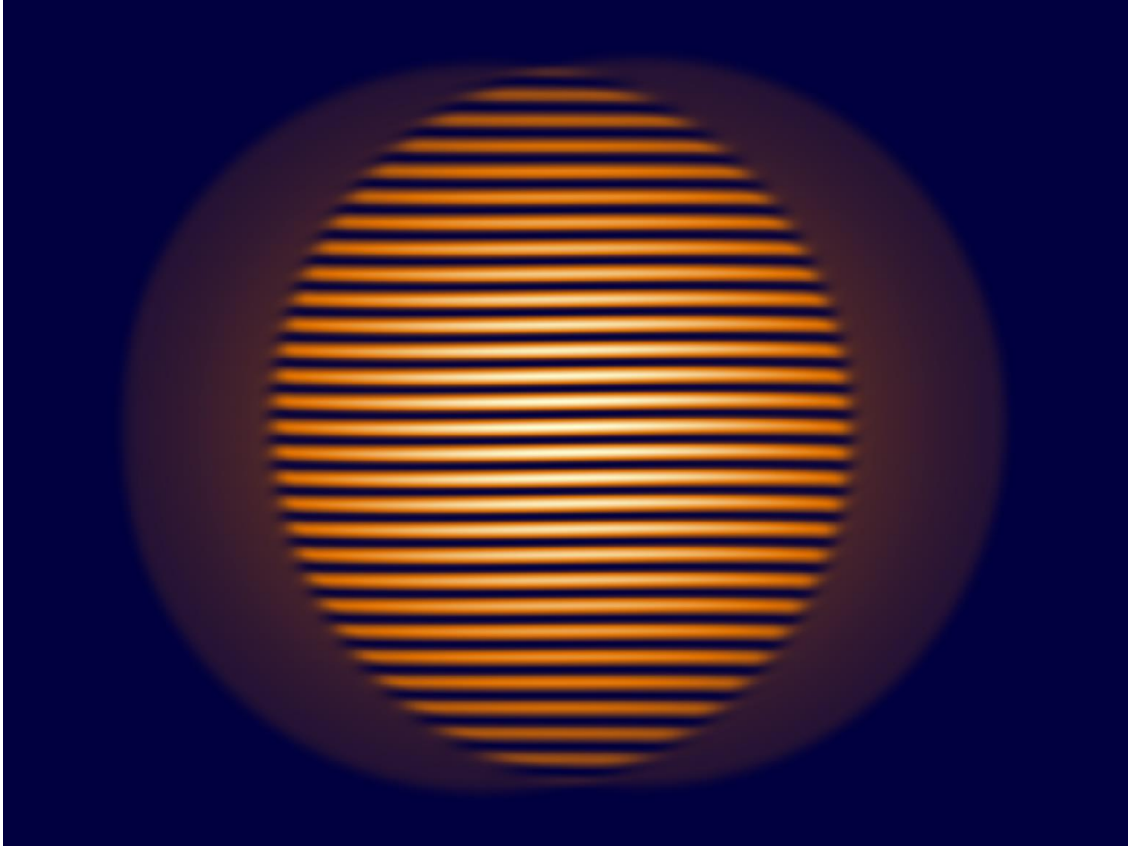


# Collimation Testing with Shearing Interferometry

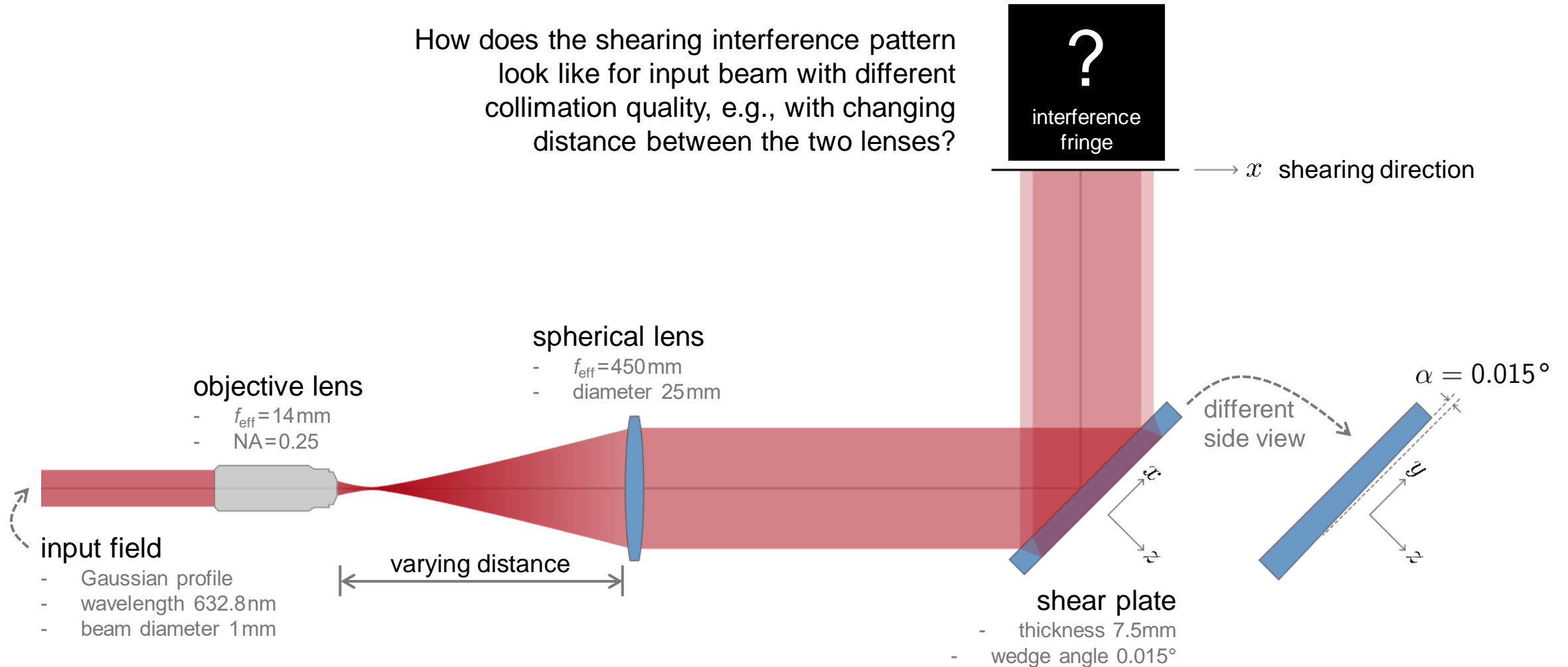
# Abstract



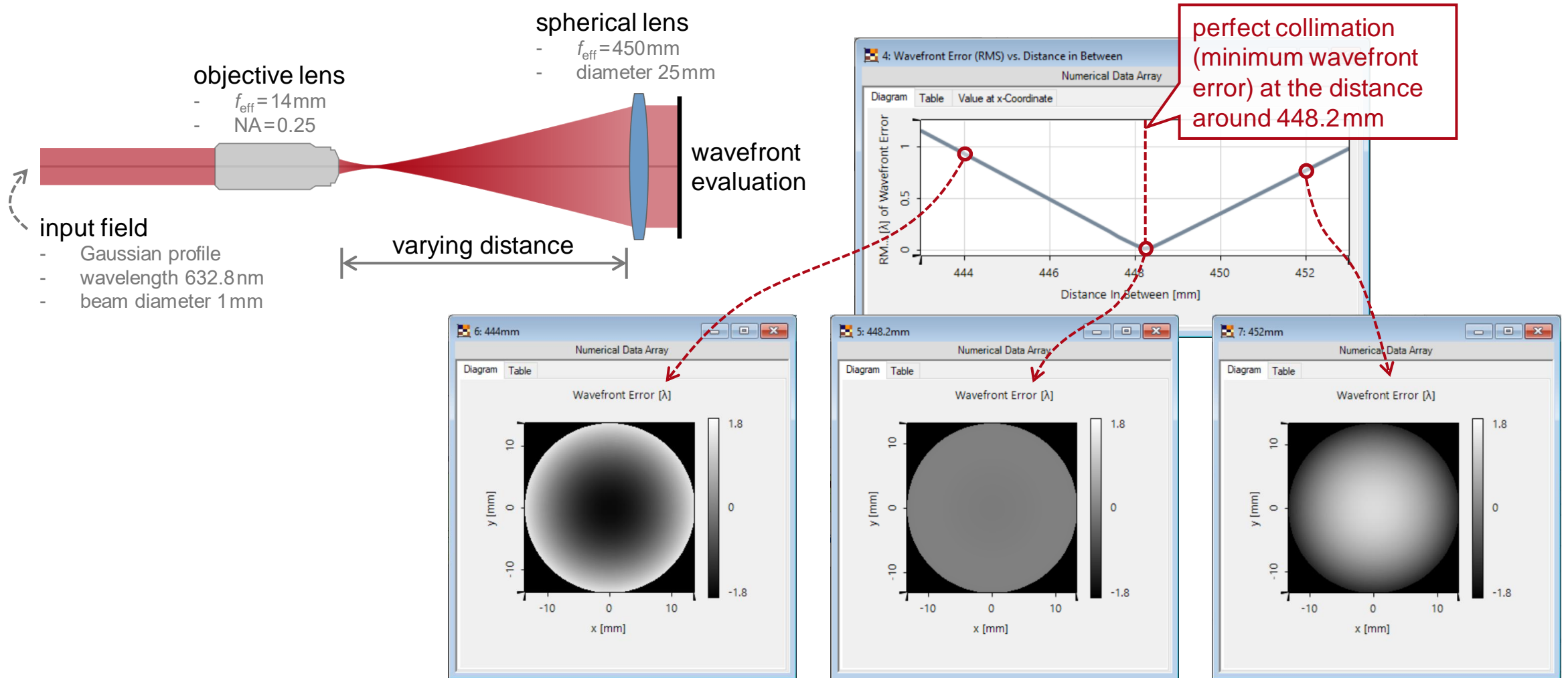
Collimation of laser beams is a fundamentally essential task for various optical applications. Testing of the collimation is therefore of significance as well, and shearing interferometry is often employed for such tasks. In this example, we demonstrate how to build up a shearing interferometer and to 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

