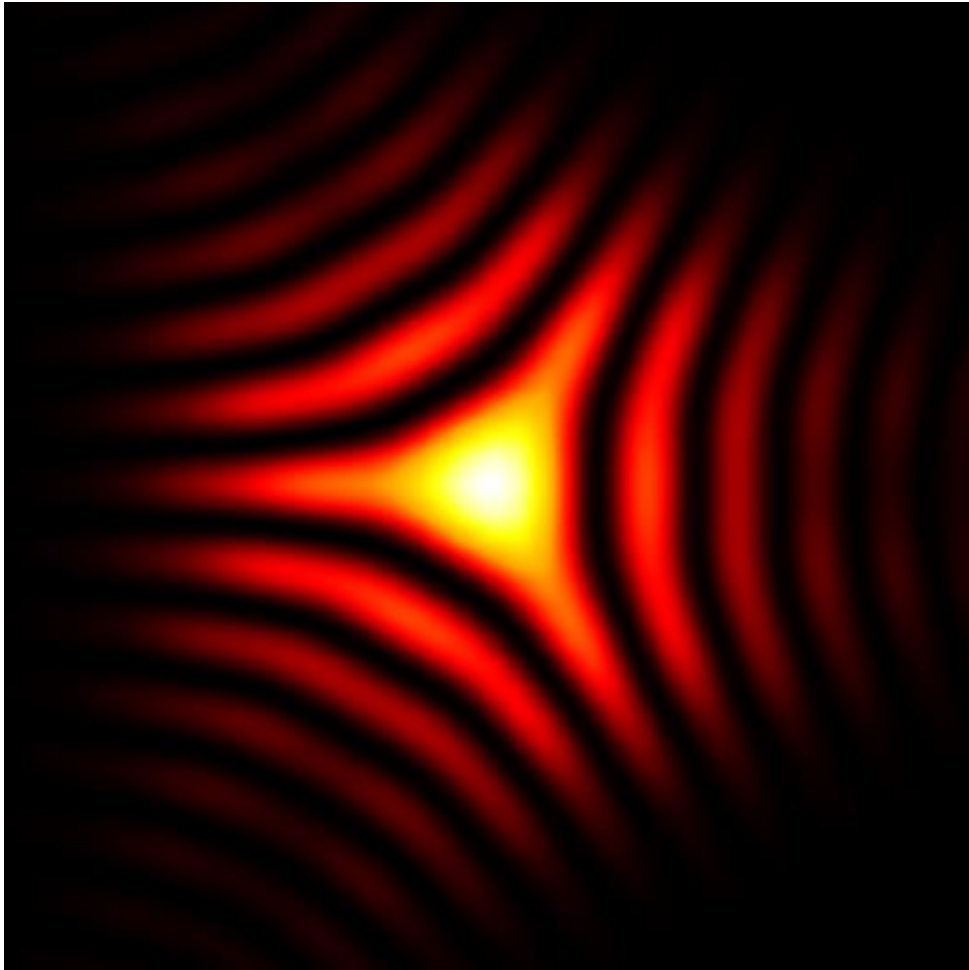


Focal Spots for Different Aberrations

Abstract

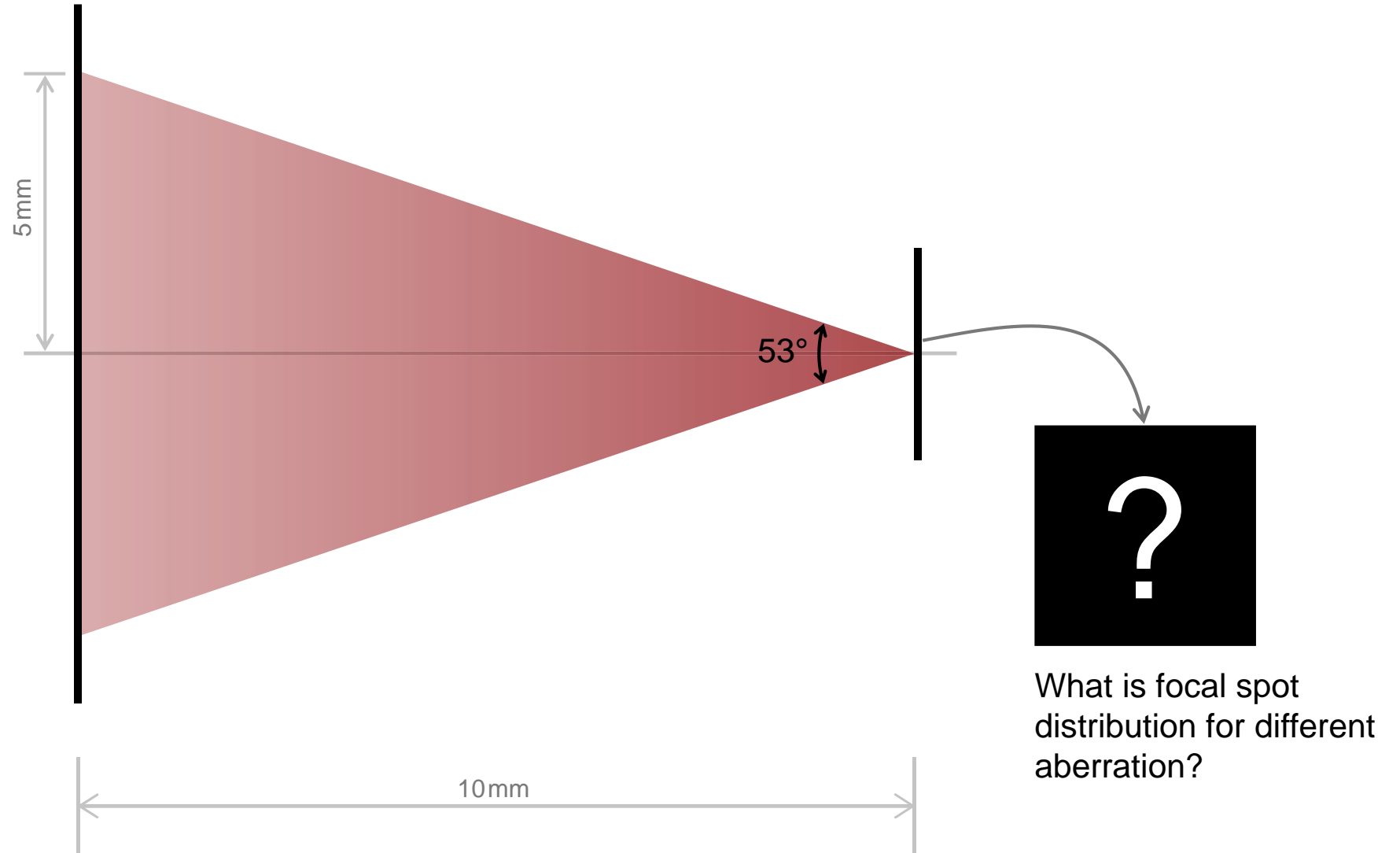


Different wavefront aberrations have different influences on the focal spot distribution. It is therefore crucial to investigate such effects in e.g. imaging systems. In VirtualLab Fusion, different wavefront aberrations can be generated and their effects on the focal spot distribution can be studied conveniently. As examples, we select several typical aberrations (spherical, coma, astigmatism, ...), vary their values, and calculate the corresponding focal spot distributions.

