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“Radio Astronomical Instrumentation and Terahertz Photonics”

I: Radio Astronomical Instrumentation

The course introduces into the fundamental concepts of radio astronomical instrumentation and wants to give an overview of the field.

A short list of contents/keywords:

1. Optical Telescopes
 - a. Ray Optics
 - b. Waves and Diffraction
 - c. Adaptive Optics
2. Motivation Submillimeter/Terahertz-Astronomy and Spectroscopy
3. Radio Telescopes
 - a. Radiation Laws
 - b. Fundamentals of Antenna Theory
 - c. Wave Optics: Gaussian Beams
4. Principles of Detection of Radiation
 - a. Incoherent Detectors
 - b. Coherent Receivers
5. Fundamental limitation of receiver sensitivity
 - a. Noise Types and Sources
 - b. Radiometer Equation
 - c. Signal processing
 - d. Observational methods
6. Interferometers and aperture synthesis