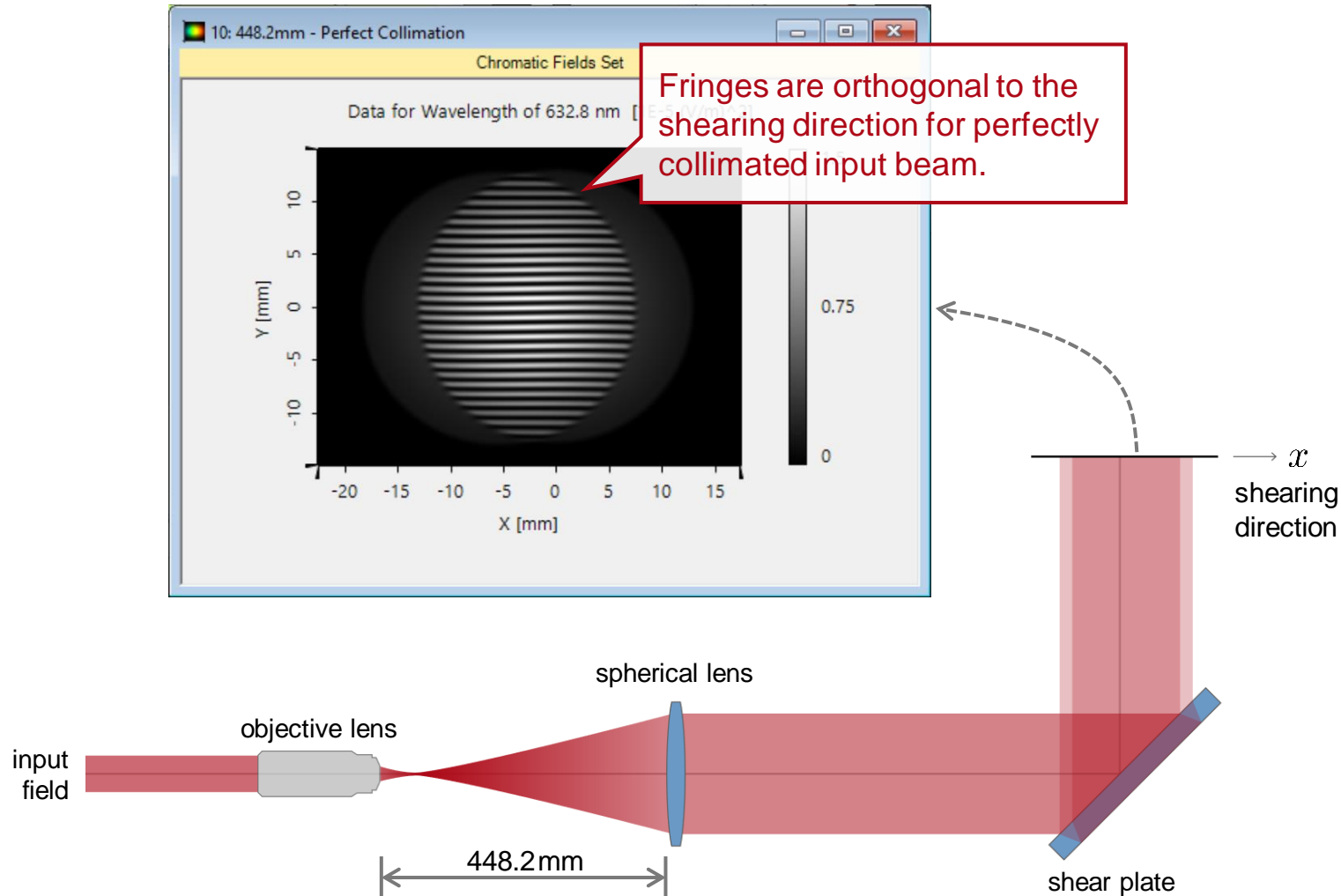
How does the shearing interference pattern look like for input beam with different collimation quality, e.g., with changing distance between the two lenses?



