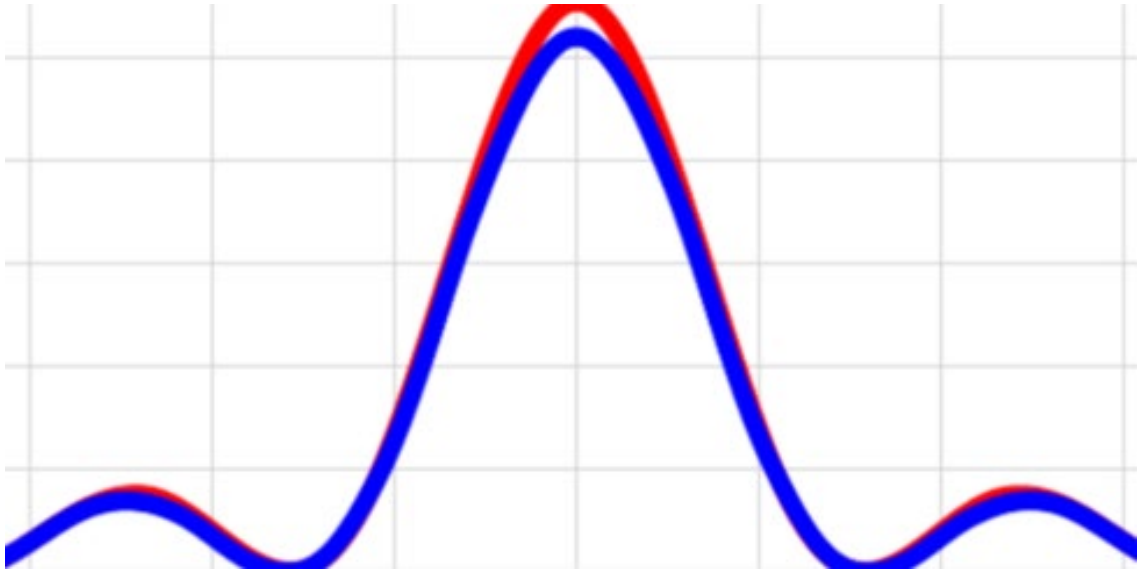
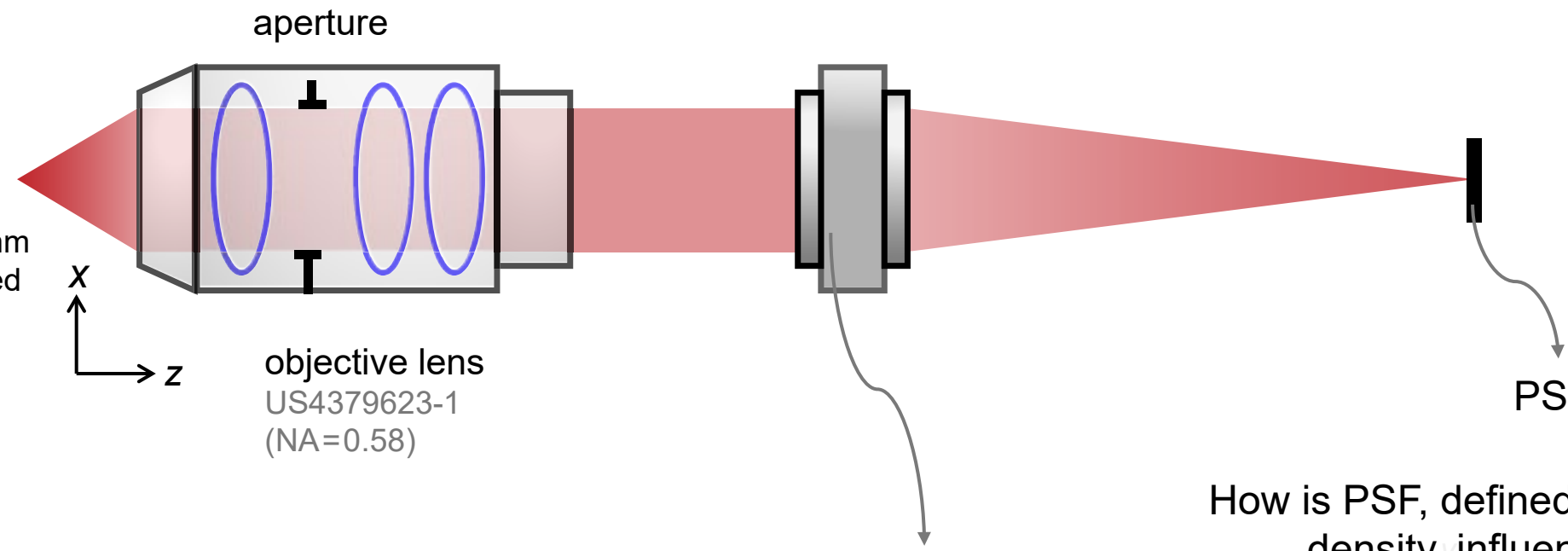
Diffraction from the Aperture in a Microscopy System