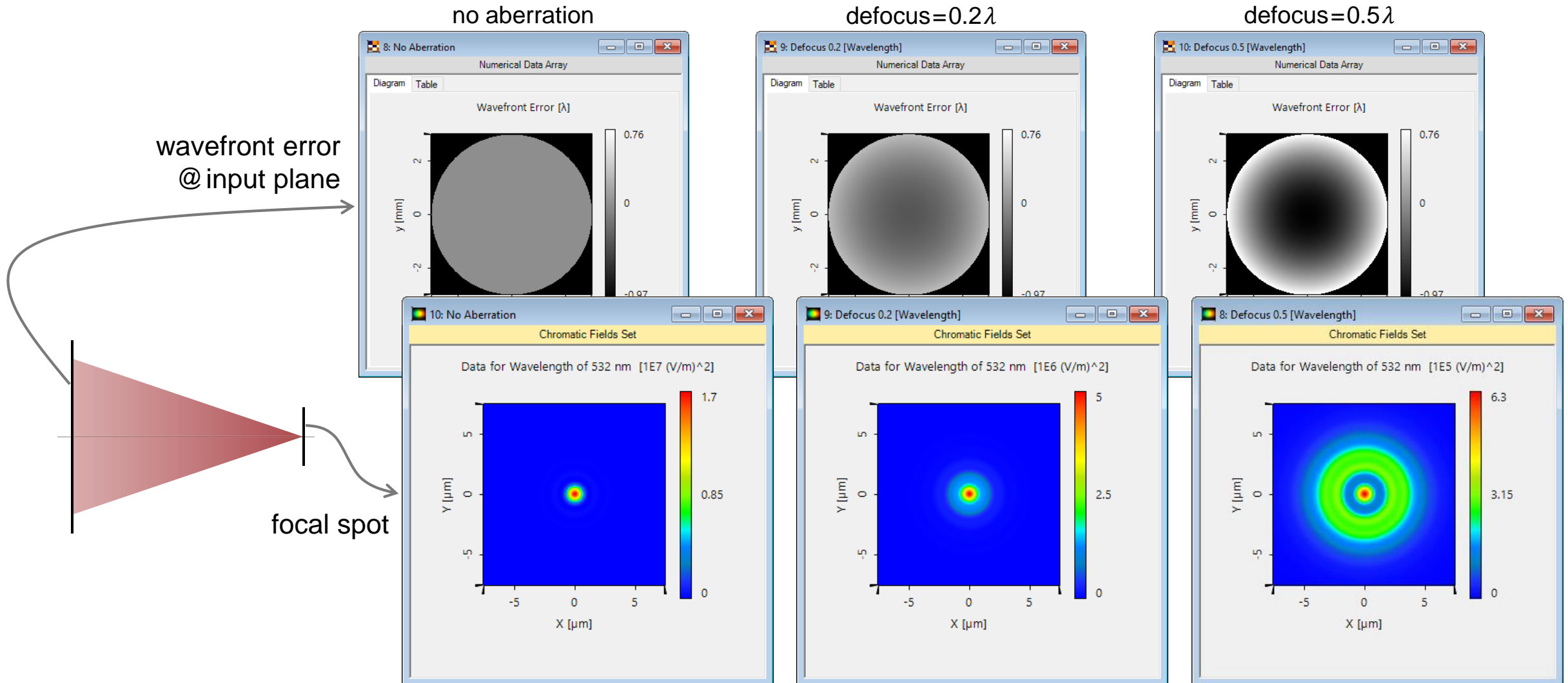
Modeling Task

input spherical wave with different aberration

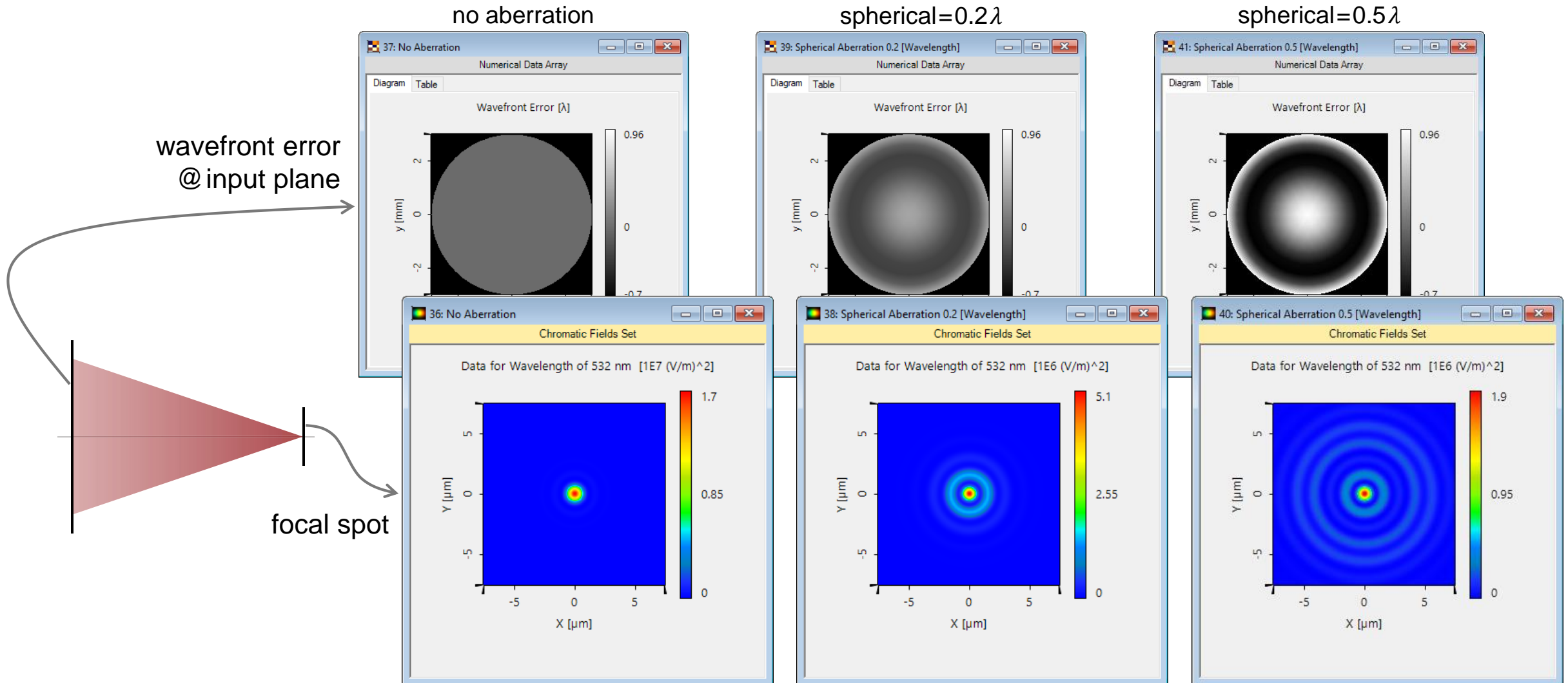
- wavelength @ 532nm
- type of aberration:
 1. defocus
 2. spherical
 3. astigmatism
 4. coma
 5. secondary coma
 6. trefoil