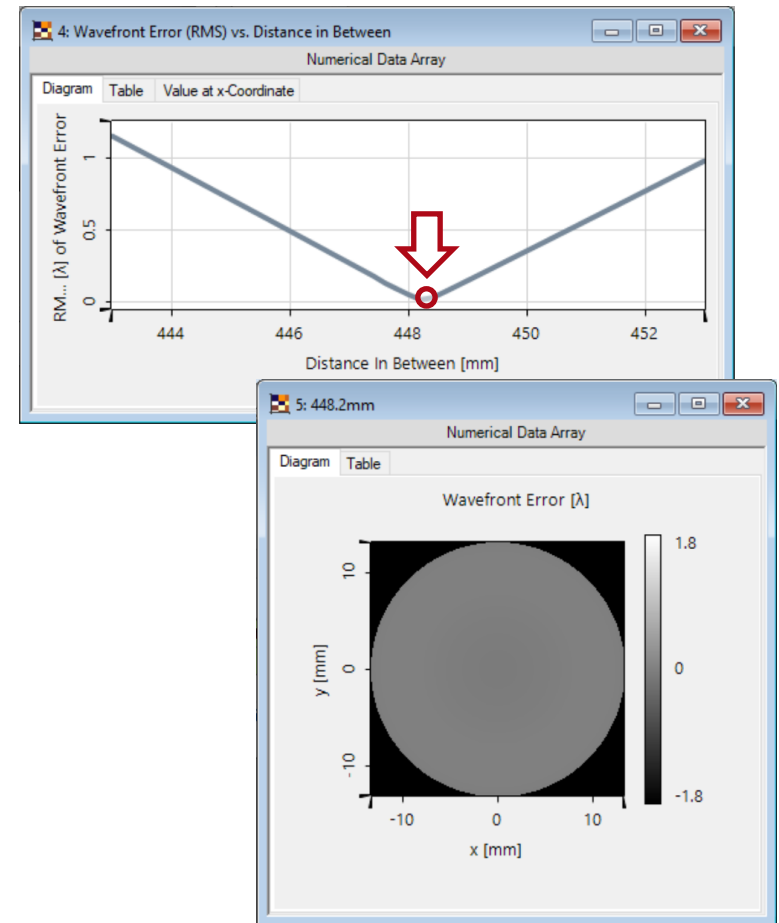
# Wavefront Evaluation after Expansion and Collimation