Abstract



In microscopy systems, the influence of the diffraction from the aperture in the system may have an effect on the PSF. However, it is rarely considered in the design as well as the usage. VirtualLab Fusion provides a straightforward way to include the diffraction effect in the microscopy lens system. This use case investigates the influences on the energy density at the entrance pupil of the tube lens as well as at the image plane.

Scenario

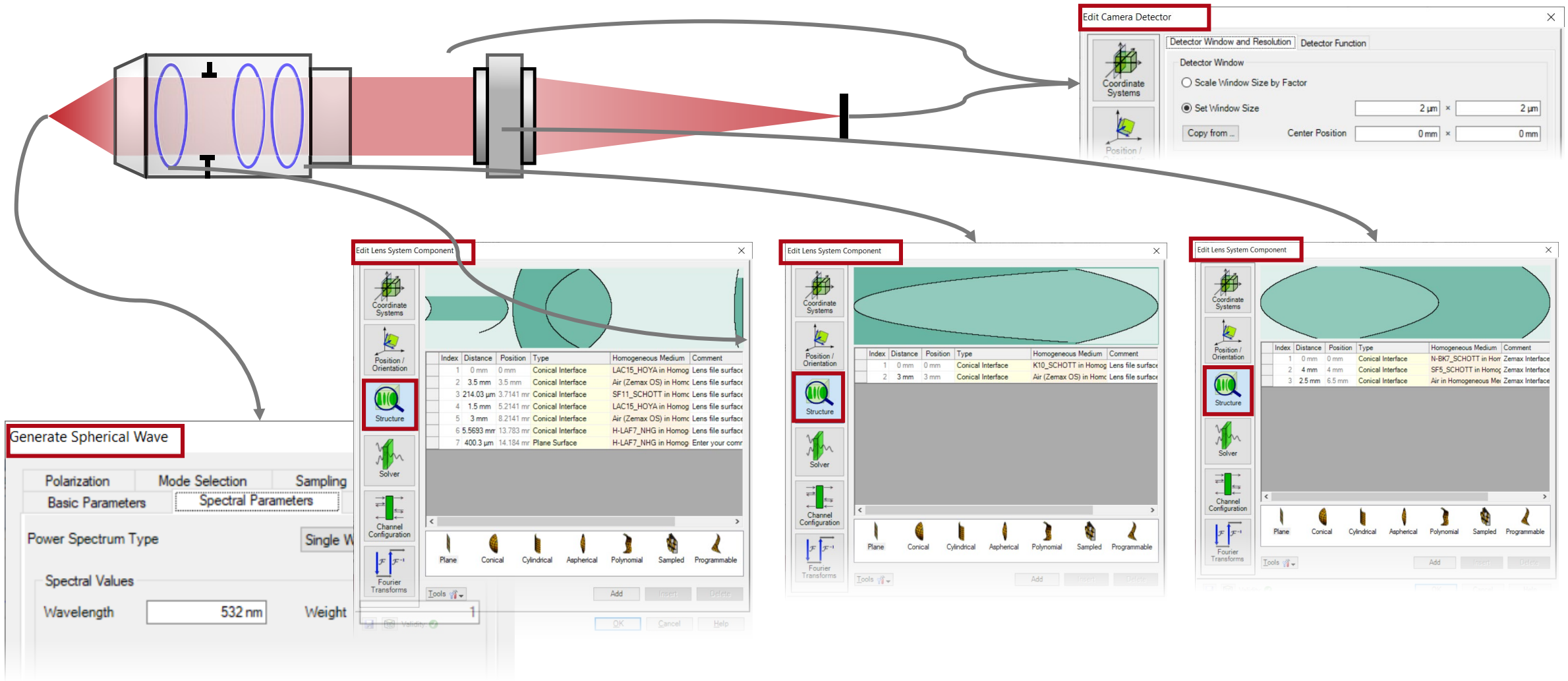


How is PSF, defined as energy density, influenced by the diffration from the aperture in the lens system?

