

Study programme: PhD studies – Astronomy and Astrophysics			
Course name: Stellar Atmospheres			
Lecturers: Olga Atanacković			
Status: Optional			
ECTS: 9			
Attendance prerequisites: None			
Course aims: Acquiring advanced knowledge of the theory of stellar atmospheres			
Course outcome: At the end of the course, student has enough skills to start a research concerning the theory of stellar spectra and stellar atmospheres modeling			
Course content:			
Basics of radiative transfer. Local thermodynamic equilibrium (LTE). The equation of radiative transfer. The condition of radiative equilibrium. The grey atmosphere.			
Line and continuum opacity. The line absorption coefficient. Line broadening mechanisms. Continuum absorption cross-sections. Hydrogen. The negative hydrogen ion. Helium and heavier elements. Continuum scattering cross sections (Thomson and Rayleigh scattering).			
Spectral line formation. Non-LTE line transfer. The two-level atomic model. The effects of an overlapping continuum. Line formation in the presence of a chromosphere. Solution of the multi-level non-LTE line transfer problem. Solution of the transfer equation in multiplets. Line formation with partial frequency redistribution.			
Model atmospheres. LTE radiative equilibrium models. Temperature correction procedures. Non-LTE radiative equilibrium model atmospheres for early-type stars. The complete linearization method. Line effects. Convection and models for late-type stars. Solar atmosphere models. Extended atmospheres. Solution of the transfer equation in spherical geometry. Expanding stellar atmospheres.			
Literature:			
1. Mihalas, D.: 1978, <i>Stellar atmospheres</i> , 2nd ed., San Francisco: W.H. Freeman & Comp.			
2. Gray, D.: 2005, <i>The observation and analysis of stellar photospheres</i> , Cambridge Univ. Press			
3. Rutten, R.: 1999, <i>Stellar atmospheres</i> , Utrecht: Sterrekundig Inst.			
4. Crivellari, L., Hubeny, I., Hummer, D.G.: 1991, <i>Stellar atmospheres: Beyond classical models</i> , 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	-		
Essay / Project	20		