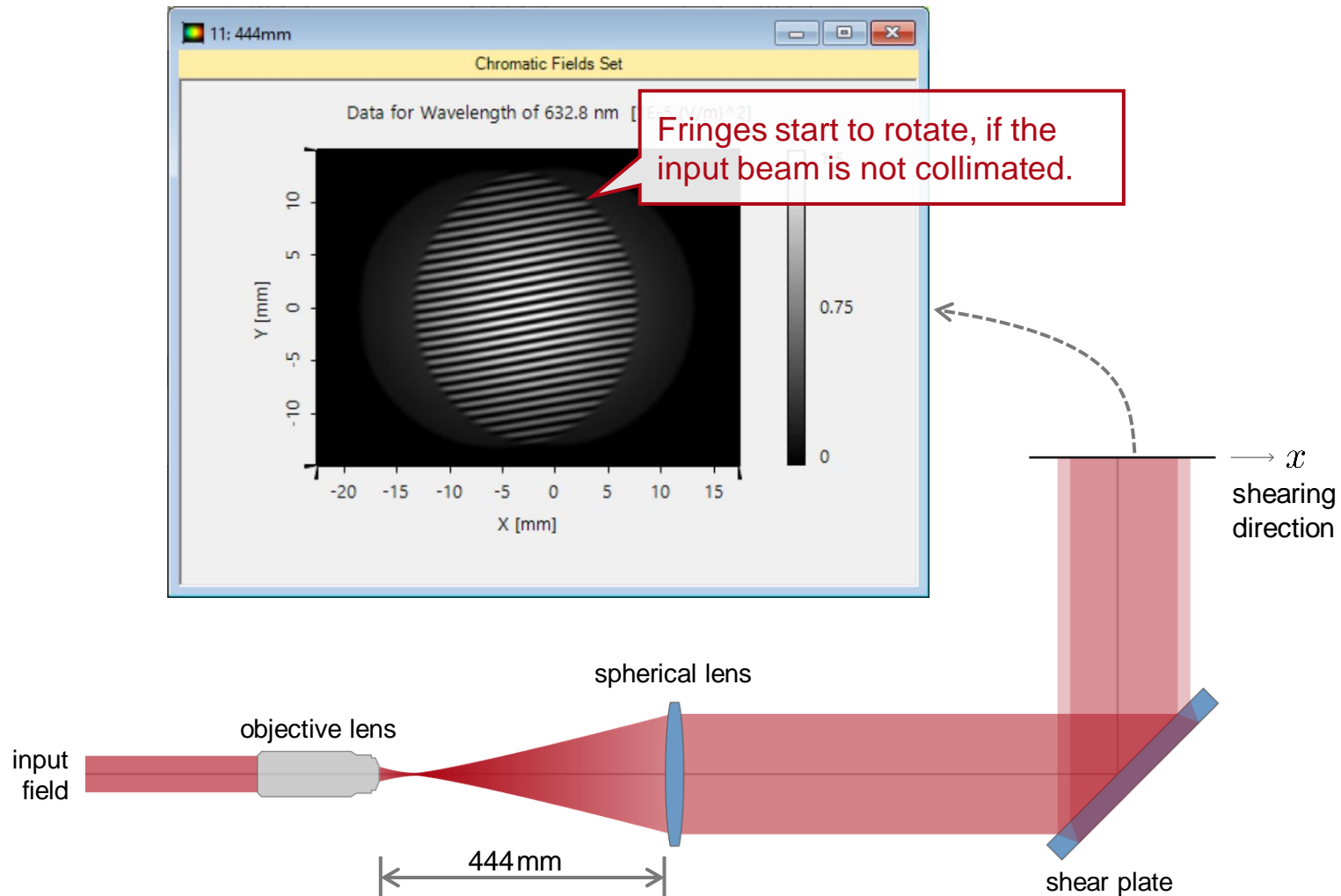
# Shear Interference Fringe



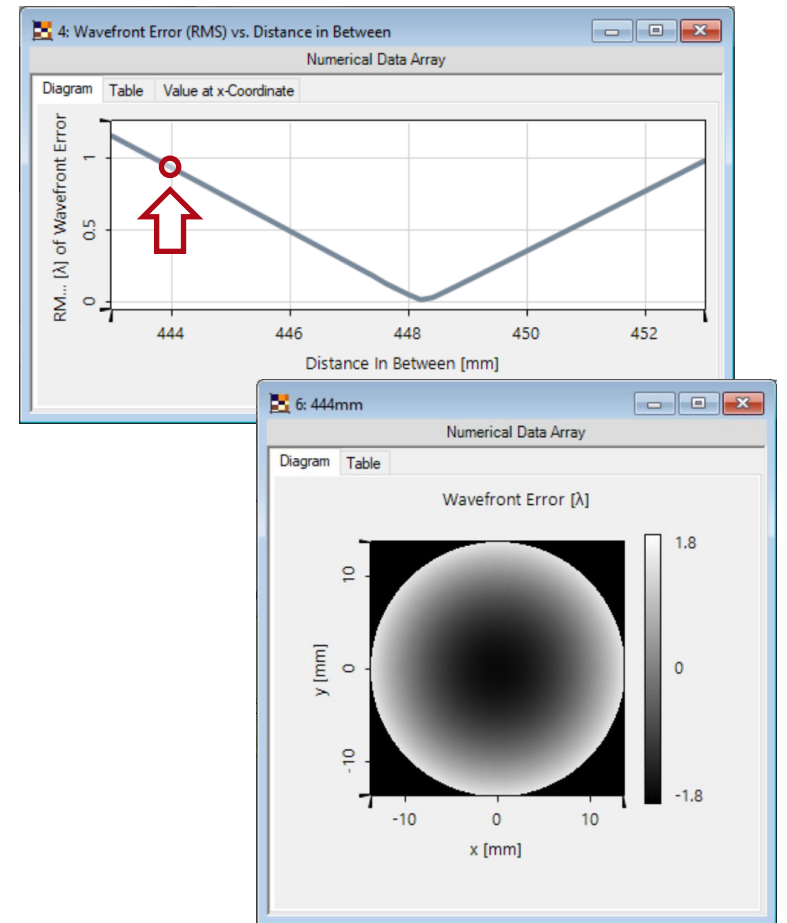
wavefront error behind spherical lens



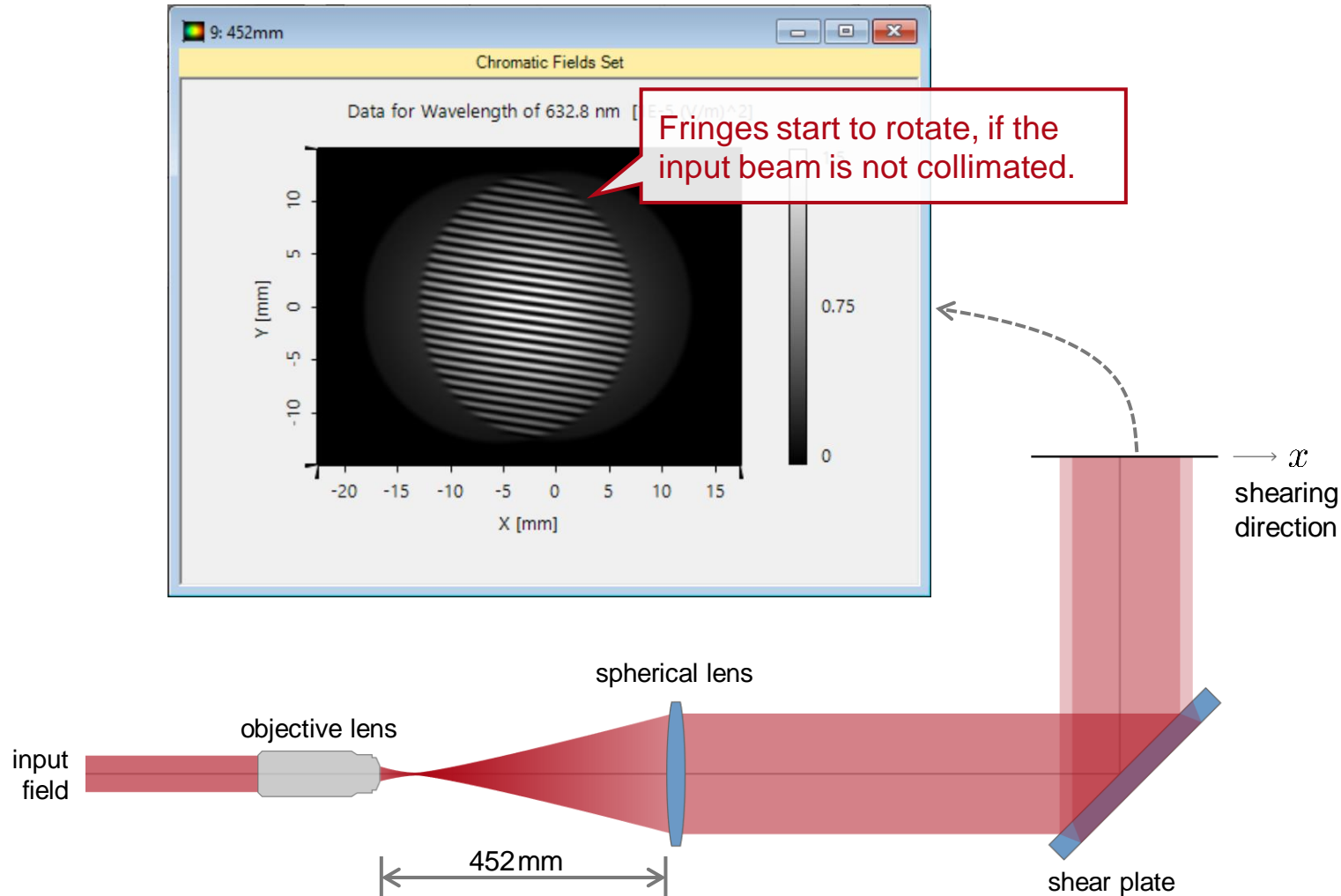
# Shear Interference Fringe



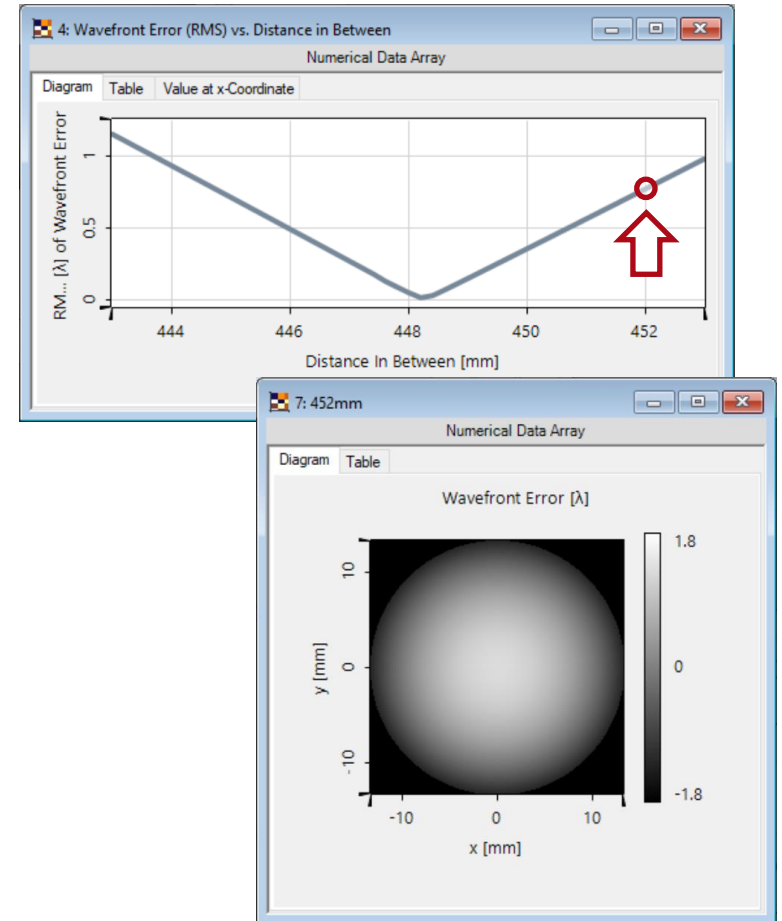
wavefront error behind spherical lens



# 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 $\mu$ m	2.4402 mm	Conical Interface	LAKN7_SCHOTT in Homoc	Enter your comment
4	2.9848 mm	5.425 mm	Conical Interface	Air (Zemax) in Homogen	Enter your comment
5	465.47 $\mu$ m				
6	1.8298 mm				
7	5.6168 mm				
8	1.477 mm				
9	393.4 $\mu$ m				
10	1.316 mm				

