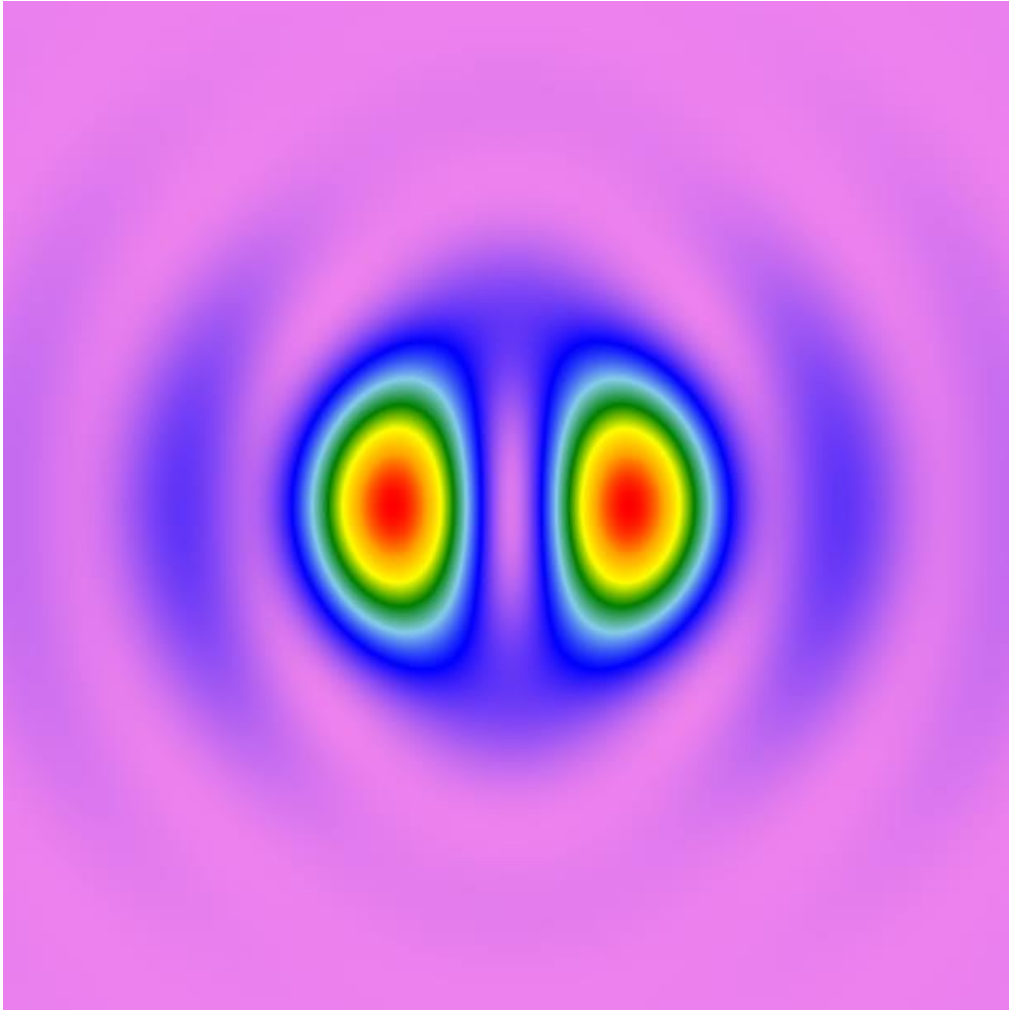


Focusing of Femtosecond Pulse by Using a High-NA Off-Axis Parabolic Mirror

Abstract



To fully characterize the focusing behavior of an ultrashort pulse, different electromagnetic properties must be considered. That includes both spatial distribution, temporal / spectral distribution, vectorial effect, and the possible coupling amongst all the above. As an example, the focusing process of a 10-fs pulse by using a high-NA parabolic mirror is modeled in VirtualLab Fusion, and both the spatial and temporal behaviors are investigated.

