Module: Elective Advanced Lectures: Modern Astrophysics

Module No.: astro850

Course: Gravitational Lensing

Course No.: astro852

Category	Type	Language	Teaching hours	CP	Semester
Elective	Lecture with exercises	English	2+1	4	ST

Requirements for Participation:

Preparation:

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:
After learning the basics of gravitational lensing followed by the main applications of strong and weak lensing, the students will acquire knowledge about the theoretical and observational tools and methods, as well as about the current state of the art in lensing research. Strong emphasis lies on weak lensing as a primary tool to study the properties of the dark-matter distribution and the equation of state of dark energy

Contents of the Course:
The detection of the deflection of light in a gravitational field was not only one of the crucial tests of Einstein's Theory of General Relativity, but has become in the past two decades a highly valuable tool for astronomers and cosmologists. It is ideally suited for studying the mass distribution of distant objects, search for compact objects as a potential constituent of the Galactic dark matter, provide powerful (and cheap) 'natural telescopes' to take a deeper look into the distant Universe, to measure the mass distribution in clusters and on larger spatial scales, and to study the relation between luminous and dark matter in the Universe. Principles and methods are described in detail and the applications will be presented

Recommended Literature:
P. Schneider, C. Kochanek, J. Wambsganss; Gravitational Lensing: Strong, Weak and Micro: Saas-Fee Advanced Course 33. Swiss Society f Astrophysics and Astronomy (Springer, Heidelberg 2006)
P. Schneider, J. Ehlers, E. F. Falco; Gravitational Lenses (Springer, Heidelberg 1992)