Study programmes: PhD studies – Astronomy and Astrophysics

Course name: Numerical Methods in Radiative Transfer

Lecturers: Olga Atanacković

Status: Optional

ECTS: 9

Attendance prerequisites: None

Course aims: Acquiring advanced knowledge of the numerical methods for solving various radiative transfer problems

Course outcome: At the end of the course, student has enough skills to start a research in the numerical methods for solving radiative transfer problems: spectrum synthesis and stellar atmospheres modeling

Course description:

Numerical methods in radiative transfer. Classification of the methods according to the form of the radiative transfer equation. Method of discrete ordinates. Formal solution. Short characteristics method. Classical Lambda iteration. Feautrier's method. Rybicki's method. Complete linearization method. Core saturation method. Cannon's operator perturbation method. Accelerated (approximated) lambda iteration methods (ALI). Scharmer's method. OAB operator. Iteration factors method. Implicit methods. Implicit integral method. Forth-and-Back Implicit Lambda Iteration (FBILI). Convergence acceleration methods. Numerical codes for the spectrum synthesis and stellar atmosphere modeling.

Literature:

1. Kalkofen, W. (Ed.), 1984, *Methods in Radiative Transfer*, Cambridge Univ. Press
2. Kalkofen, W. (Ed.), 1987, *Numerical Radiative Transfer*, Cambridge Univ. Press
3. Kourganoff, V.: 1963, *Basic methods in transfer problems*, New York: Dover Publ.
4. Crivellari, L., Hubeny, I., Hummer, D.G.: 1991, *Stellar atmospheres: Beyond classical models*, NATO ASI Series.

Number of hours: 10	**Lectures**: 4	**Tutorials**: 6

Teaching and learning methods: Ex cathedra, group work, student research

Assessment (maximal 100 points)

Course assignments	points	Final exam	points
Lectures	-	Written exam	-
Exercises / Tutorials	20	Oral exam	60
Colloquia	-	Written-oral exam	-
Essay / Project	20		