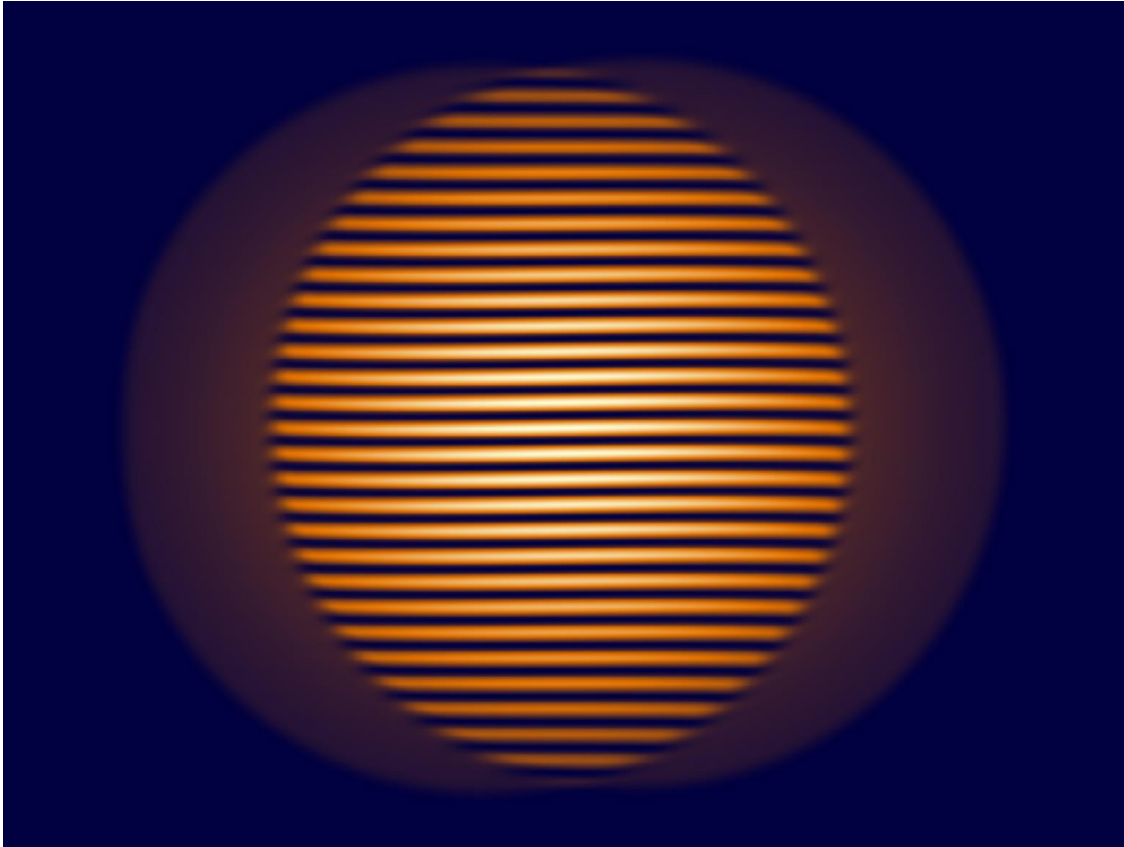


Collimation Testing with Shearing Interferometry

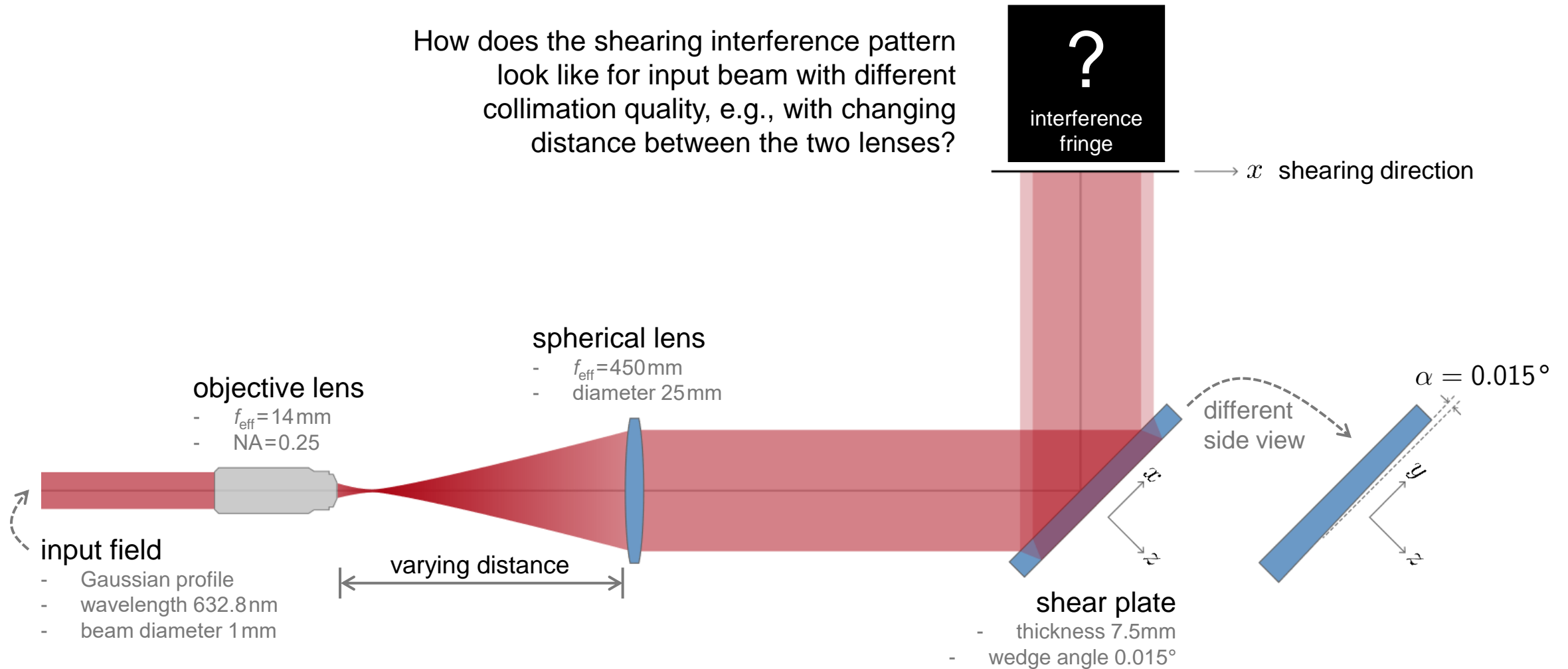
Abstract



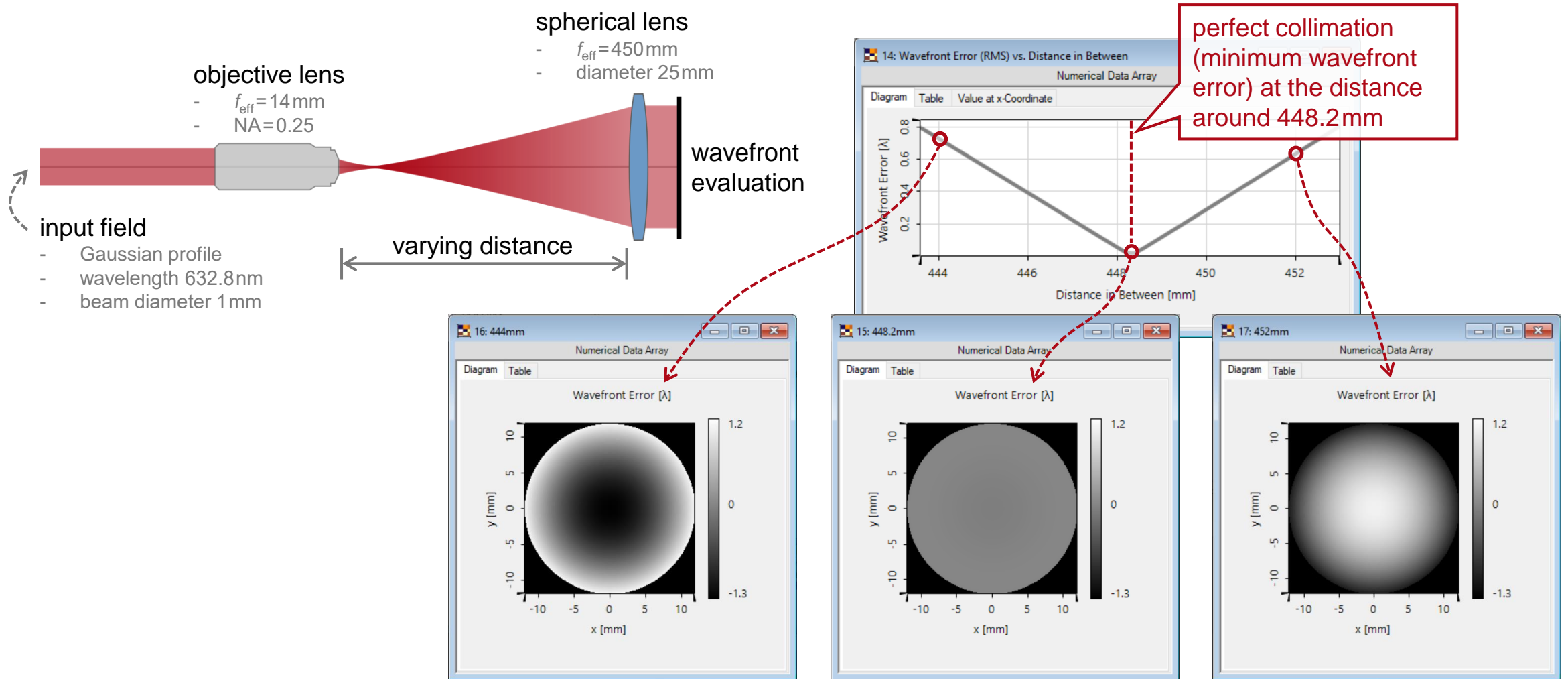
Collimation of laser beams is a fundamentally essential task for various optical applications. Testing of the collimation is therefore of significance as well, and shearing interferometry is often employed for such tasks. In this example, we demonstrate how to build up a shearing interferometer and to use it for testing the collimation. By varying the beam collimation system – in this example, the distance between the two lenses – we observe the interference fringes from the shearing interferometry.