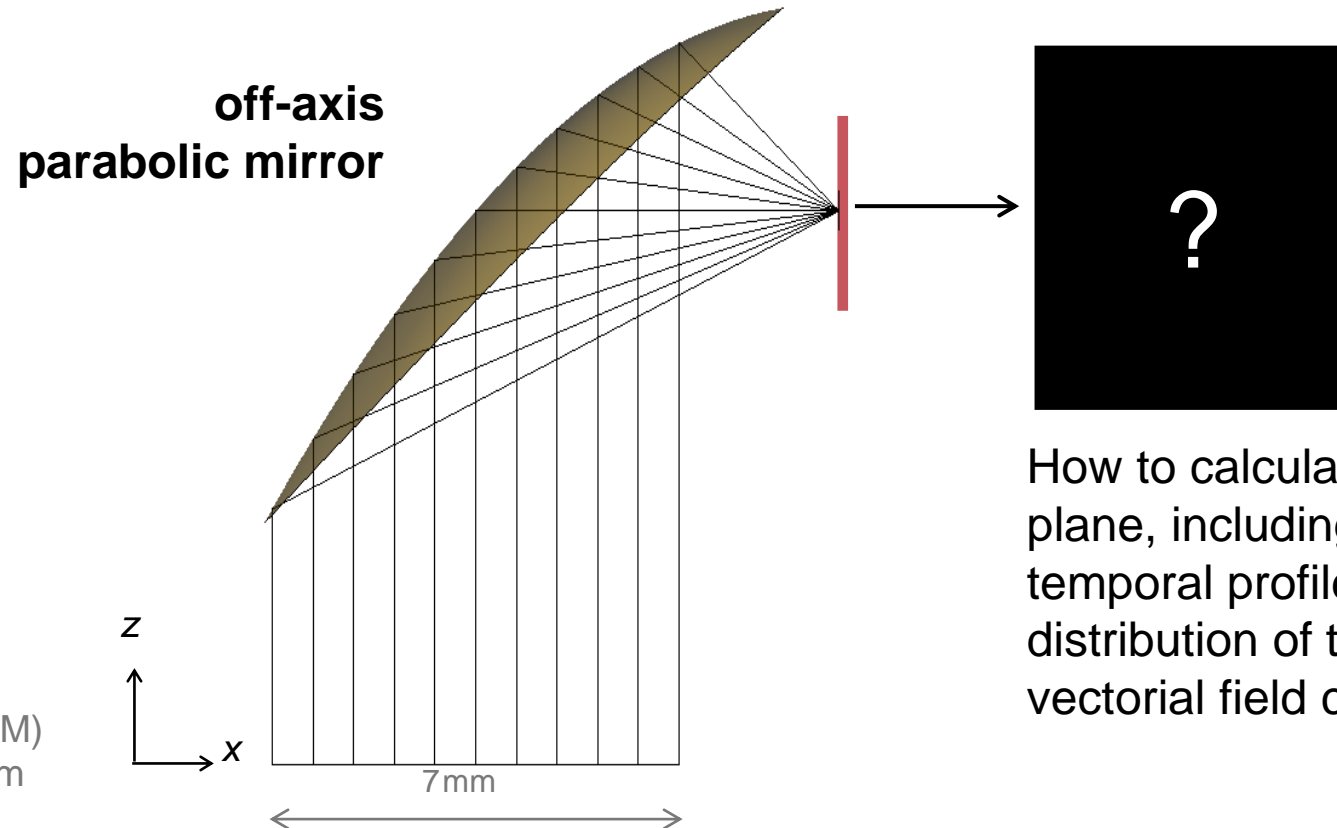
Modeling Task

a) **monochromatic source**

- beam diameter 7 mm
- linearly polarized in x direction
- wavelength 800 nm

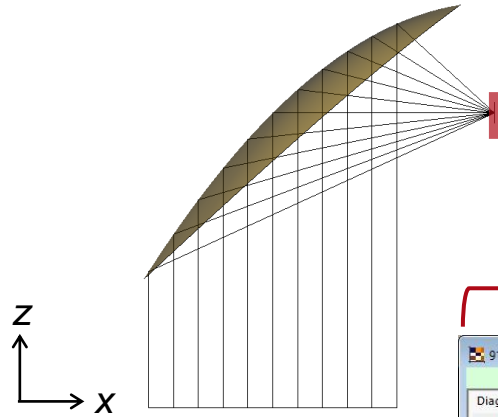
b) **pulse source**

- time duration 10 fs (FWHM)
- carrier wavelength 800 nm
- beam diameter 7 mm
- linearly polarized in x direction



How to calculate the field in the focal plane, including the spectral / temporal profile and the spatial distribution of the focal spot for all vectorial field components?