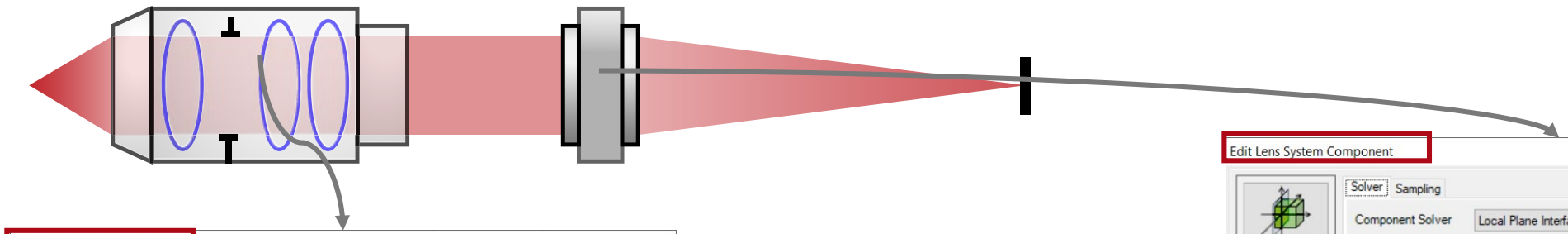
How is the energy density at the entrance pupil of the tube lens influenced by the diffration from the aperture in the lens system?

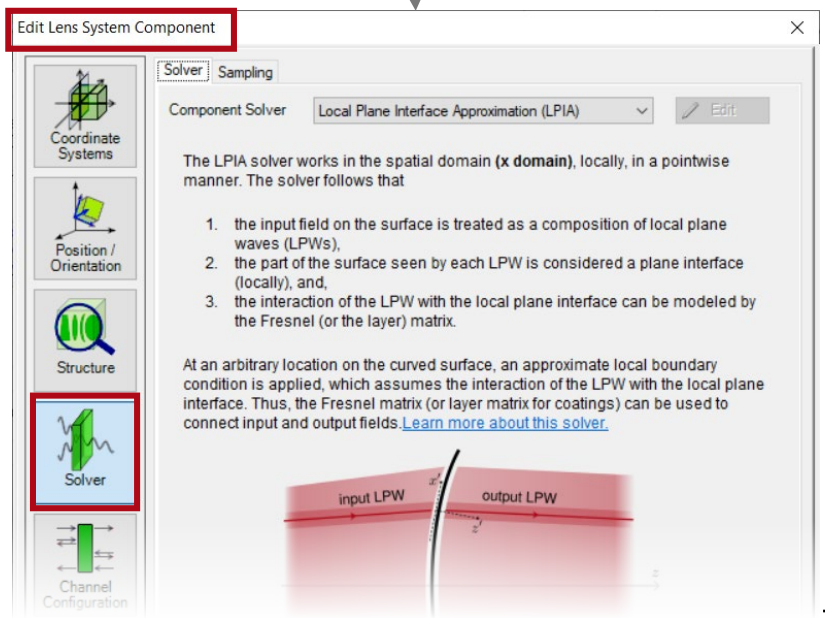
Building the System in VirtualLab Fusion

