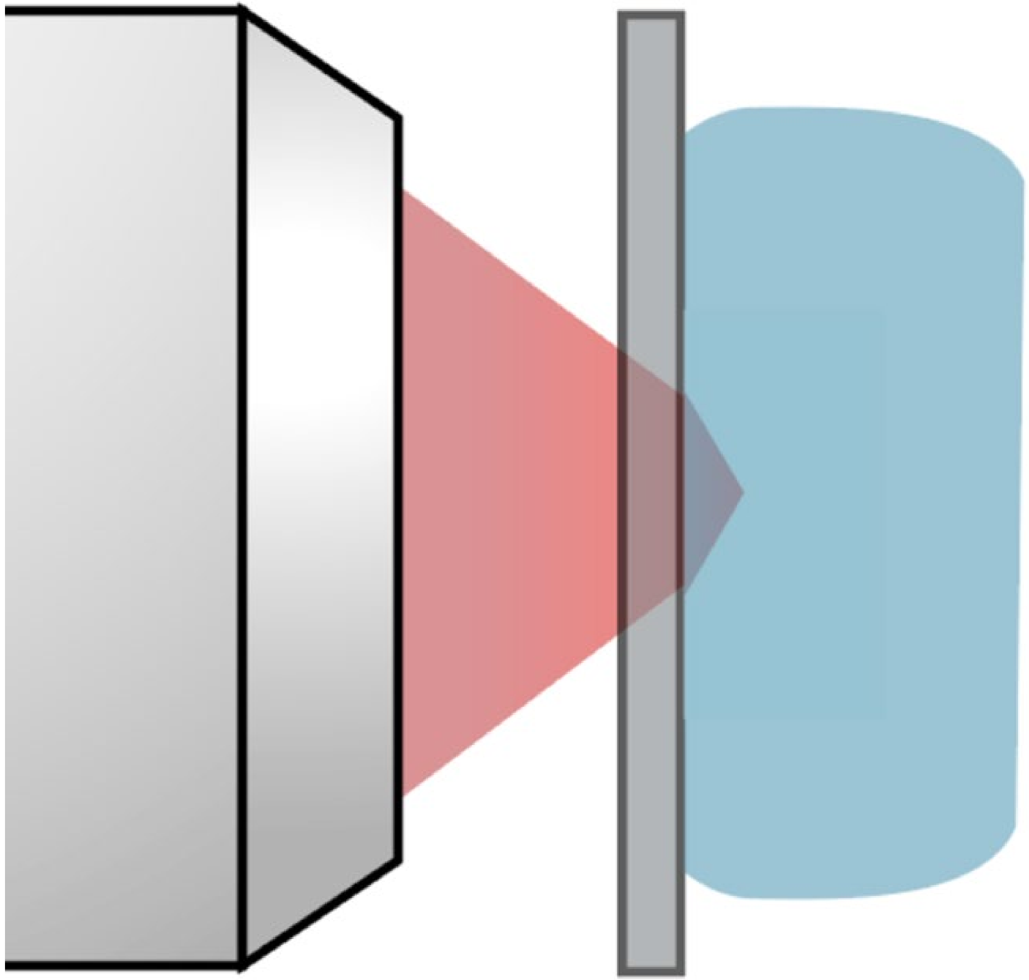
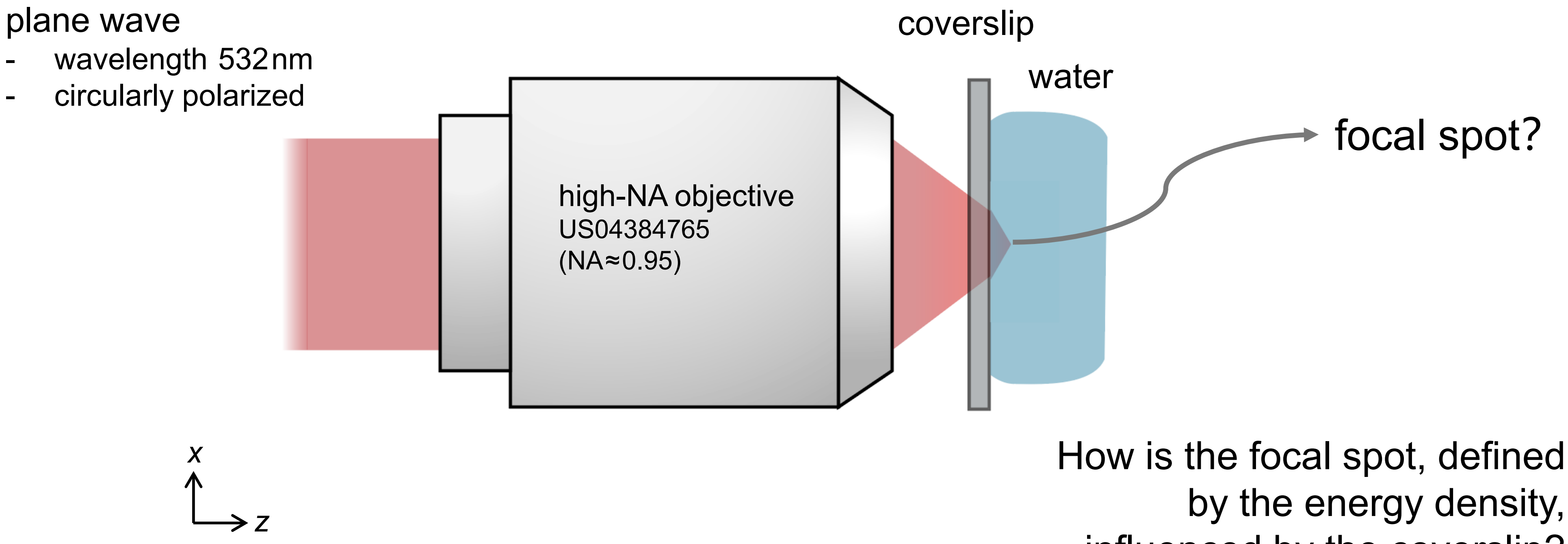
Tight Focusing Through a Stratified Medium

