

## VirtualLab Fusion Training Course

# Analysis and Design of Diffractive and Micro-Optical Systems

**Location:** Jena, Germany

**Date:** 27 – 29 March 2019

**Time:** 9:00 – 17:00

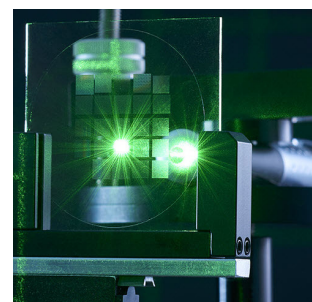
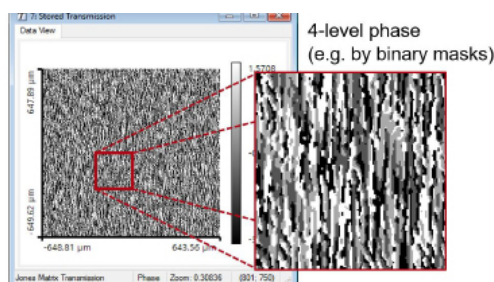
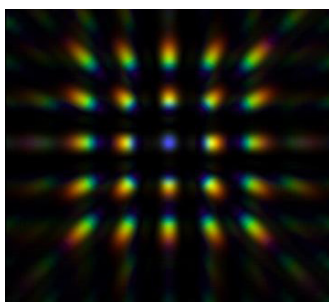
**Registration:** [sales@lighttrans.com](mailto:sales@lighttrans.com)

**Requirements:** Elementary skills in the use of VirtualLab and particular in using the Optical Setup for the setup and analysis of laser systems are recommended. No laptop is required.

Attendees at the software course develop their skills in modeling and analysis of micro-structured and diffractive optical components with refractive, diffractive and hybrid surfaces. Customized surface profiles and refractive index distributions will also be explained. The course teaches the analysis of these components including diffraction and interference effects. The modeling and analysis of typical tolerances, e.g. of micro-structured elements, will be discussed along several examples. We present the optimization of diffractive beam splitters, diffusers and beam shapers by the Iterative Fourier Transform Algorithm (IFTA). The course will also cover the use of the Fourier Modal Method (FMM) to model and perform a rigorous analysis of both 2D and 3D grating structures with features in the wavelength range and with arbitrary surface and index modulations. Finally local and global parametric optimization algorithms of VirtualLab for the rigorous optimization of gratings will be introduced.

## Short Overview (daily program is given on subsequent pages):

- Modeling of micro-optical components
- Import and export
- Analysis, design and tolerancing of diffractive and micro-optical systems
- Modeling and analysis of homogenization systems
- Design of diffractive and refractive beam splitters, diffusers and beam shapers
- Rigorous analysis and optimization of gratings



## Topics day 1

### Modeling of micro-optical components, simulation tolerances and analysis of homogenization systems

- Thin element approximation
- Customized height profiles
- Refractive index modulations
- Import of surface measurement data
- Export of surface data in GDSII, CIF, STL, bit-map and ASCII formats
- Analysis of alignment errors, tilts, etching depth tolerances, edge rounding, modeling of customized amplitude and phase transmissions and masks
- Periodic micro-structured elements (for example micro-lens arrays)
- Systems with micro-lens arrays and diffractive optical elements
- Light with partial coherence (temporal or spatial), as for example, LEDs and Excimer

## Topics day 2

### Algorithms and basics of diffractive optics design for beam splitters and diffusers

- Introduction to the Iterative Fourier Transform Algorithm (IFTA)
- Calculation of physical parameters of beam splitting and light diffusing systems

- Session editors for the design setup
- Generation of regular and arbitrary beam arrays, generation of diffuse top hats, lines and arbitrary 2D light patterns
- Design and optimization of beam splitters and diffusers by the IFTA
- Design processes can be applied for controlling of spatial light modulators (SLMs)

## Topics day 3

### Design of refractive and diffractive beam shapers, rigorous modeling of gratings, optimization of gratings

- Shaping of rectangular and circular top hats
- Optimization of diffractive beam shapers by the Iterative Fourier Transform Algorithm (IFTA)
- 2D and 3D grating structures as sequences of surfaces and homogeneous as well as inhomogeneous media (using the stack concept)
- Design and optimization of beam splitters and diffusers by IFTA
- Rigorous analysis of periodic structures, rigorous near field and field inside grating calculation of periodic structures
- Analysis of reflection, transmission and polarization of sub-wavelength polarizing gratings and anti-reflection structures
- Local and global optimization in VirtualLab, rigorous parametric optimization of gratings



The course is based on the latest release of VirtualLab Fusion available at the course time. Depending on the group's dynamic, the order of the listed topics and their time assignment may vary.

Request a quote for this training via [sales@lighttrans.com](mailto:sales@lighttrans.com)