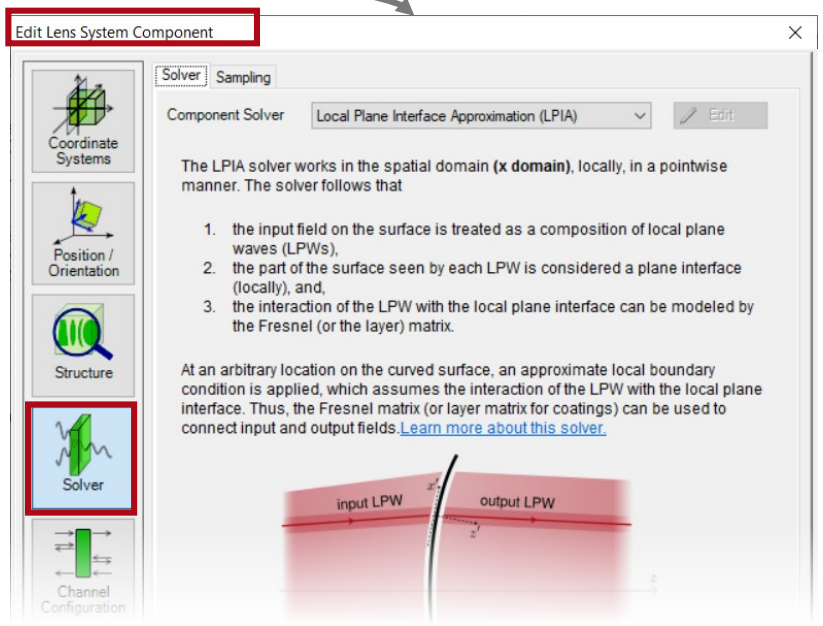
System Building Blocks



Solvers for Components

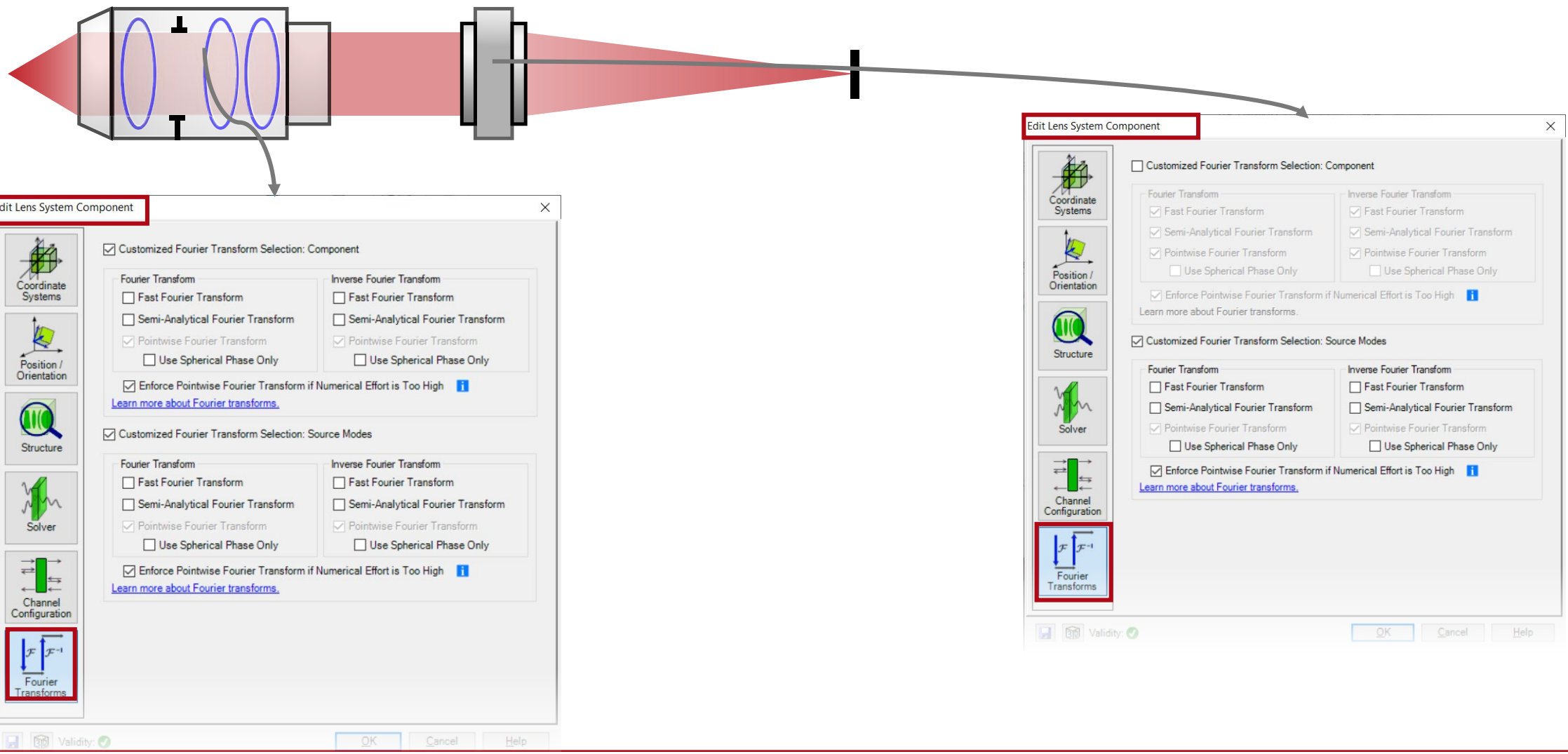






Components	Solvers
