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Plattform für
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Materialwissenschaften

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Optical Research with VirtualLab Fusion (Optics Simulation Software from LightTrans GmbH, Jena)

One-Day Workshop for all interested Members of the ZfM/LaMa and its Affiliates (given in English)

Trainers: Mrs. Olga Baladron and Mrs. Huiying Zhong (www.lighttrans.com)

Date: Thursday, April 12, 2018, 10:00 a.m. – 5:00 p.m.

Place: JLU Gießen, Chemistry Lecture-Hall Building (Heinrich-Buff-Ring 19), Seminar Room C 106

Scope

Please see the following pages for detailed information on the contents of this workshop.

Registration: until April 3, 2018, via E-Mail to Martin Güngerich.
Registered participants will receive a download link for the free Trial Version of VirtualLab a few days before the event. Please install the Software on your personal laptop and bring it with you to the workshop. Please note that the Trial Version can only be started 50 times!

Number of Participants: min. 7, max. 25

Free VirtualLab Seminar

Optical Research with VirtualLab Fusion

Course Time: According to the arrangement

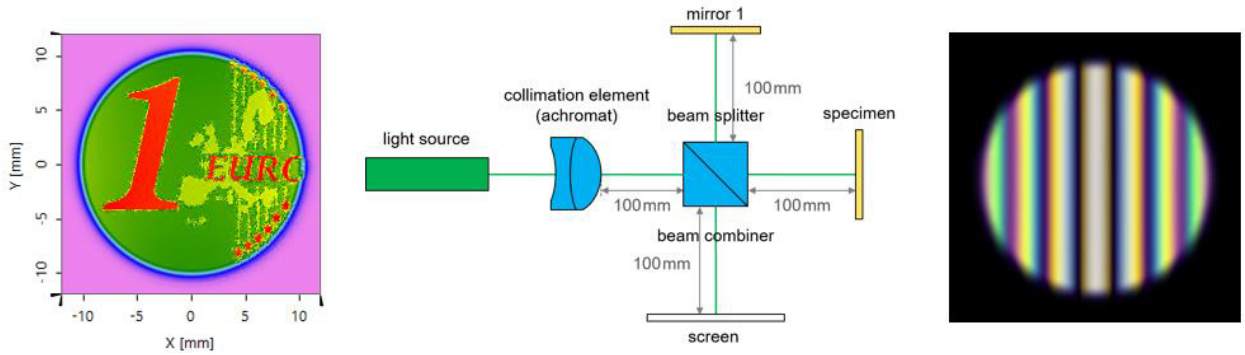
Requirements: Graduate students with limited or no knowledge of VirtualLab, professors, industrial partners

Are you starting out in the field of optics and photonics research as a master or PhD student? Are you interested in gauging the potential of optical-simulation software options to help you in your current and future career? Then we invite you to join us in this free seminar, where we will present, in a hands-on manner, the capabilities of the physical-optics modelling-and-design software VirtualLab Fusion.

After a brief introduction of the software and an overview of its role in R&D in the framework of the latest developments in industrial and academic applications, we will take you along through the simulation of a series of experiments: scheduled in order of increasing complexity, they fulfil the twofold objective of introducing you to the handling of VirtualLab Fusion and illustrating its potential both as an educational tool (with some of the experiments taken from amongst the fundamental cornerstones of optics history) and as an enabler of cutting-edge technology, as we take a peek into more modern topics like, for instance, laser resonators or pulse broadening and compression. You will see how, through a ground-breaking and theoretically cogent combination of the best qualities of both geometrical and physical optics, VirtualLab Fusion sets itself apart from other optical software in being able to bring fast physical optics to your simulations.

Short overview (for more detailed program see below):

- Introduction to VirtualLab Fusion: basic concepts of light representation and propagation and GUI
- Recreation of some historically relevant optics experiments: Abbe diffraction limit, Michelson's and Young's interferometers, etc.
- Simple examples from modern R&D hot topics: laser resonators, pulses, gratings, etc.
- Introduction to the potential for customisation of VirtualLab Fusion through basic programming tasks



Simulation of a white light Michelson interferometer.

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Detailed Schedule:

- **Presentation of VirtualLab Fusion:** We will kick-start the seminar with a brief introduction of the software, placing it in the context of the latest applications and current hot topics in optics R&D. We will give an overview of the most fundamental theoretical principles behind the algorithm, before moving on to more practical aspects like the different propagation engines available (ray and field tracing) and the corresponding models for numerical light representations.

- **Introduction to the user interface of VirtualLab Fusion:** In order to ease the way into the hands-on part of the training, we will give a brief tour of the graphic user interface in VirtualLab Fusion.

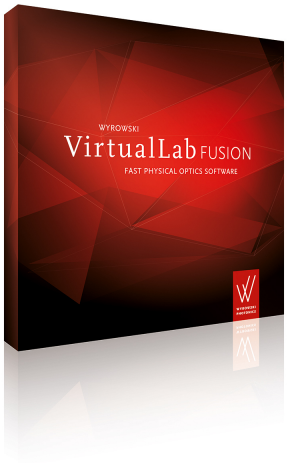
- **Simulation of simple experiments:** We will use this section to warm up for handling the software by guiding you through some basic examples that also serve the purpose of illustrating important effects in optics: we will study polarisation by generating a locally polarised beam, perform the Poisson spot experiment, and work with lens systems by building them from scratch in VirtualLab Fusion and by using the import-from-Zemax option.

- **Simulation of historically relevant experiments and selected examples from modern topics:** Inspired by the education in laboratory work which optics students typically receive in universities, in this part of the training we aim to recreate some of the best-known, most fundamental experiments in the history of optics in VirtualLab Fusion. Emulating a real-life lab, we will set up the experiment together, briefly review the relevant theory before running the simulations and, once the experiment has been carried out, we will perform a thorough analysis of the results. We will also include in this part some examples from more modern fields. In this part, depending on the available time, we will perform a selection of the following: study of Abbe's diffraction limit, construction and analysis of a spatial frequency filter (4f system), simulation of a Michelson interferometer, double slit experiment (Young interferometer), study of pulse broadening and compression phenomena and system optimisation (laser resonator without active media, design of aspherical lens or saw-tooth grating).

- **Introduction to the programming capabilities of VirtualLab Fusion:** Finally, we will demonstrate the versatility of VirtualLab Fusion by performing some simple programming tasks together as part of the seminar exercises. We will also show, as illustration, some examples of more complex instances of programming.

Interested in other examples we have not mentioned here?
We welcome your suggestions for topics for our hands-on training session!

The course is based on the latest release of VirtualLab Fusion available at the time when the course takes place. Depending on the group dynamic, the order of the listed topics and their time assignment might vary.



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