**Announcement**

# Principles of Geometrical Light and Electron Optics

Prof. Harald Rose

**Description**

The lecture is aimed at students in the Physics Master programme and will cover the fundamentals of geometric light and electron optics. Under the ray approximation, the photon is assumed to be a massless particle and its propagation in a medium with a variable refractive index will be calculated similarly to quantum mechanics. Before considering in more detail different aspects of electron optics and electron microscopy, we will first examine some very general concepts involved in image formation. These ideas were derived during the development of visible-light optics. On this basis the ray equations will be derived and the optical Eikonal introduced, from which it is possible to derive the Abbe sine condition and the setup of an ideal light microscope which then will be extended to understanding of the real electron microscope's optics.

**Teaching Method**

- Seminar: Task to be solved will be discussed to support the lecture
- Lab: Two experiments will be performed (1) optical bench, lens systems, (2) determine the spherical aberration of the objective lens of the TEM TALOS.

**Details**

> Module:   74609 Wave and Particle Optics, 3 CP
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> Exam:   14609 wave and particle optics (only particle optics will be written tested).

**Schedule**

> Mon, 09.03.2020, 15.00 - 18.00, O27/2203: lecture
>
> Tue, 10.03.2020 - Fri, 13.03.2020

- 10.00 - 13.00, O27/2203: lecture
- 14.00 - 16.00, O27/2203: seminar and lab

**Lecturer**

> Prof. Harald Rose, Electron Microscopy Group of Materials Science
> Seminar and Lab: Dr. Dorin Geiger, Electron Microscopy Group of Materials Science