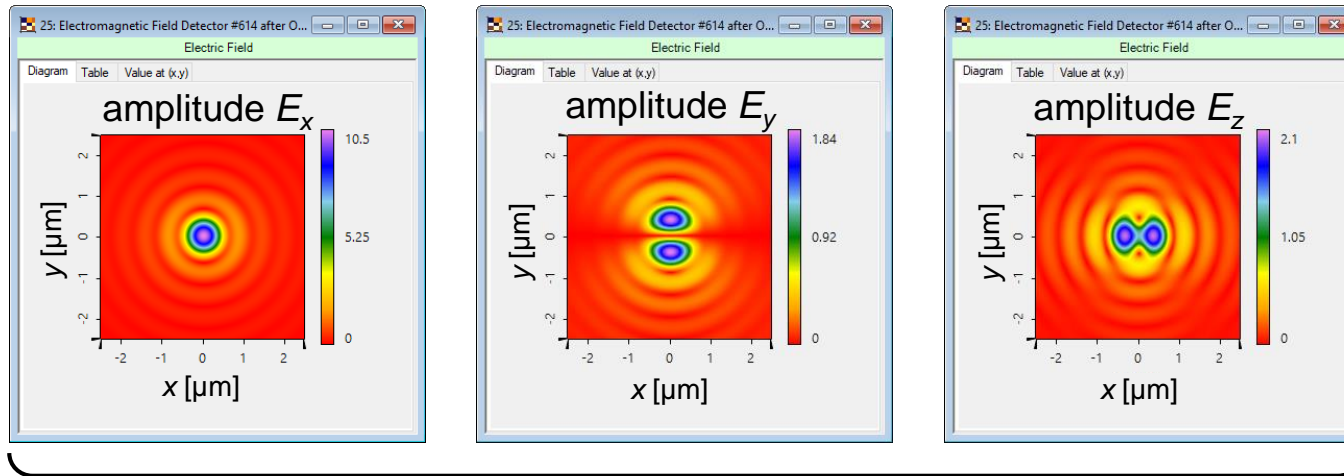
Abstract

In high-NA focusing situations, the vectorial nature of light starts to play a role. To demonstrate it, a high-NA parabolic mirror is used to focus the input plane wave with linear polarizations in different directions. By using the fast-physical-optics simulation techniques in VirtualLab, the fields in the focal plane can be easily examined and a clear difference between the focal spots due to different input polarizations can be seen.
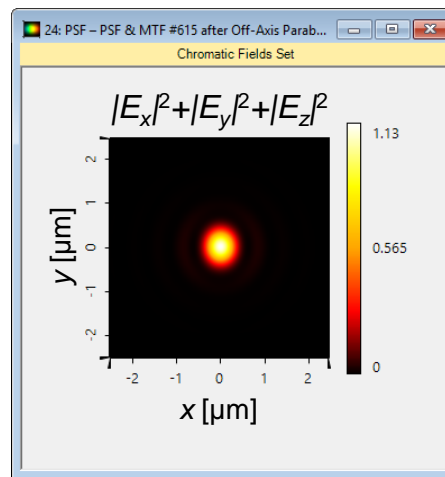
Modeling Task

z

x

x

z

7.5mm

7mm

?

How to calculate fields on focal plane after reflected by an off-axis parabolic mirror?

input plane wave
- wavelength 532nm
- linearly polarized

3

Results

amplitude E_x

amplitude E_y

amplitude E_z

x [μm]

y [μm]

linearly polarized
in x direction

$|E_x|^2 + |E_y|^2 + |E_z|^2$

x [μm]

y [μm]

Fully vectorial
electromagnetic field
simulation takes less
than 3 seconds.

FWHM (x)	FWHM (y)
571.3 nm	565.8 nm

4

Results

amplitude E_x

amplitude E_y

amplitude E_z

x [μm]

y [μm]

$|E_x|^2 + |E_y|^2 + |E_z|^2$

x [μm]

y [μm]

x

z

linearly polarized
in y direction
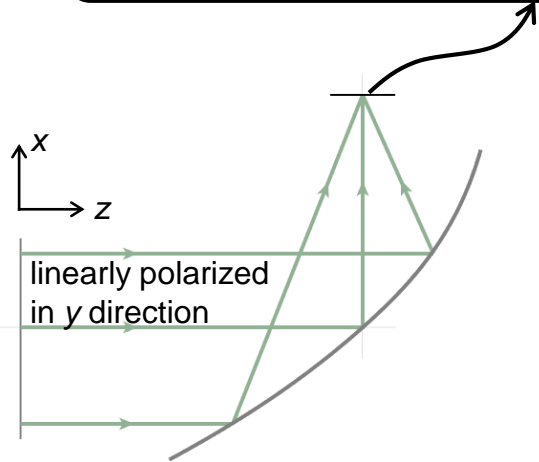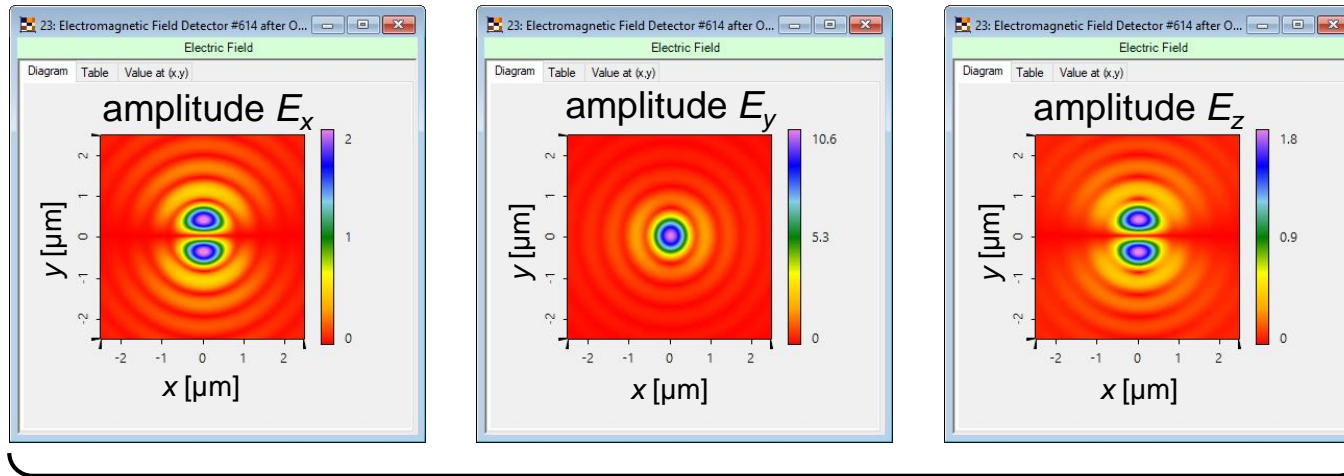
FWHM (x)	FWHM (y)
534.1 nm	607.9 nm

Document Information

title	High-NA Focusing by Off-Axis Parabolic Mirror
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