Level: bachelor

Course title: Processing of Astronomical Observations

Status: obligatory

ECTS: 4

Requirements:

Learning objectives

Students should learn the theoretical basis of data reduction from astronomical observations and its primary methods used in the reduction of astronomical observations. Through reduction of specific observational photometric and spectroscopic data, students gain routine knowledge about the specifics of data reduction, determine physical properties from observed parameters of celestial bodies, about sources and eliminating systematic errors and determine random errors at observational astronomical data.

Learning outcomes

Student will be provided with the knowledge about methods of determining the measured values of astronomical observational data and determining their systematic and random errors.

Syllabus

Theoretical instruction

Theoretical part deals with those methods of statistical mathematics and theory of probability that are applied in the data reduction of astronomical observations. Distribution characteristics of measured samples from astronomical data are considered. The properties of location parameters of the distribution such as mean, median and most probable value are discussed. Special attention is paid to the dispersion parameters such as dispersion and standard deviation (as measures of random measurement errors). Ways of determining the value of location parameters and methods of eliminating systematic, that is, determining the values of the random errors in the case of direct and with the help of propagation of systematic and random errors in indirect and parametric measurements. Properties of sources of errors in the case of observing photons as information carriers coming from celestial bodies are studied. These include errors arising from nature of photon radiation, the systematic errors caused by the Earth's atmosphere (e.g. extinction), random errors caused by the turbulent properties of Earth's atmosphere, the errors caused by optical parts of the telescope, then the elements of the analyzer and at the end, errors that arise in the very detectors of radiations.

Practical instruction

Practical part reinforces the theoretical knowledge in the data reduction of astronomical observations through a variety of examples and assignments. Using specific observational examples, tasks to find the values of location parameters, systematic and random errors are solved. Complete procedure of photometric observational data reduction of stars is performed. A complete reduction procedure regarding spectroscopic observational data of stars and the Sun is done.

Weekly teaching load				Other:
Lectures: 2	Exercises: 1	Other forms of teaching: 0	Student research:	