

MICRO-627

Optical Design

Scharf Toralf

| Cursus | Sem. | Type |
|-----------|------|------|
| Photonics | | Obl. |

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| Language of teaching | English |
| Credits | 2 |
| Session | |
| Exam | Written & Oral |
| Workload | 60h |
| Hours | 40 |
| Courses | 20 |
| Exercises | 20 |
| Number of positions | 0 |

Frequency

Only this year

Remark

Registration closed - Contact EDPO

Summary

The course is designed for scientists who want to acquire knowledge and expertise in optics and optical design and is relevant to practitioners in a broad range of fields. The main focus of the course is the layout and optimization of optical imaging systems using the optical design software Zemax.

Content

Introduction - optical systems Optical modeling, paraxial optics, raytrace, lenses, materials, optical systems, model, ray sets, pupil, vignetting, imaging, etendue, system complexity
 Introduction into Zemax Basic handling
 Aberrations I Ray aberrations, expansions, representations, primary aberrations
 Aberrations II Wave aberrations, Rayleigh and Marechal criteria, Zernike coefficients, measurement
 Aberrations III PSF, Strehl, MTF
 Optimization Basic principles, correction process, constraints, bending, initial systems, global methods, lens splitting, lens removal, burried surfaces
 Correction methods I Structure, symmetry, stop position, telecentricity, retrofocus, telesystem
 Correction methods II Correction of primary aberrations, aplanatic surfaces, higher orders, wide field setups, vignetting
 Chromatical correction Dispersion, partial dispersion, axial chromatical aberration, achromatization, classical achromate setup, negative, convergent light, aplanatic, apochromatic correction, miscellaneous
 Simple systems Single lens, 4f systems, endoscopes, relays, eyepieces, scan lenses
 Mirror systems and telescopes Telescopes, setup and formulas, reflecting telescopes, catadioptric sytems
 Camera systems Overview, system classification, distinctive optical design features, examples
 Field flattening Introduction, Petzval theorem, correction of field curvature, examples
 Aspheres Surface types, Forbes approach, spherical correction, optimal location of aspheres, miscellaneous

Keywords

Optical system and lens design
 Ray tracing with Zemax

Learning Prerequisites

Important concepts to start the course

Basic knowldege on optics