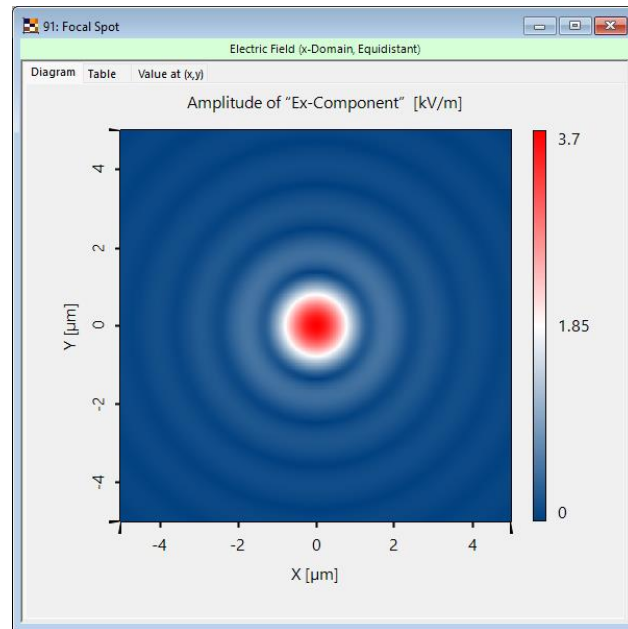
Results – Monochromatic Source



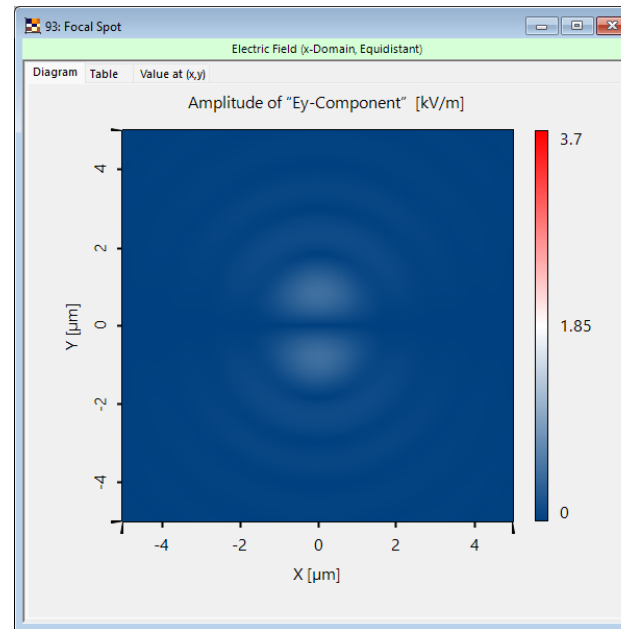
Source:

a) **monochromatic**
(800 nm)

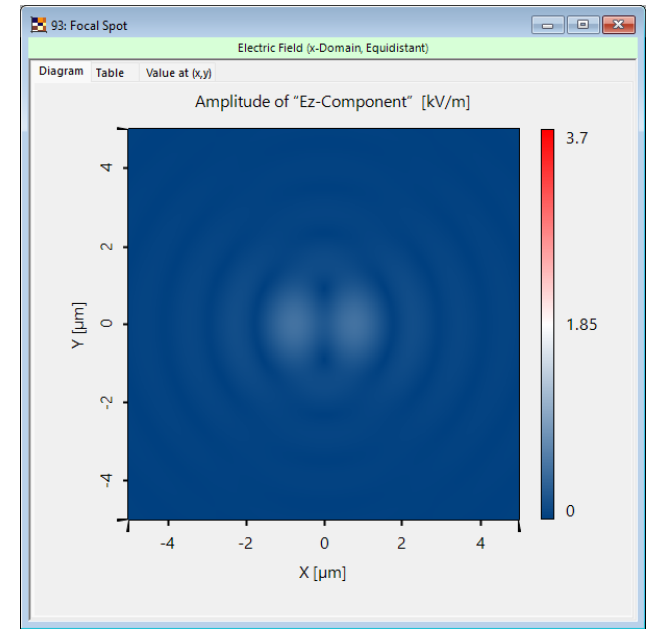
b) Pulse (800 nm
central
wavelength, 10 fs
pulse duration)



