Generation of Spatially Varying Polarization by Interference with Polarized Light
Interferometry is an important technique for optical metrology. As an example, a Mach-Zehnder interferometer with a coherent laser source is built up in VirtualLab Fusion. Particularly in this example, two polarizers are inserted to control the polarization states of the two interfering beams. By rotating one polarizer, the changes in the interference pattern are visualized, and as a result, spatially varying polarization is generated.
Modeling Task

He-Ne laser - fundamental Gaussian - wavelength 632.8 nm - circularly polarized

3x beam expander
beam splitter
polarizer (fixed)
polarizer (rotatable)
beam combiner

How does the interference pattern change with respect to the polarization states of the two arms?
Interference Pattern Changes with Polarizer Rotation

Interference fringes start to disappear, when polarizer rotates from parallel to orthogonal orientation.
Interference Pattern Changes with Polarizer Rotation

Fringe contrast changes with polarizer rotation.

- Polarizer rotation by 0°
- Polarizer rotation by 75°
Interference Pattern

Interference information is encoded in polarization state.
Peek into VirtualLab Fusion

- Setting of polarization angle
- Non-sequential ray tracing analysis
- Visualization of polarization state
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]

- Configure the surface channels of components
  - Channel Configuration for Surfaces and Grating Regions [Use Case]
VirtualLab Fusion Technologies
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| further reading | - [Mach-Zehnder Interferometer](#)  
- [Laser-Based Michelson Interferometer and Interference Fringe Exploration](#) |