Modeling Task

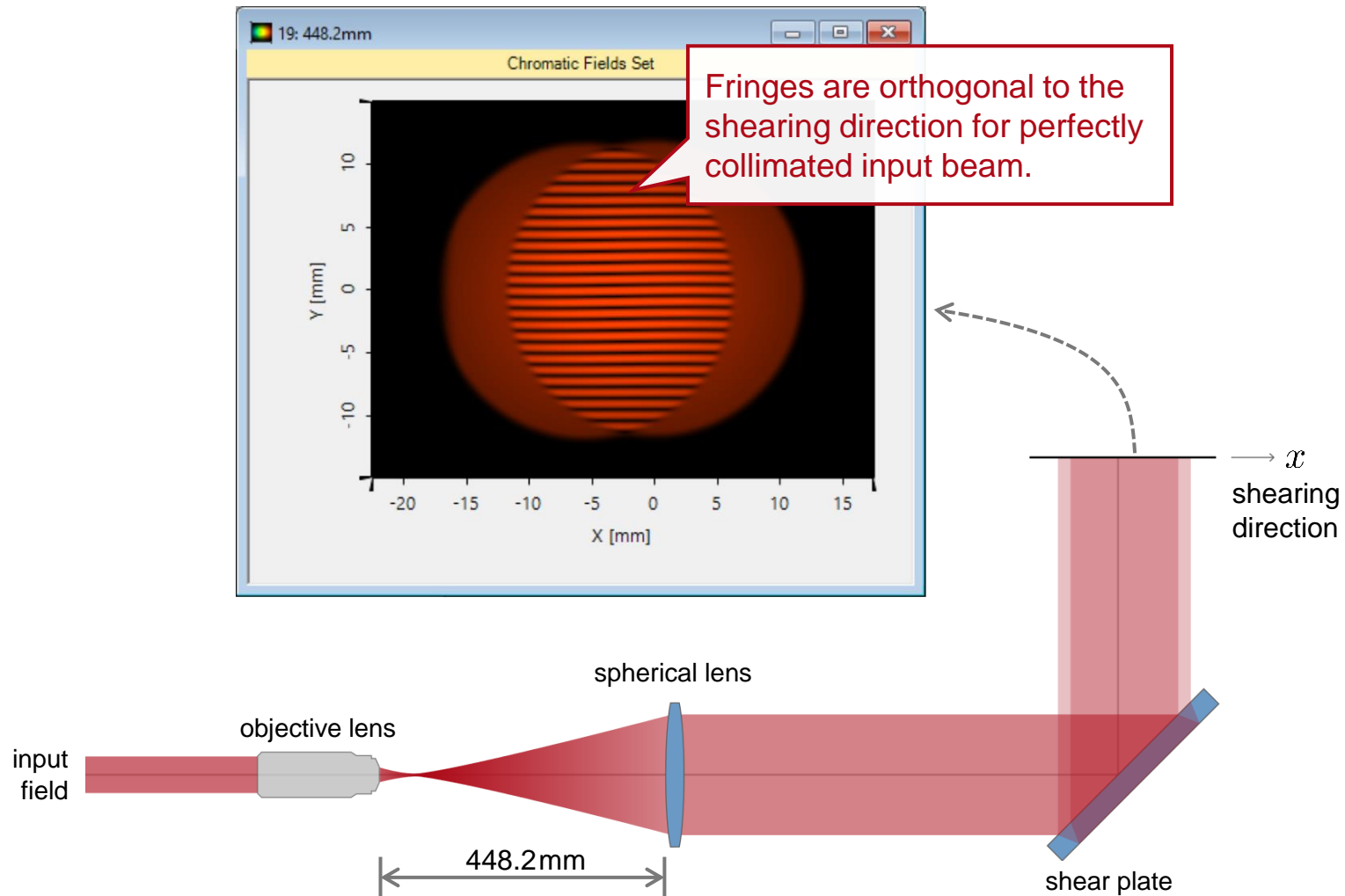
How does the shearing interference pattern look like for input beam with different collimation quality, e.g., with changing distance between the two lenses?