x - component

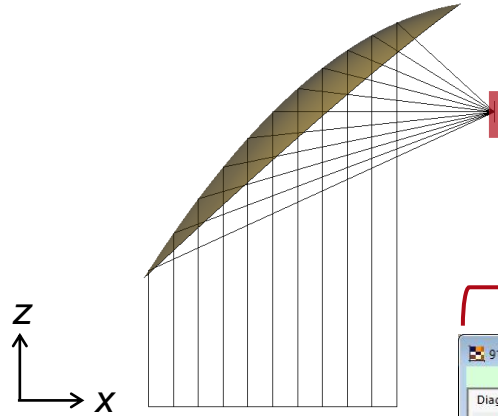


y - component



z - component

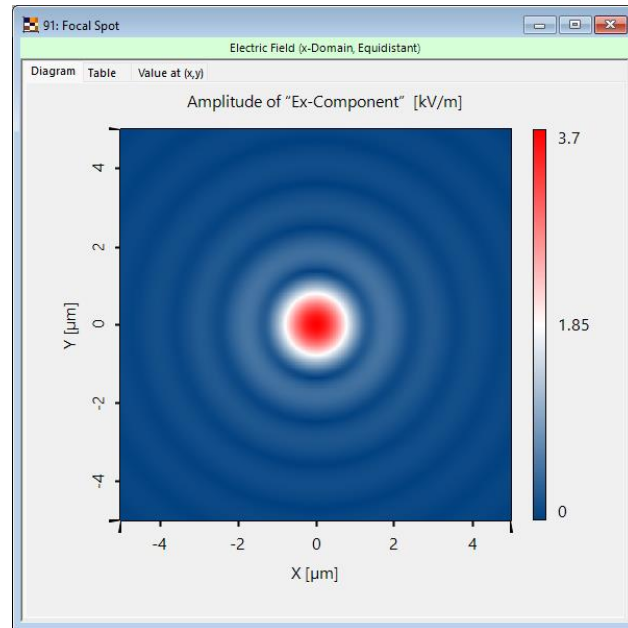
Results – Monochromatic Source



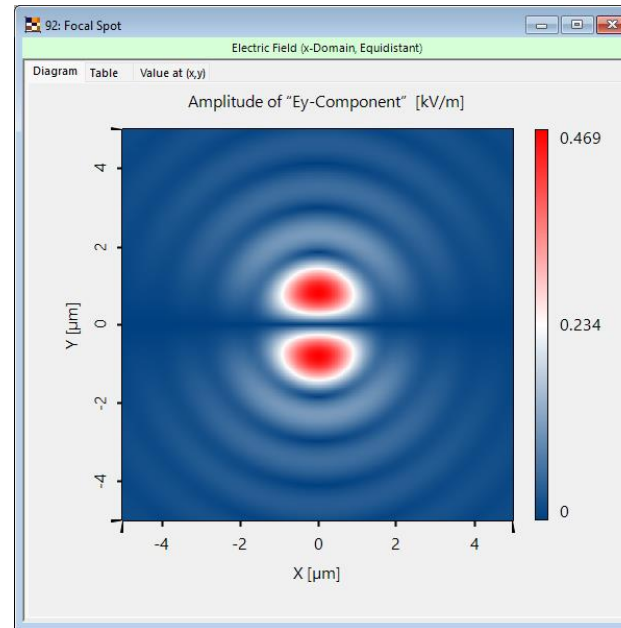
Source:

a) **monochromatic**
(800 nm)