Lens Systems	Local Plane Interface Approximation (LPIA)

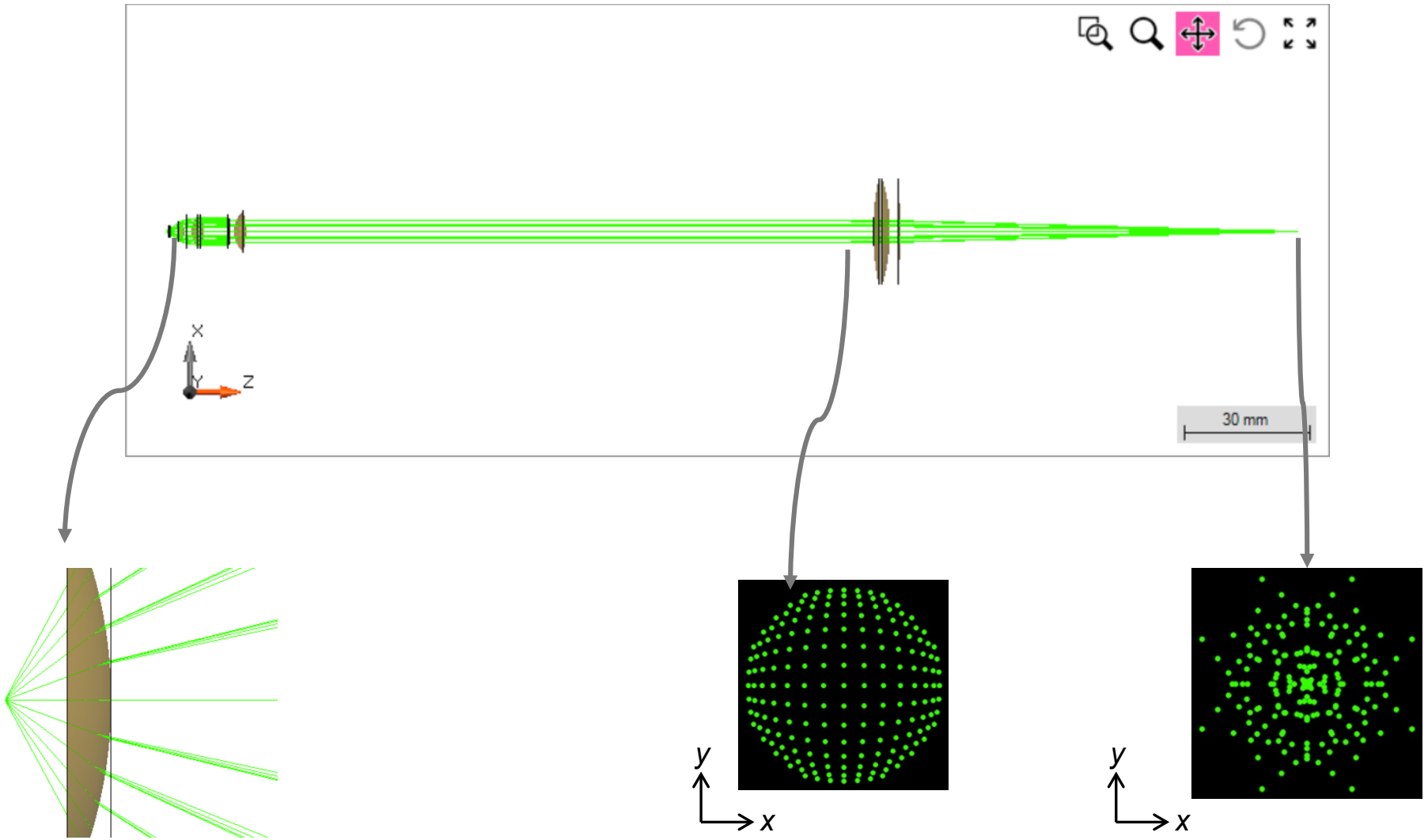
Fourier Transforms Before and After Components