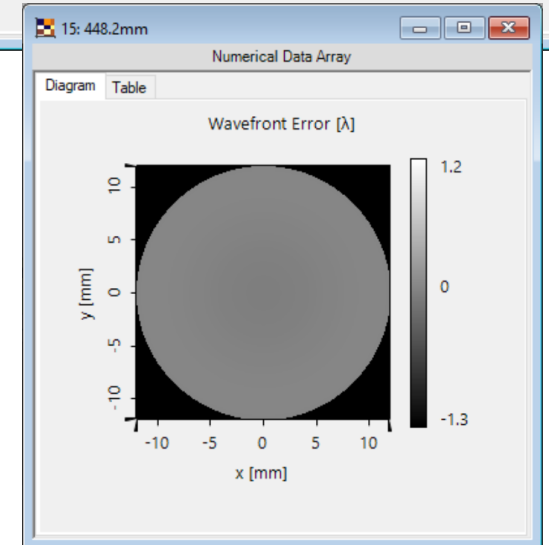
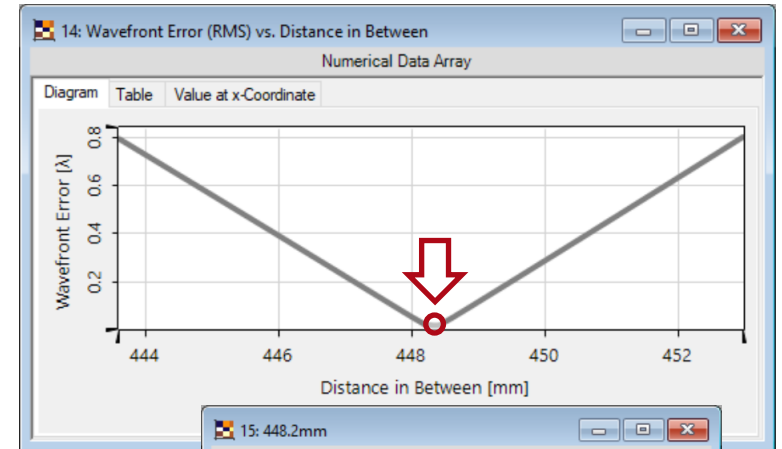
Wavefront Evaluation after Expansion and Collimation