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

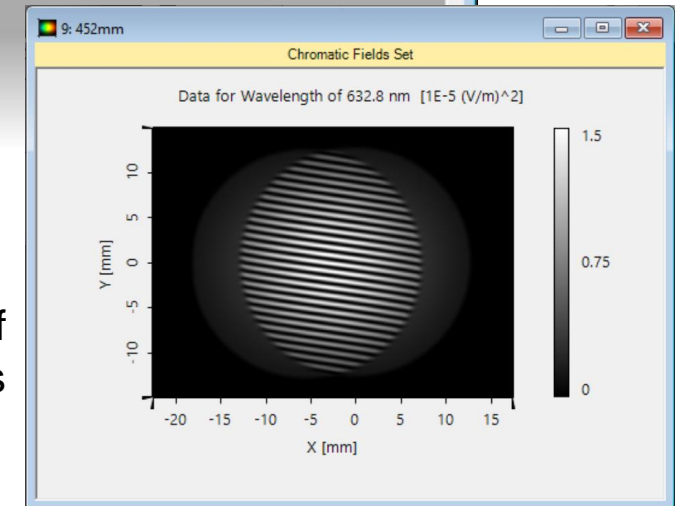
Go!

Use Already Calculated Results for Next Run

Detector	Subdetector	Combined Output	Iteration Step		
			46	47	
Varied Parameters	Distance Before (Spherical...	Data Array	452 mm	452.2 mm	452.4
Wavefront Error #600 after Spherical Lens #2 (T) (Field and Generation)	Data Arrays	Animation	Gridless Data Array	Gridless Data Array	Gridless Data A
	RMS [ $\lambda$ ] of Wavefront Error	Data Array	0.77464	0.81632	0.8

