Measurement Methods Using Light—What's Behind Them?

Target Group:

- Students of engineering and the natural sciences who are interested in the fundamentals of optical measurement techniques (Bachelor, Master)

Content:

- Students explore the role of light as a carrier of information, from measurement and modeling to the interpretation of real measurement data. They operate instruments such as a spectrometer or a white-light interference microscope and fabricate micro-optical components in the cleanroom and in the holography lab. They understand which measurement method is suitable for which research question and where its limitations lie.

Methods, Objectives, Outcome

- Students understand the fundamentals of optics and lighting technology and relate them to various measurement methods. They describe the operating principles of measurement methods and compare them in terms of measured variables, resolution, measurement range, and areas of application. Under supervision, they fabricate diffraction gratings as the key component of spectrometers in a cleanroom and in the holography lab. Under supervision, they set up simple optical measurement setups, perform measurements, take safety considerations into account, and document experimental results. They use optical design software to design simple optical systems, simulate beam paths, and investigate the influence of system parameters on the system. They will evaluate sample measurement data, visualize results, and discuss potential sources of error. Working in groups, they will develop an optical measurement strategy for an application-specific problem and present their results in a way that is understandable to an interdisciplinary audience.

Virtual component:

The diffraction grating is the central component of a spectrometer. The virtual session will focus on the properties of such gratings, which will then be modeled, fabricated and characterized on-site.