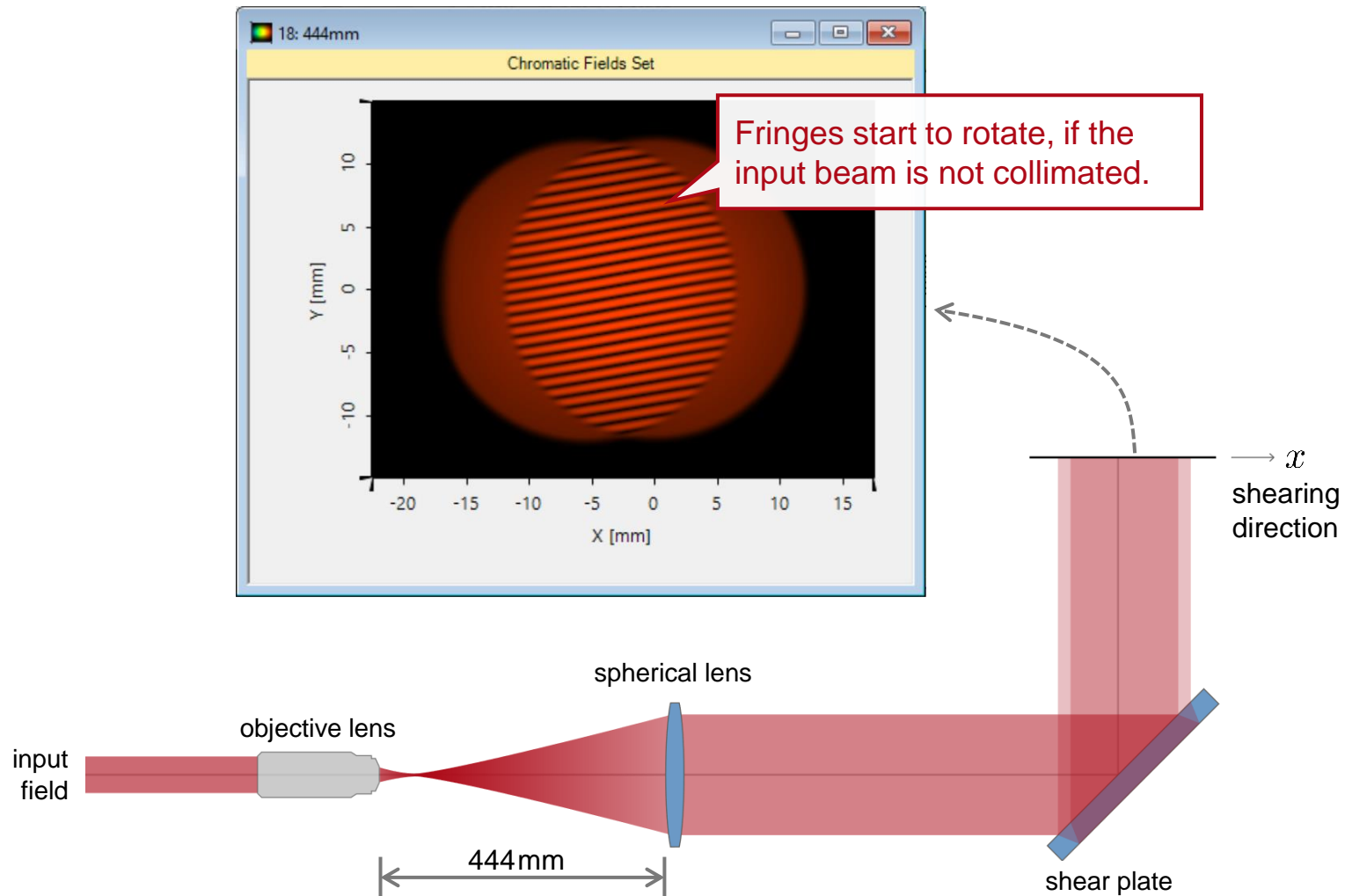
Shear Interference Fringe



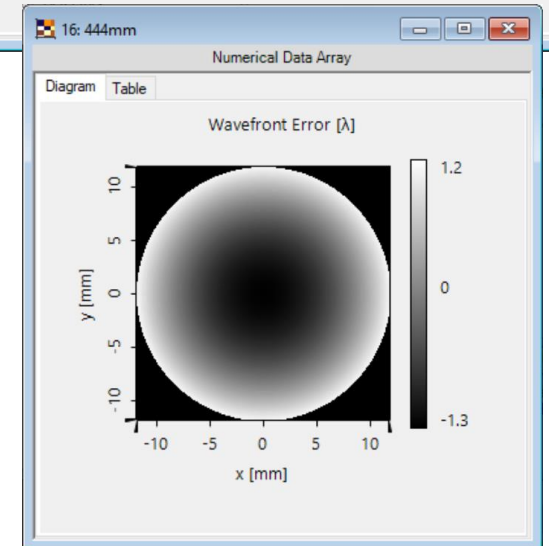
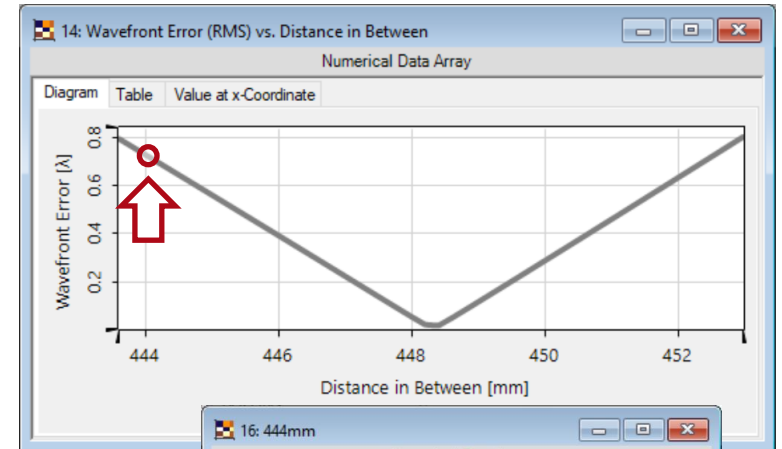
wavefront error behind spherical lens