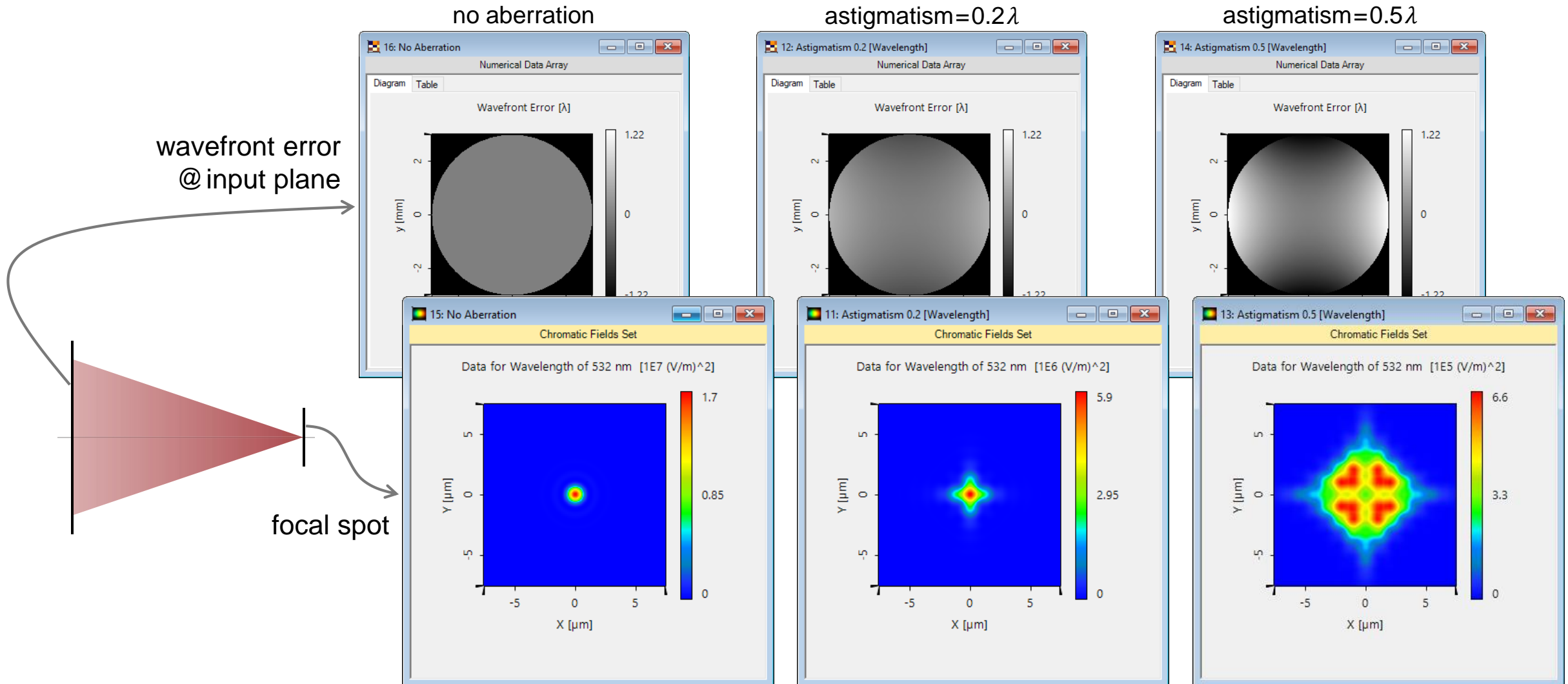
Defocus



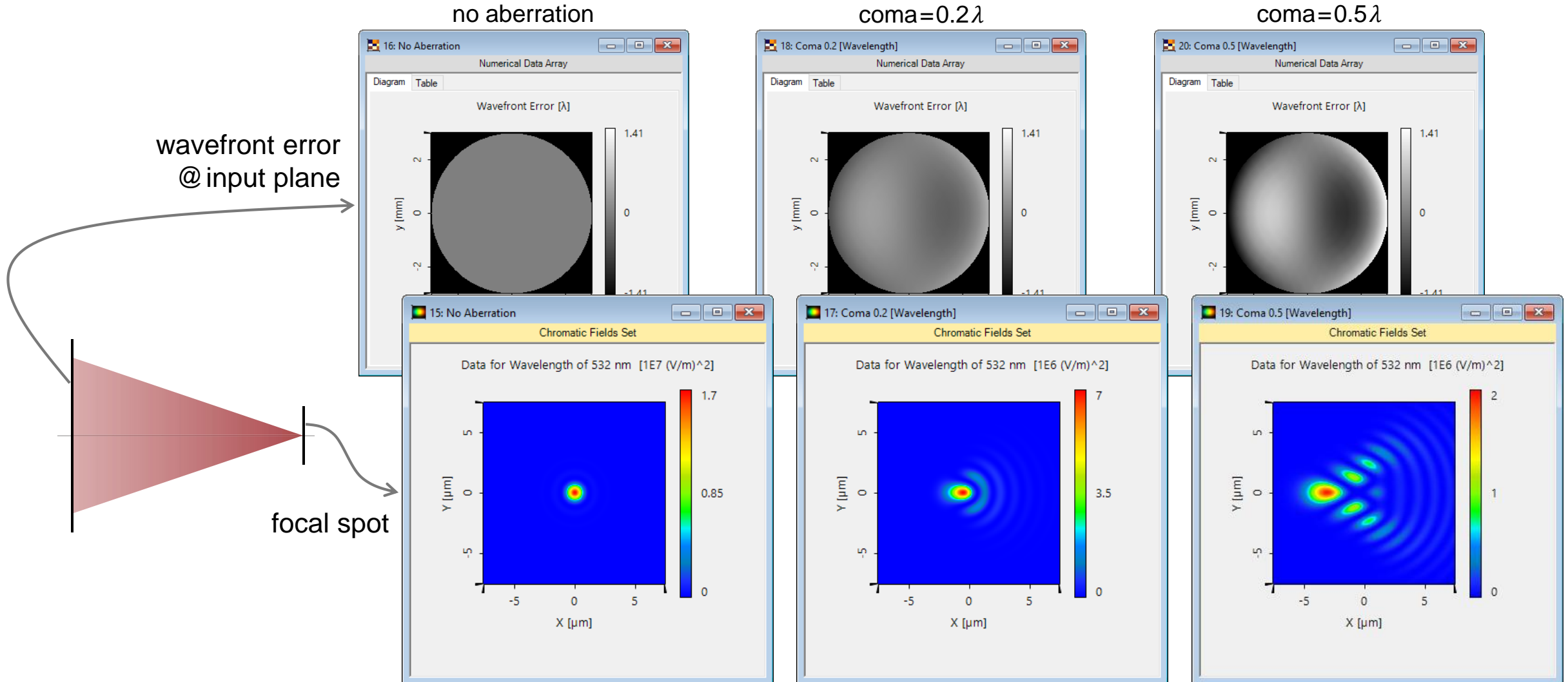
Spherical Aberration



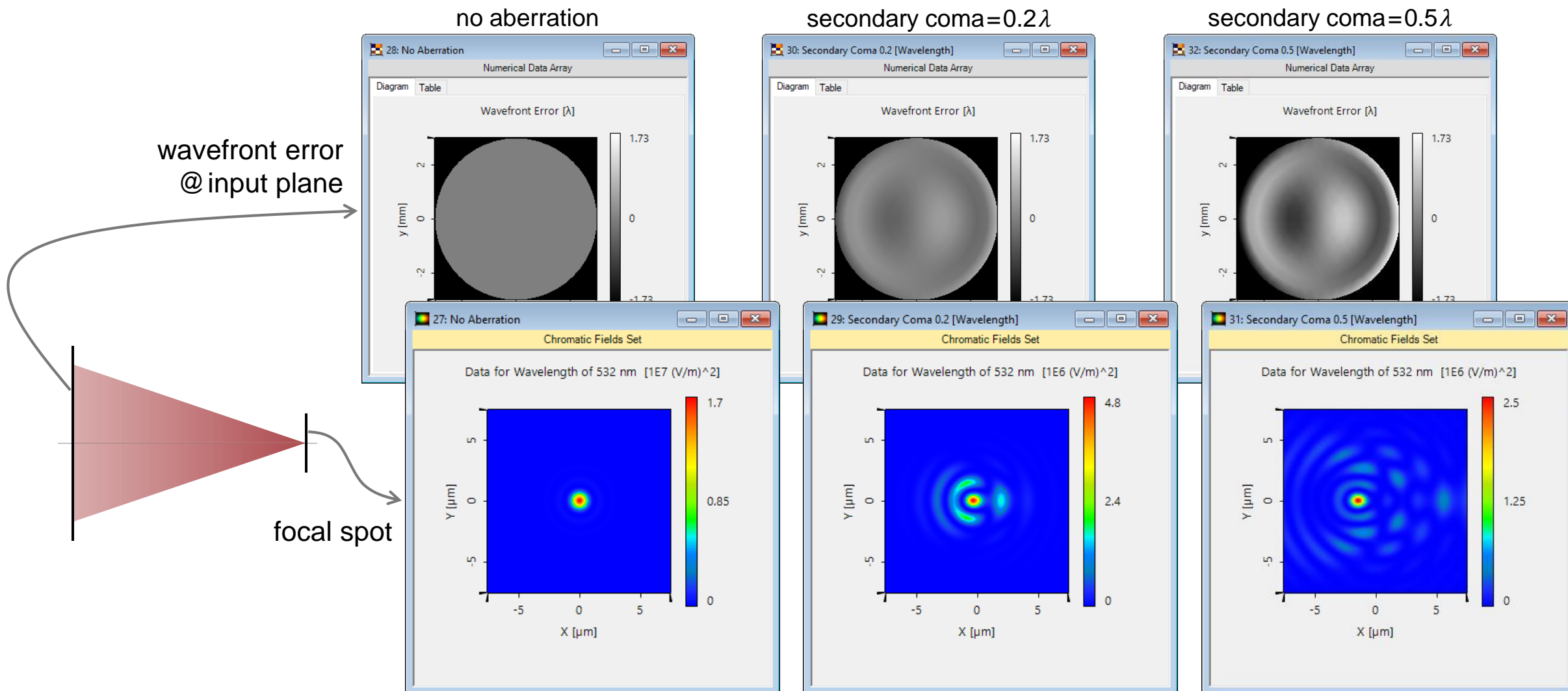
Astigmatism



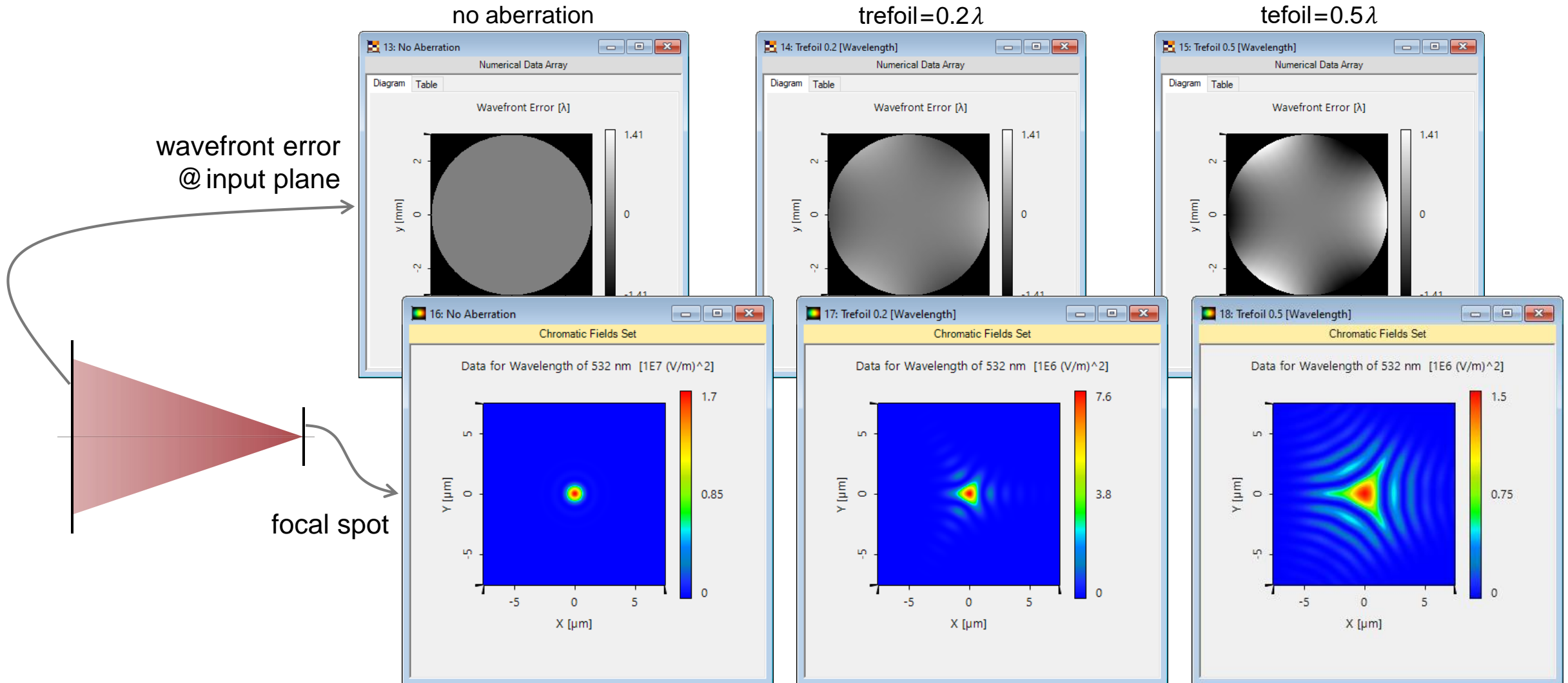
