Module: Elective Advanced Lectures: Observational Astronomy

Module No.: astro840

Course: Radio Astronomy: Tools, Applications, Impacts

Course No.: astro841

Category	Type	Language	Teaching hours	CP	Semester
Elective	Lecture with exercises	English	3+1	6	WT

Requirements for Participation:

Preparation:
Good knowledge of electrodynamics, atomic physics, and astronomy

Form of Testing and Examination:
Requirements for the examination (written or oral): successful work with the exercises

Length of Course:
1 semester

Aims of the Course:
An introduction to modern radio astronomy, its history, methods, and research potentials is given. The goals are to equip the student with the background and know-how to analyze and interpret data from modern single-dish and interferometer radio telescopes, and to enable them to motivate and write radioastronomical observing proposals. Aperture synthesis techniques are explained at some depth. The lecture is furnished with numerous examples demonstrating the versatility and power of radioastronomical tools

Contents of the Course:
Radiation: processes, propagation; Signal detection; Radio telescopes: properties, types; Receivers: heterodyne, bolometers; Backends: continuum, spectroscopy, pulsars; Interferometers: Fourier optics, aperture synthesis; imaging; Future: APEX, ALMA, LOFAR.

Recommended Literature:
B. F. Burke; F. Graham-Smith, An Introduction to Radio Astronomy (Cambridge University Press 2002)
T. L. Wilson; C. Rohlfs; Tools of Radio Astronomy (Springer, Heidelberg 4. rev. und erw. Ed. 2006)
J. D. Kraus; Radio Astronomy (Cygnus-Quasar Books, Durham 2. Aufl. 1986)
R.A. Perley; F. R. Schwab, A.H. Bridle; Synthesis Imaging in Radio Astronomy, 3rd NRAO Summer School 1988 (Astronomical Society of the Pacific Conference Series, 1989)
A. R. Thompson, J. M. Moran, G.W. Swenson, Interferometry and Synthesis in Radio Astronomy (Wiley & Sons, Weinheim 2. Aufl. 2001)
Lecture Notes (U. Klein)