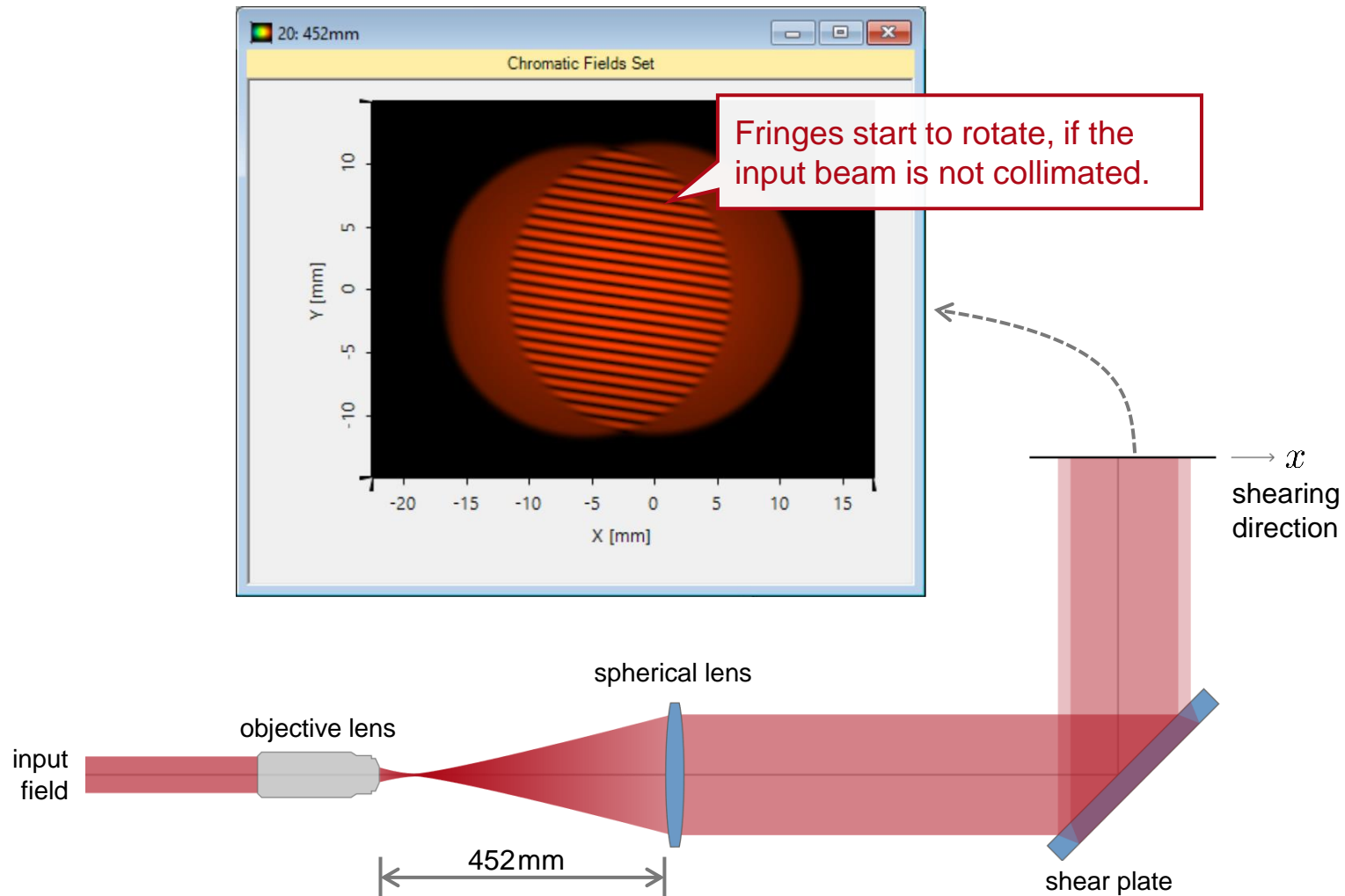
Shear Interference Fringe



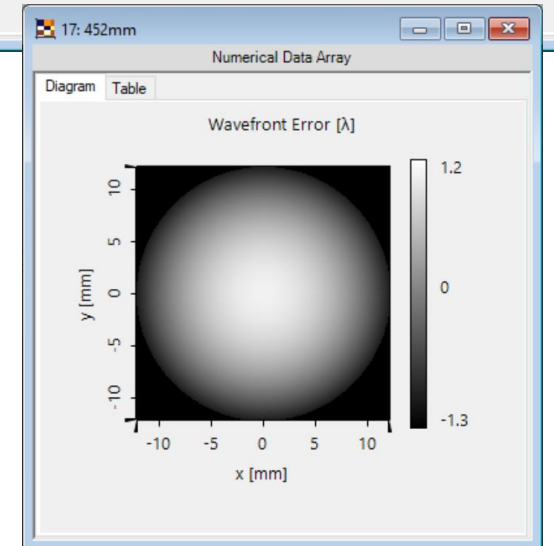
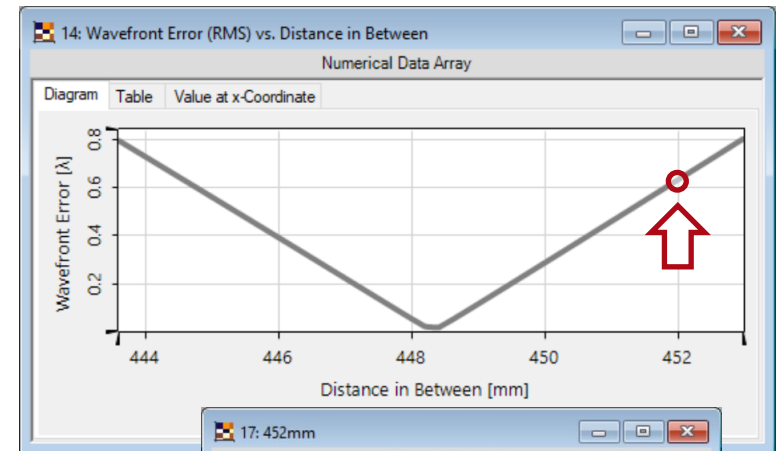
wavefront error behind spherical lens



Shear Interference Fringe



wavefront error behind spherical lens



Peek into VirtualLab Fusion

convenient definition of lens systems

3D View: Objective Lens

Index	Distance	Position	Type	Homogeneous Medium	Comment
1	0 mm	0 mm	Conical Interface	SK14_SCHOTT in Homoc	Enter your comment
2	1.9586 mm	1.9586 mm	Conical Interface	Air (Zemax) in Homogen	Enter your comment
3	481.6 μ m	2.4402 mm	Conical Interface	LAKN7_SCHOTT in Hon	Enter your comment
4	2.9848 mm	5.425 mm	Conical Interface	Air (Zemax) in Homogen	Enter your comment
5	465.47 μ m		Conical Interface	LAKN7_SCHOTT in Hon	Enter your comment
6	1.8298 mm		Conical Interface	Air (Zemax) in Homogen	Enter your comment
7	5.6168 mm		Conical Interface	LAKN7_SCHOTT in Hon	Enter your comment
8	1.477 mm		Conical Interface	Air (Zemax) in Homogen	Enter your comment
9	393.4 μ m		Conical Interface	LAKN7_SCHOTT in Hon	Enter your comment
10	1.316 mm		Conical Interface	Air (Zemax) in Homogen	Enter your comment

display of lens systems in 3D

16: C:\Users\...\Collimation Testing_02_Collimation Lenses Setup_Scanning Distance.run