Coma



Secondary Coma



Trefoil



Peek into VirtualLab Fusion

customizable wavefront aberrations

Edit Zernike & Seidel Aberrations

Basic Parameters Physical Parameters Sampling

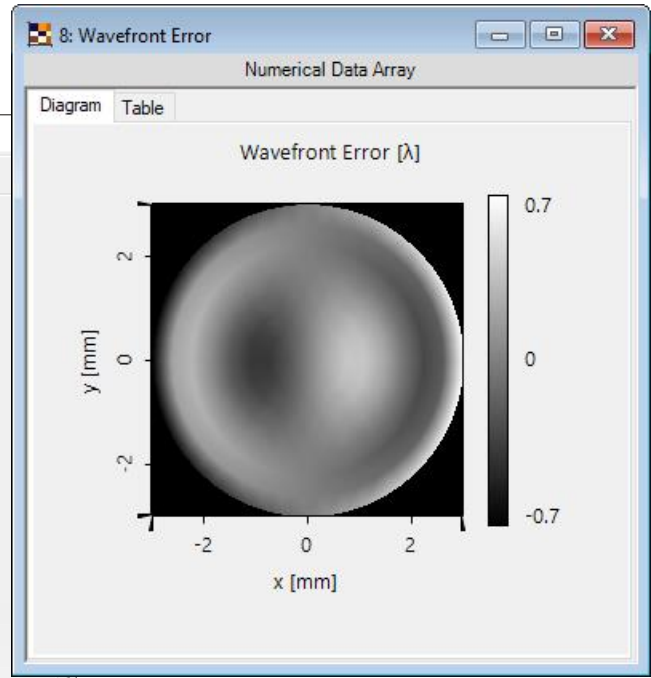
Mode: Zernike Standard Aberrations

Polynomial Degree: 5 Corresponds to 21 Coefficients

n	Name	Value [λ]
15	Tetrafoil X	0
16	Pentafoil Y	0
17	Secondary Trefoil Y	0