Abstract



In the real-life experiment, a coverslip is very often applied with a microscope for observing biological specimens. The focal spot of the high-NA objective could be influenced by the aberration introduced by the coverslip. In VirtualLab Fusion, the influence of the focal spot by the coverslip can be analyzed straightforwardly with a stratified medium. The aberrated focal spot is demonstrated and analyzed in this use case.

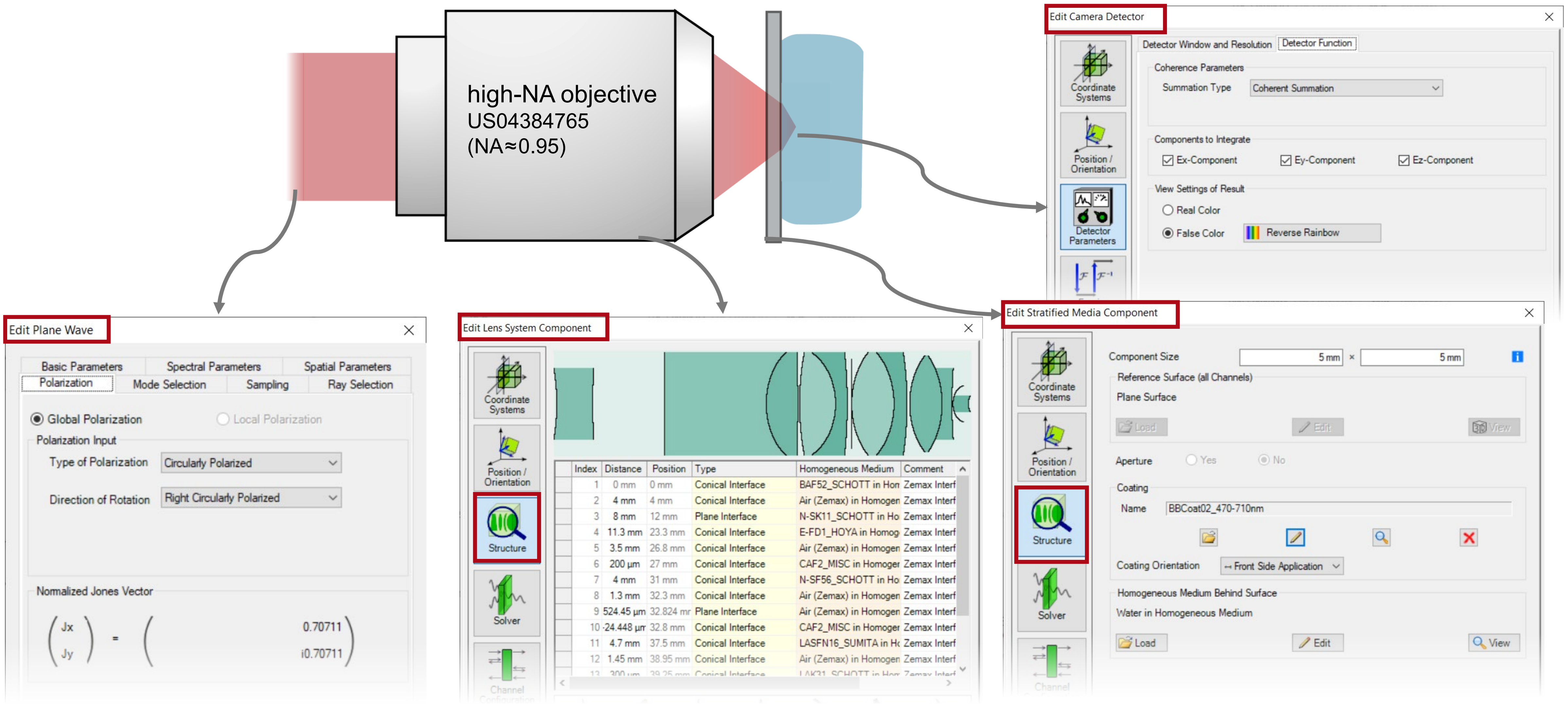
Scenario



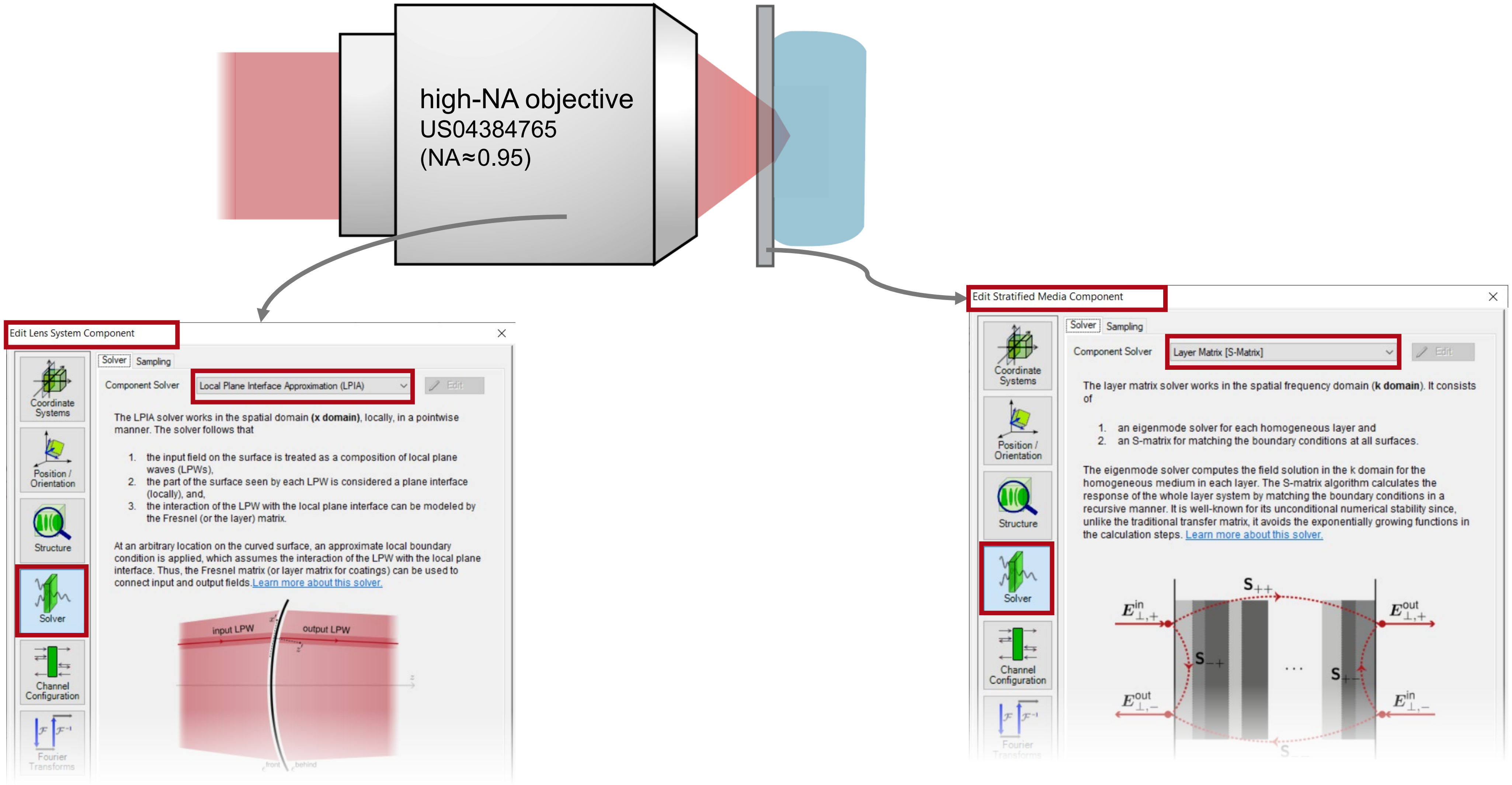
How is the focal spot, defined by the energy density, influenced by the coverslip?

