Laser-Based Michelson Interferometer and Interference Fringe Exploration
Michelson interferometer is a typical configuration for optical interferometry. Different configurations in the setup may lead to different interference fringes, and therefore it is worth of investigating the relation between them. With the help of non-sequential tracing technology in VirtualLab Fusion, it is easy to set up and to configure a Michelson interferometer, and to visualize the interference fringe in different situations. In this example, several typical situations and the corresponding fringes are demonstrated.
Modeling Task

- Monomode laser:
  - Wavelength: 635 nm
  - Half-angle divergence: 2°

How does the interference fringe change with respect to the shift and tilt of the movable mirror?
Result with Equivalent Optical Path

Coherent superposition of two fields reflected from planar mirrors at equivalent-path positions gives no interference fringes.
Shift of the movable mirror introduces defocus, and therefore ring fringes are observed at the detector plane.
Result with Tilted Movable Mirror

Tilt of the movable mirror leads to parallel striped interference fringes are seen at the detector plane.
Combination of both shift and tilt of the movable mirror gives rise to shifted ring pattern in the interference fringe.
Peek into VirtualLab Fusion

flexible channel control for non-sequential tracing

convenient positioning & orientation settings
Workflow in VirtualLab Fusion

- Set up input Gaussian field
  - Basic Source Models [Tutorial Video]
- 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]
- Use Parameter Run to check influence/changes
  - Usage of the Parameter Run Document [Use Case]
VirtualLab Fusion Technologies

- Prisms, plates, cubes, ...
- Lenses & freeforms
- Apertures & boundaries
- Gratings
- Diffractive, Fresnel, meta lenses
- Micro lens & freeform arrays
- SLM & adaptive components
- Diffractive beam splitters
- Scatterer
- Waveguides & fibers
- Free space
- Nonlinear components
- Crystals & anisotropic components
- Field Solver

# Idealized component
## Document Information

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| further reading | - Mach-Zehnder Interferometer  
- Full-Field Optical Coherence Scanning Interferometry  
- Fizeau Interferometer for Optical Testing |