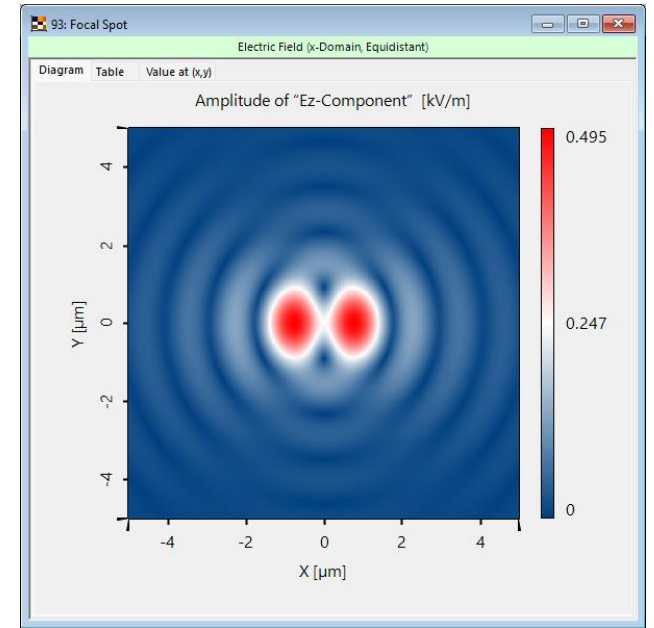
b) Pulse (800 nm
central
wavelength, 10 fs
pulse duration)