Results

Start the parameter run and analyze its results

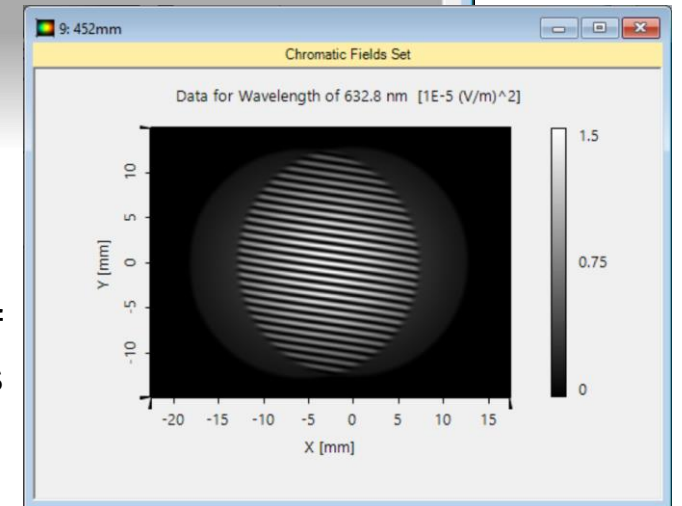
Go!

Use Already Calculated Results for Next Run

Detector	Subdetector	Combined Output	Iteration Step		
			46	47	48
Varied Parameters	Distance Before (Spherical...	Data Array	452 mm	452.2 mm	452.4 mm
Wavefront Error #600 after Spherical Lens #2 (T) (Field and Generation)	Data Arrays	Animation	Gridless Data Array	Gridless Data Array	Gridless Data Array
	RMS [λ] of Wavefront Error	Data Array	0.77464	0.81632	0.81632

