

## SC9 | Design of optical imaging systems



NIVEAU : ADVANCED

**Publics :** Engineer, project manager in R&D

**Prérequis :** Basic knowledge in geometrical optics

**Responsable(s) pédagogique(s) :** Eric Ruch - Ingénieur expert à REOSC

**Langue de la formation :** French

**Capacité maximum :** 12

**Prix :** 2560€ HT - **Durée :** 2 x 3 days - 42 h

### Objectifs

- ▶ Understand the conventional optical system combinations and their applications
- ▶ Specify or size an optical system, write a specification
- ▶ Evaluate the performance of an optical system and optimize it.

### Dates et lieu des prochaines sessions

- ▶ 20 march 2019 au 22 march 2019 et 03 april 2019 au 05 april 2019 - Palaiseau

### Thèmes abordés

Basis on optical systems

- ▶ Photometry and radiometry

Analysis of an optical system

- ▶ Limit of resolution of optical systems

Classical optical combinations

- ▶ Dioptric and catadioptric systems, zoom, optical IR

---

## SC9 | Design of optical imaging systems

---

### Le programme

#### Instrumental optics reminder

- ▶ Geometric characteristics of optical systems
- ▶ Magnification - Aperture - Resolution - Field of view - Depth of field
- ▶ Reminder about aberrations

#### Photometry

- ▶ Reminder on photometric quantities: flux, illumination, intensity, luminance, geometric extended
- ▶ Photometry instruments
- ▶ Reminder about cameras and matrix detectors

#### Analysis of an optical system

- ▶ Criteria qualities of an optical imaging system : defects of the wavefront, PSF, MTF
- ▶ Measurement methods of these criteria: star test, wavefront analyzers
- ▶ Basic principles in adaptive optics

#### Study conventional optical combinations

- ▶ Diopter systems: from simple lens objectives to high quality photographic objectives
- ▶ Catadioptric systems: telescope mirrors 2 or 3, on- and off-axis
- ▶ Lenses with variable focal (zoom)
- ▶ Optical systems for thermal infrared

#### Labwork

- ▶ Aberration measurements (star test)
- ▶ wavefront analysis (Zygo, Haso)
- ▶ FTM measurements (LSF, Foucault method)

### Méthodologie et évaluation

Lectures and exercices

Demonstrations in the lab

Labworks on instruments