FSH3130 Advanced Astrophysics 7.5 credits

Fortsättningskurs i astrofysik

This is a translation of the Swedish, legally binding, course syllabus.

If the course is discontinued, students may request to be examined during the following two academic years

Establishment

Course syllabus for FSH3130 valid from Spring 2013

Grading scale

Education cycle

Third cycle

Specific prerequisites

Enrolled PhD student.

Recommended prerequisites: Astrophysics equivalent to SH2204. Mathematical methods of Physics.

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

After completing the course the student should be able to:

1. Describe the most important radiation processes in the Universe and explain how radiation is transported in different media.
2. Apply the theories for the production of line and continuum spectra to calculate the most important properties of the emitting object/medium from observed spectra.
3. Explain the main points of accretion theory and use the theory to solve problems for relevant astrophysical phenomena.
4. Describe Compact objects (black holes and neutron stars) and phenomena related to these objects (e.g., active galactic nuclei, pulsars and gamma-ray bursts).
5. Apply the learning outcomes above to critically evaluate different ways of using high-energy observations to study the properties of compact objects
6. Identify a topical resarch area in the field of high-energy astrophysics, write a review of the topic in the form of a scientific paper as well as a referee report for another student.

Course contents

The course gives a solid foundation in astrophysics, with particular emphasis on high-energy astrophysics. The following topics are covered:

Radiative transfer and line spectra

Continuum spectra: Compton emission, Synchrotron emission and Brehmsstrahlung.

Accretion onto neutron stars and black holes

Astrophysical applications of the theory of relativity

Compact objects (black holes and neutron stars) and phenomena related to these objects (e.g., active galactic nuclei, pulsars and gamma-ray bursts), with particular focus on relevant radiation processes.

Course literature

Föreläsningsanteckningar och utdelat material.

Lecture notes and hand-outs.

Examination

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

Home assignments: Examines objectives 1-3.

Project: Examines all course objectives, with paricular emphasis on 4-6.

Other requirements for final grade

Passing grade on the following:

Home assignments (2 hp).

Project (5.5 hp).

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.