18	Secondary Coma Y	0
19	Secondary Coma X	0.2
20	Secondary Trefoil X	0
21	Pentafoil X	0

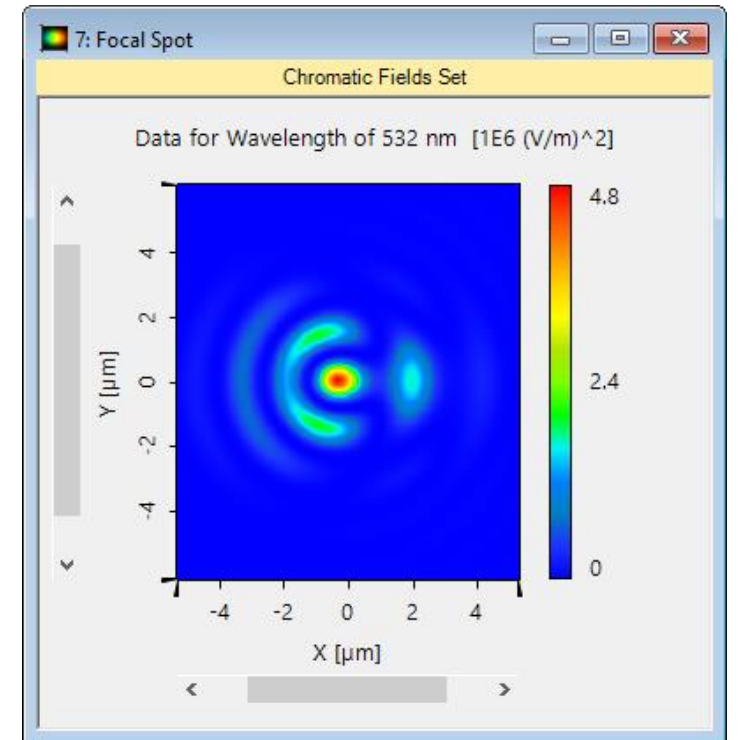
Maximum Radial Extent: 3 mm

Wavelength Dependency: Chromatic (Wavelength: 532 nm)