parameter sweep

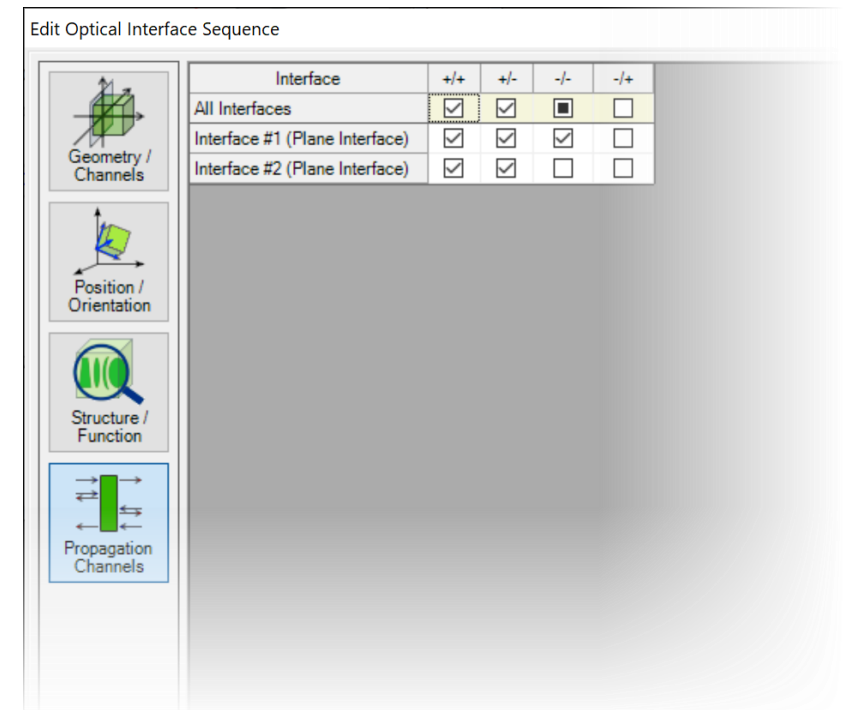
calculation of interference fringes



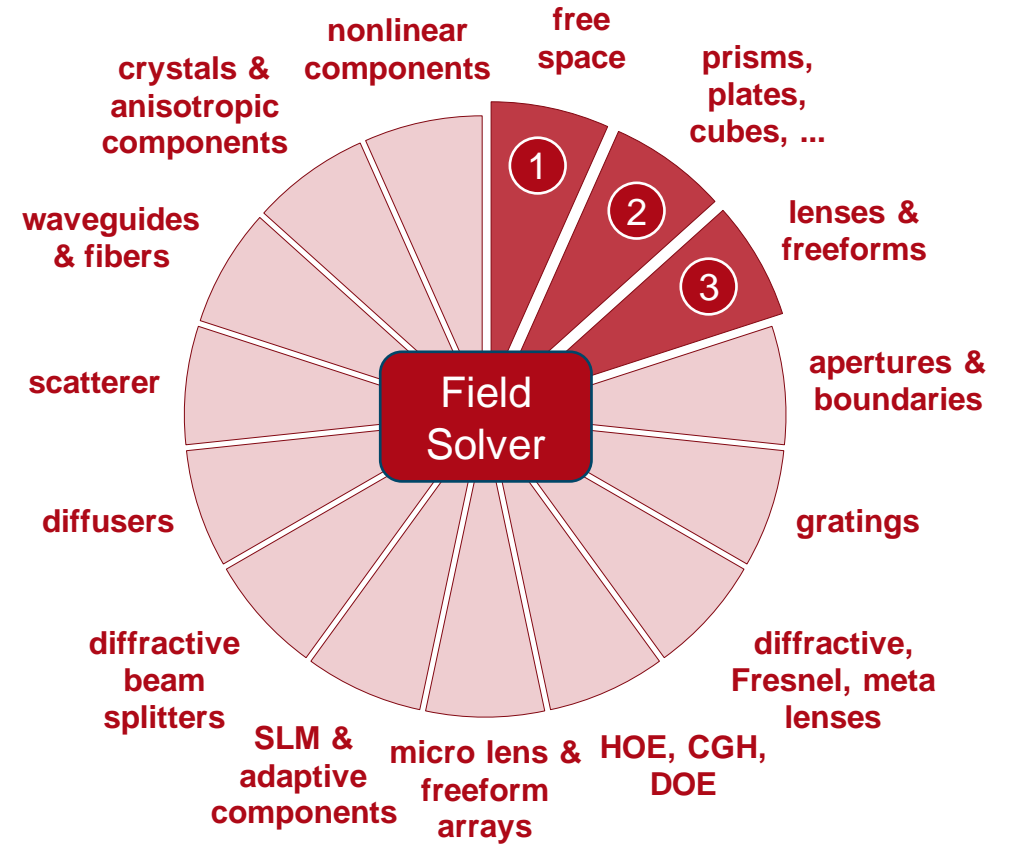
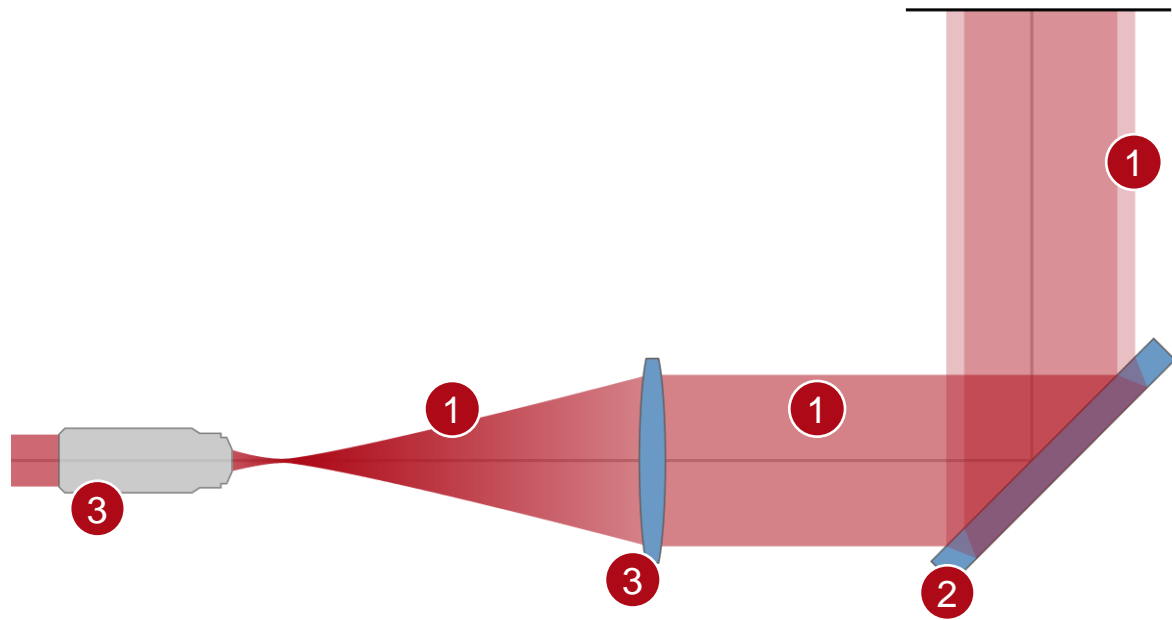


# Workflow in VirtualLab Fusion

- 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 Setting for Non-Sequential Tracing](#) [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
document code	IFO.0013
version	1.0
toolbox(es)	Starter Toolbox (Non-Sequential Extension)
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"><li>- <a href="#">Laser-Based Michelson Interferometer and Interference Fringe Exploration</a></li><li>- <a href="#">Fizeau Interferometer for Optical Testing</a></li></ul>