Geometric-Optics Simulations

by Ray Tracing

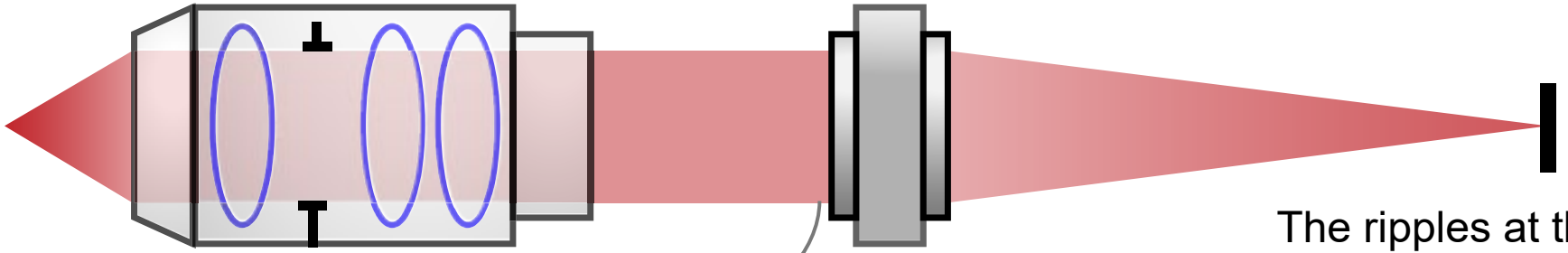
Results: Ray Tracing



Fast Physical-Optics Simulations

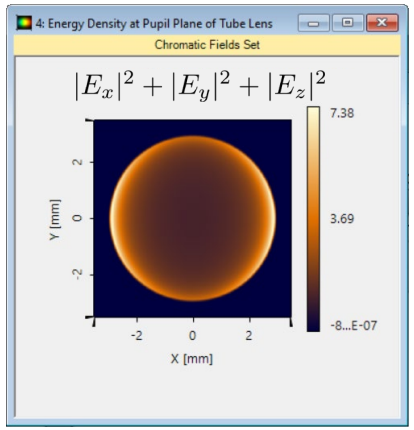
by Field Tracing

Energy Density at the Tube Lens

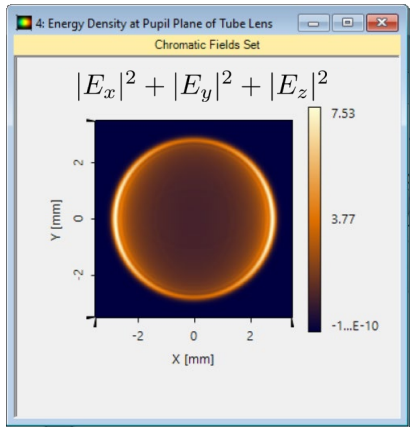


The ripples at the border are caused by the diffraction effect.