x - component

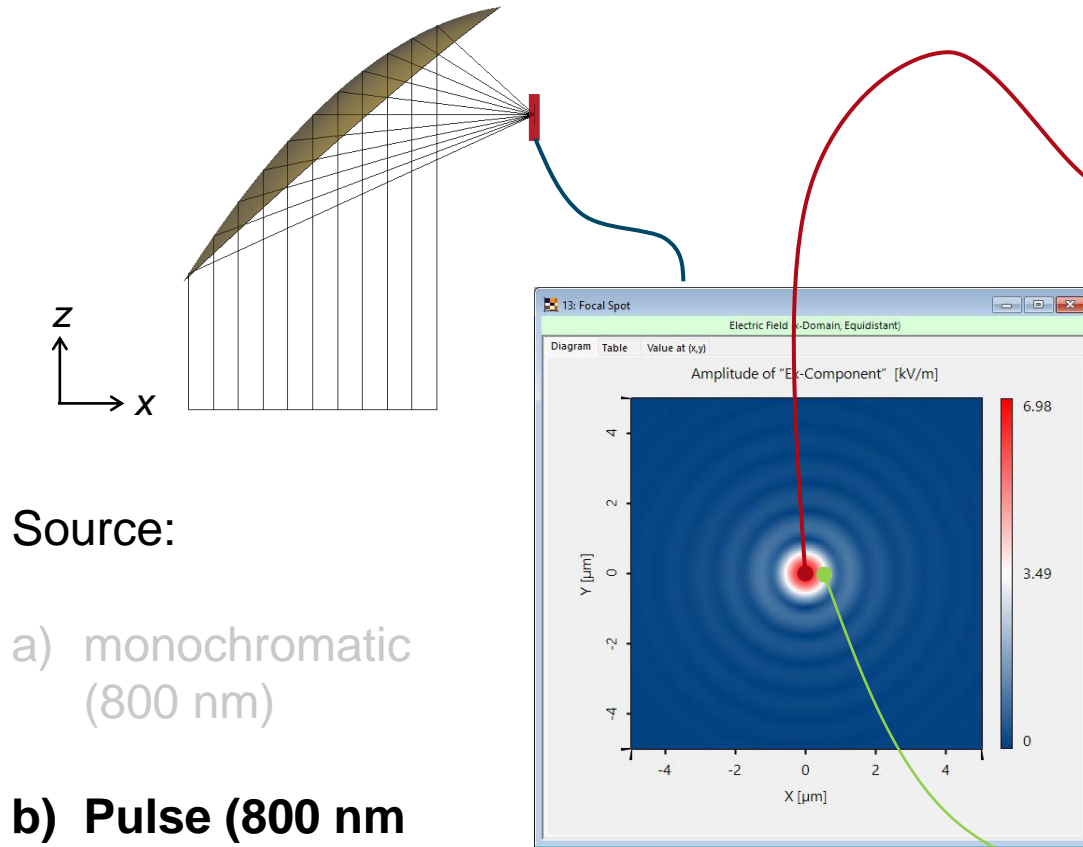


y - component



z - component

Results – Puls Source



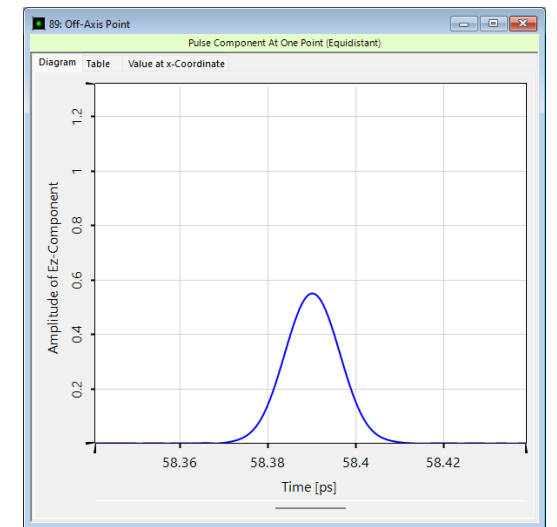
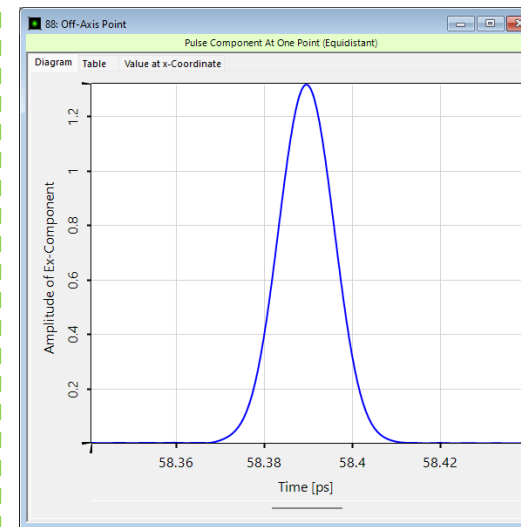
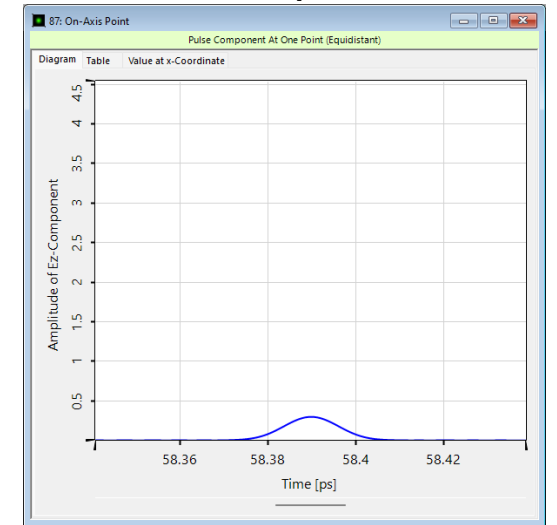
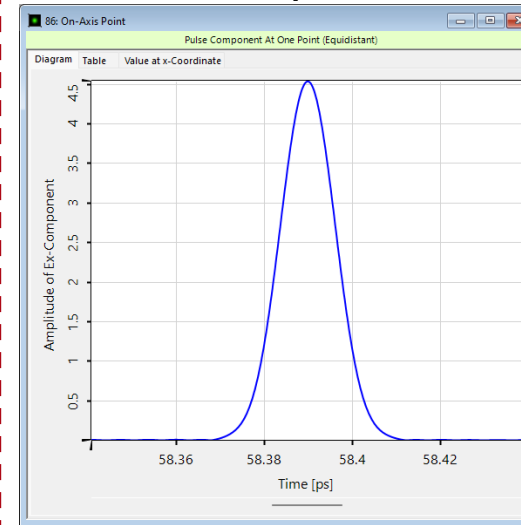
Source:

a) monochromatic
(800 nm)

b) **Pulse (800 nm
central
wavelength, 10
fs pulse
duration)**

x - component

z - component



Document Information

title	Pulse Front Tilt in SSTF – Setups
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software version	2020.2 (Build 1.116)
category	Application Use Case
further reading	<ul style="list-style-type: none">- <u>Grating Stretcher for Ultrashort Pulses</u>- <u>Pulse Focusing with High-NA Lens</u>