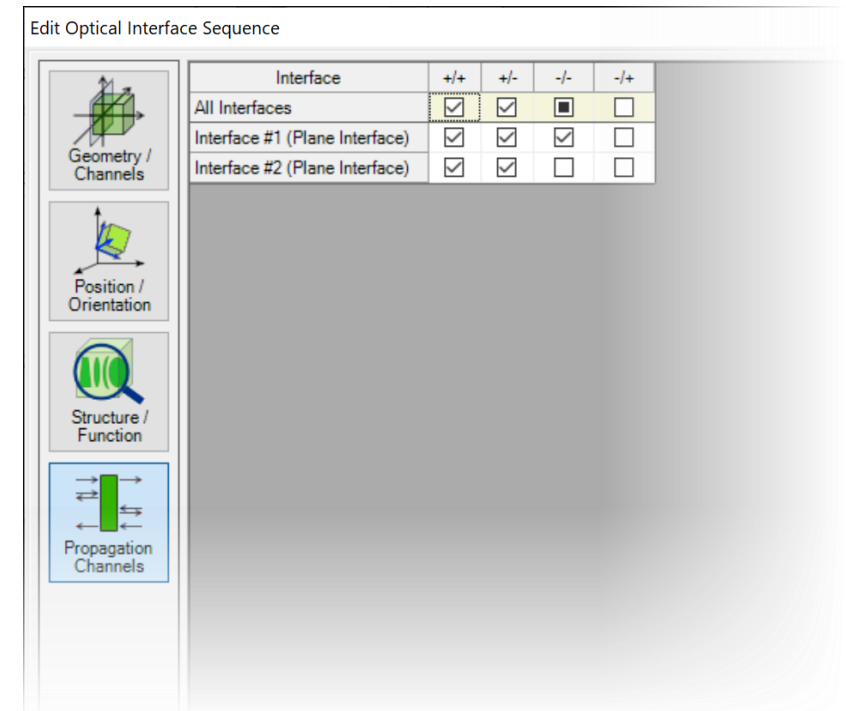
parameter sweep

calculation of interference fringes

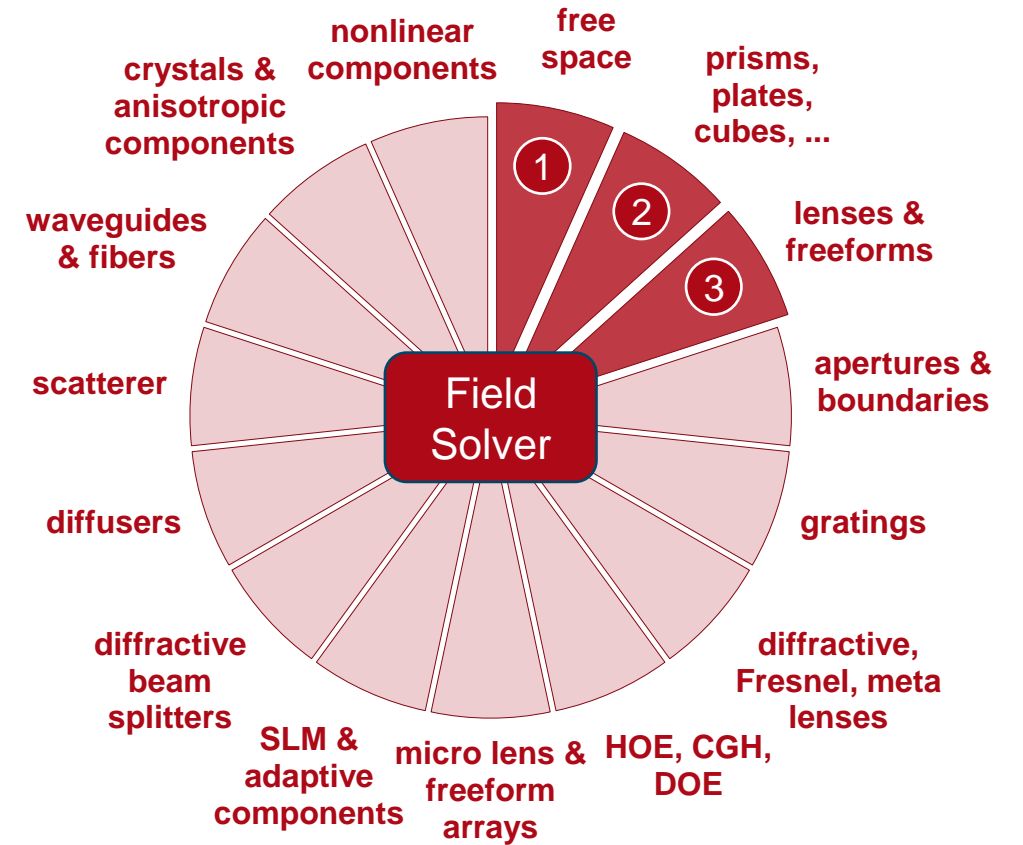
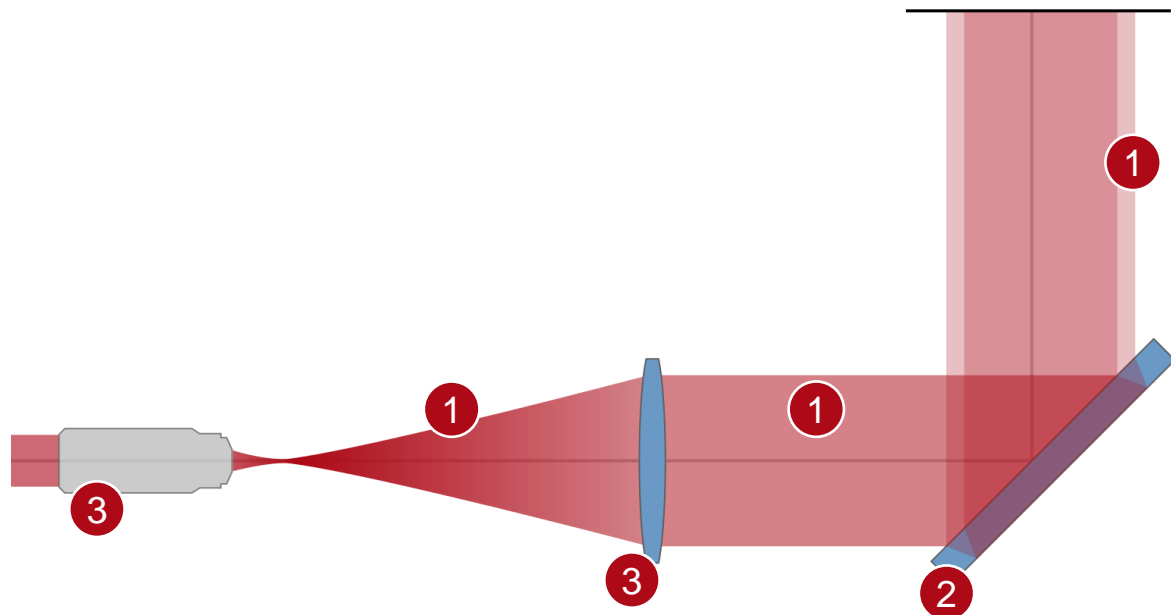


Workflow in VirtualLab Fusion

- Set up input Gaussian field
 - [Basic Source Models](#) [Tutorial Video]
- Import lens systems from Zemax OpticStudio®
 - [Import Optical Systems from Zemax](#) [Use Case]
- Set the position and orientation of components
 - [LPD II: Position and Orientation](#) [Tutorial Video]
- Set the non-sequential channels of components
 - [Channel Configuration for Surfaces and Grating Regions](#) [Use Case]
- Check influence from selected parameters with Parameter Run
 - [Usage of the Parameter Run Document](#) [Use Case]



VirtualLab Fusion Technologies



Document Information

title	Collimation Testing with Shearing Interferometry
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further reading	<ul style="list-style-type: none">- Laser-Based Michelson Interferometer and Interference Fringe Exploration- Fizeau Interferometer for Optical Testing