Building the System in VirtualLab Fusion

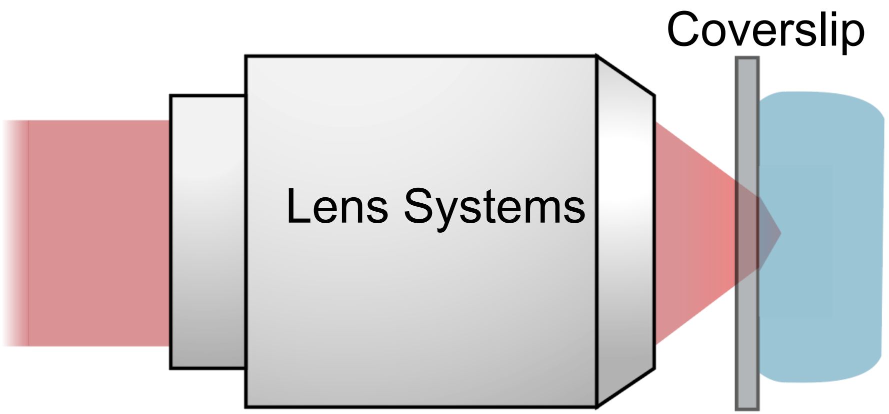
System Building Blocks



Solvers for Components



Summary

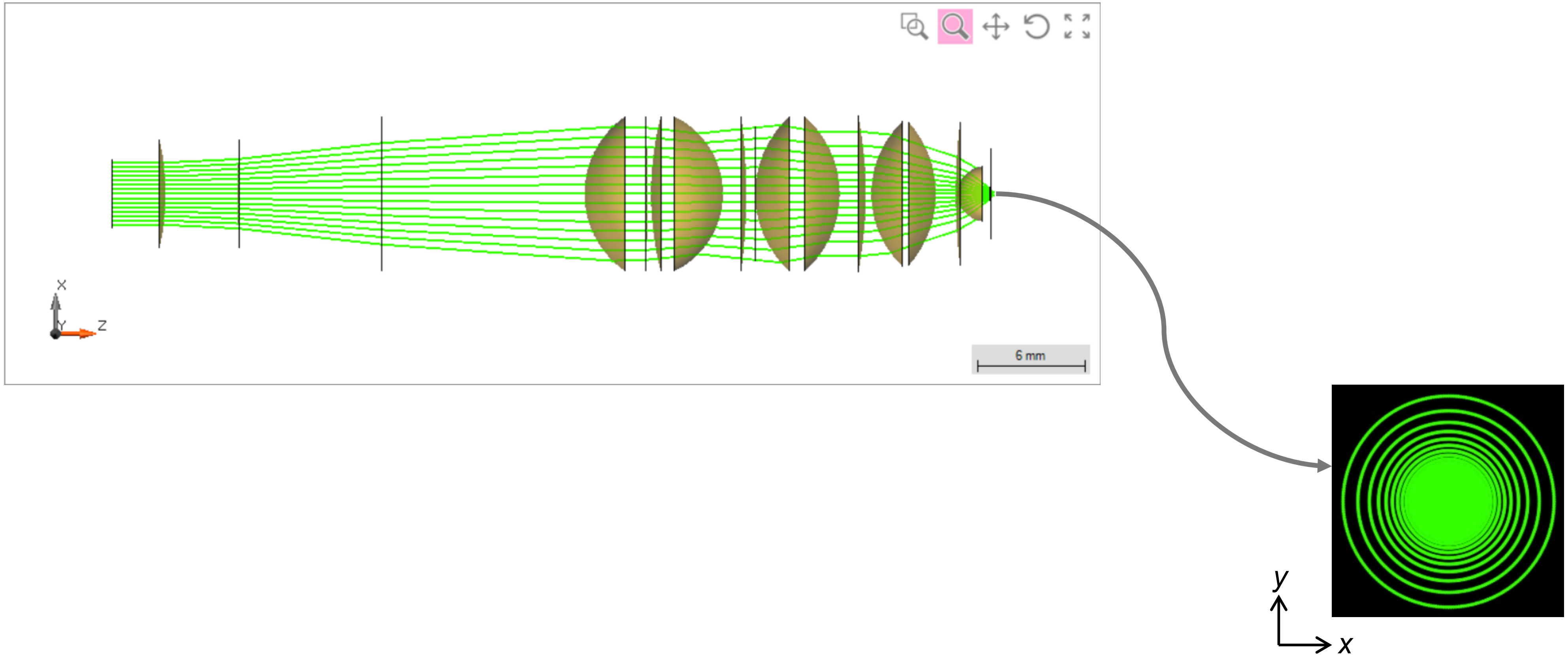


Components	Solvers
Lens Systems	Local Plane Interface Approximation (LPIA)
Coverslip	S-matrix for stratified medium