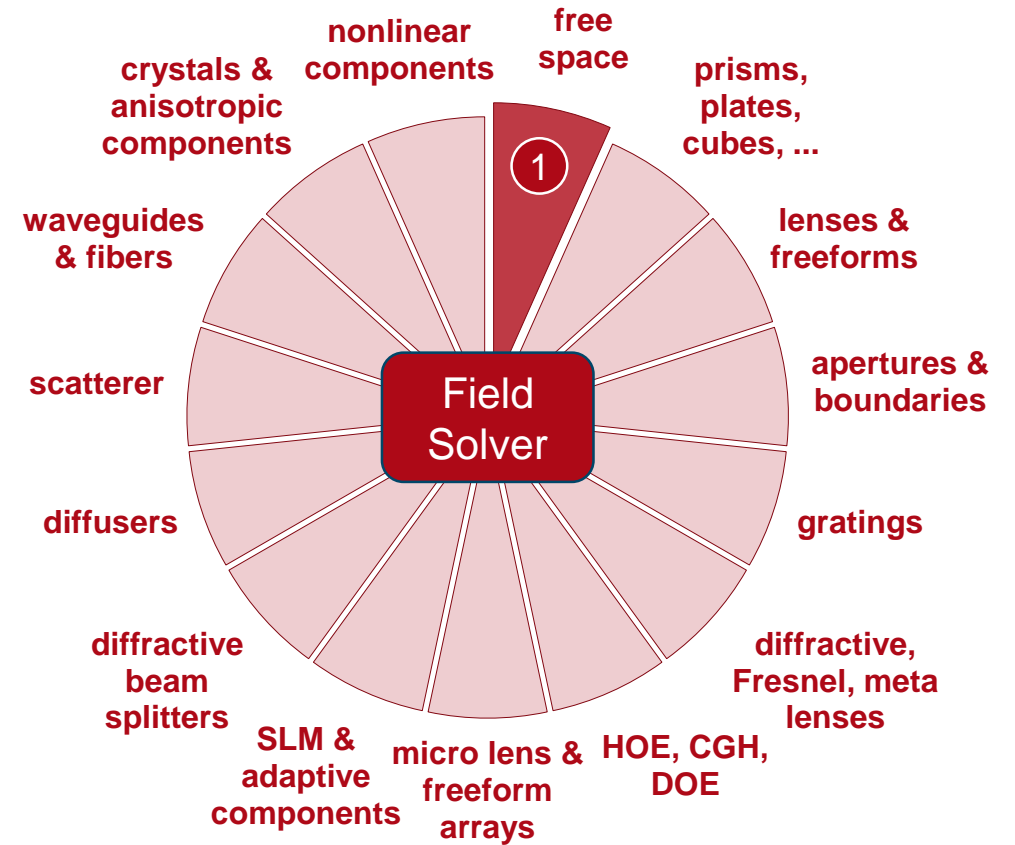
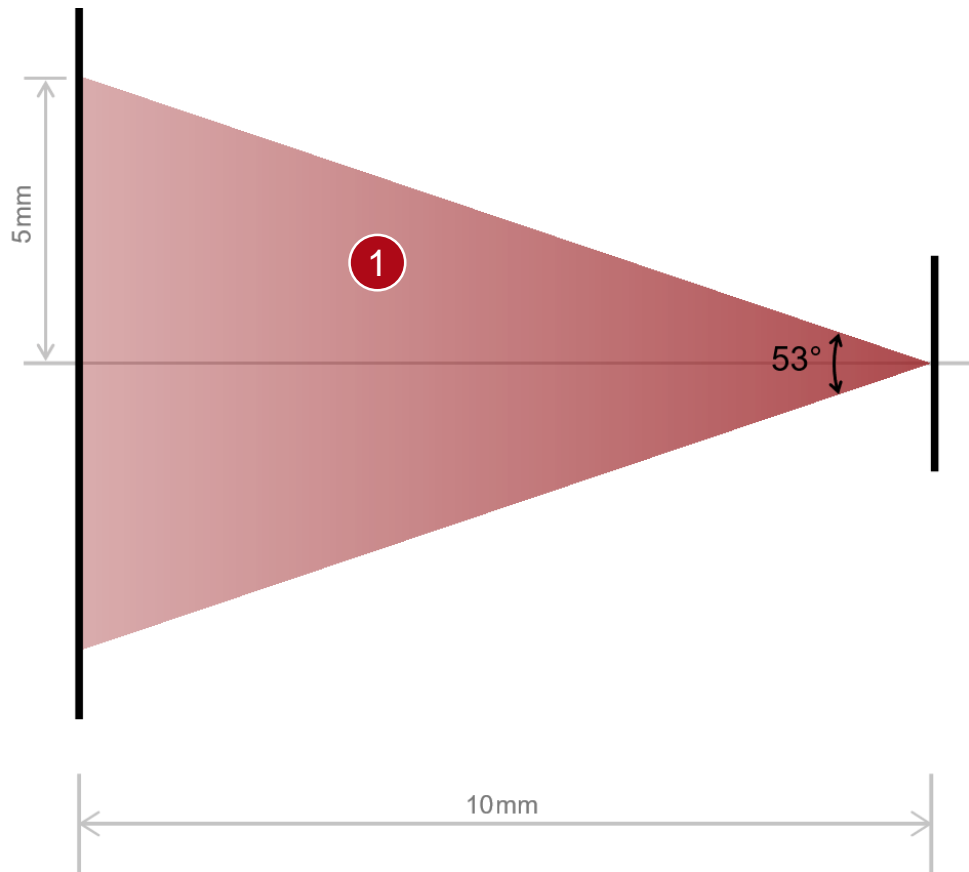


visualization of wavefront error

fast calculation and flexible visualization of focal spot



VirtualLab Fusion Technologies



Document Information

title	Focal Spots for Different Aberrations
document code	MISC.0002
version	1.1
toolbox(es)	Starter Toolbox
VL version used for simulations	VirtualLab Fusion Summer Release 2019 (7.6.1.18)
category	Application Use Case
further reading	<ul style="list-style-type: none">- <u>Advanced PSF & MTF Calculation for System with Rectangular Aperture</u>- <u>Simulation of Laser Beam in Focal Region of High-NA Asphere</u>