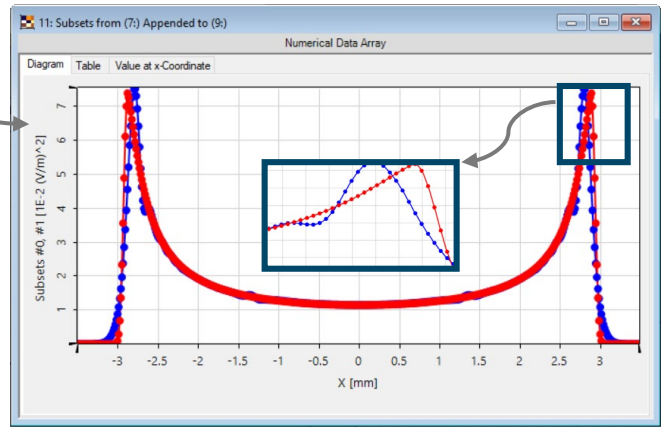
without diffraction effect



with diffraction effect

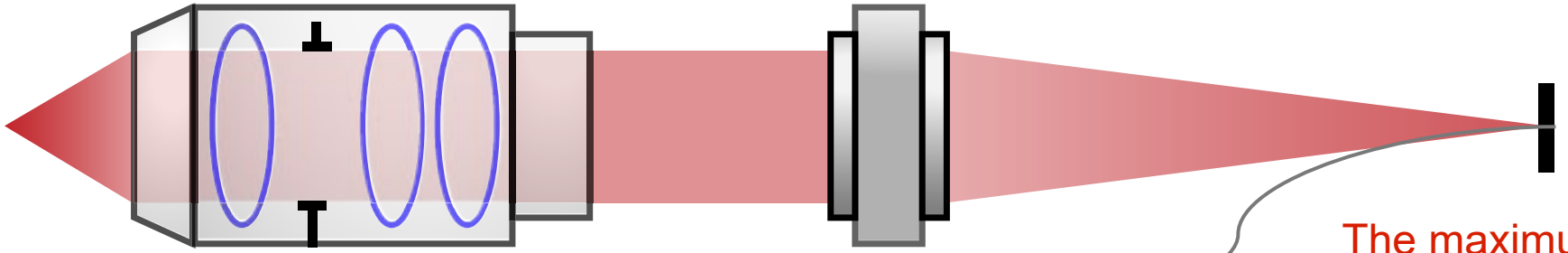


profiles along x direction



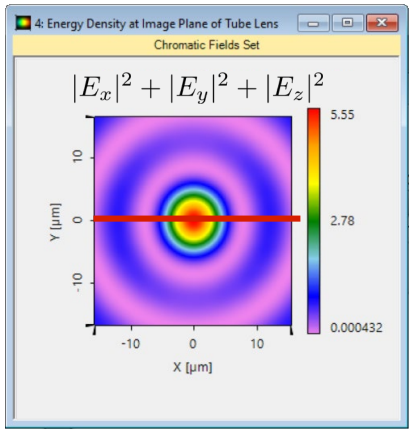
with diffraction effect
without diffraction effect

PSF at Image Plane

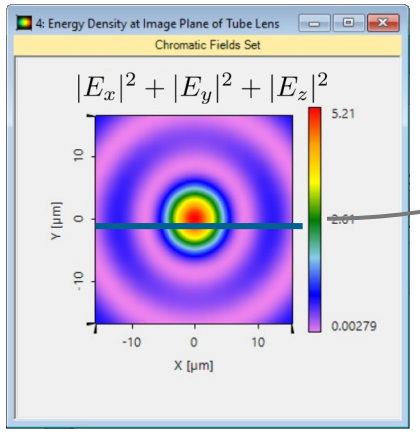


The maximum energy density is decreased due to the diffraction from the aperture.

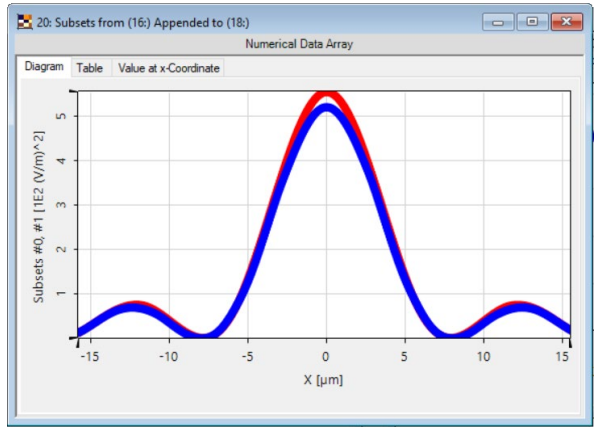
without diffraction from aperture in lens system



with diffraction from aperture in lens system



profiles along x directions



with diffraction effect

without diffraction effect

Document Information

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