Geometric-Optics Simulations

by Ray Tracing

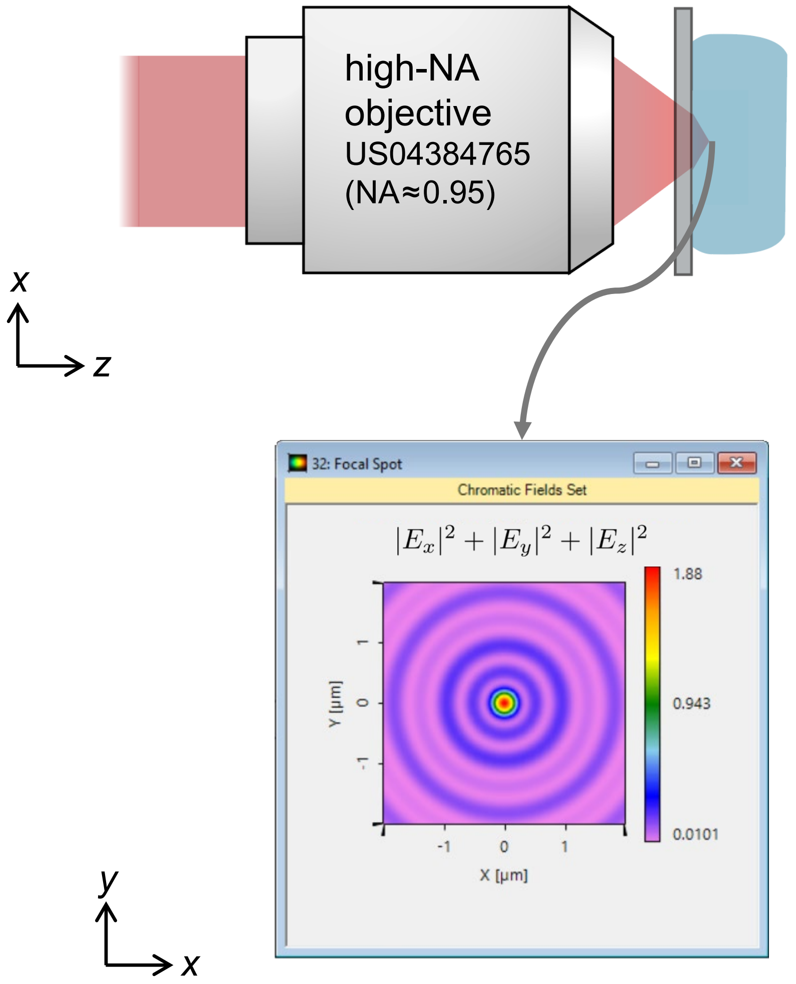
Results: Ray Tracing

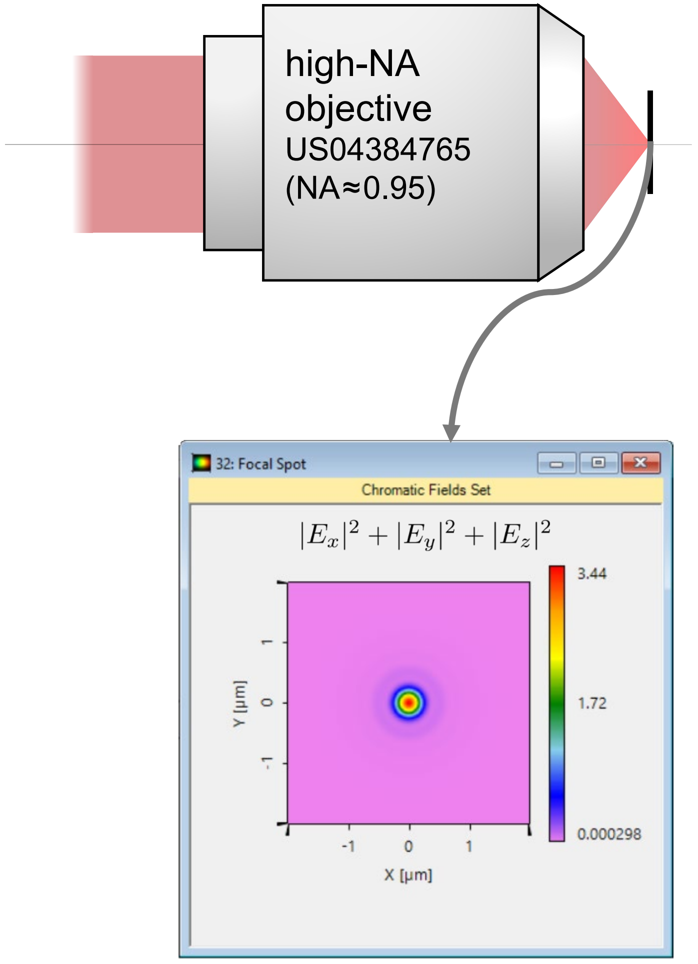


Fast Physical-Optics Simulations

by Field Tracing

Focusing through the Coverslip into the Medium





original focal spot in air

By comparing the original focal spot in air, the focal spot influenced by the aberration is clearly demonstrated.

Document Information

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further reading	- Debye-Wolf Integral Calculator - Analyzing High-NA Objective Lens - Resolution Investigation for Microscope Objective Lenses by Rayleigh Criterion