Course Unit Descriptor

Study Programme: Physics

Course Unit Title: Optical plasma diagnostic

Course Unit Code: FD18ODP

Name of Lecturer(s): Full Professor Zoran Mijatović

Type and Level of Studies: PhD

Course Status (compulsory/elective): Elective

Semester (winter/summer): Summer

Language of instruction: English

Mode of course unit delivery (face-to-face/distance learning): Face-to-face

Number of ECTS Allocated: 15

Prerequisites: Master in Plasma physics

Course Aims:

Obtaining knowledge about the methods for plasma diagnostics applying optical spectroscopy.

Learning Outcomes:

Abilities:

- General: Ability for professional and scientific activities in the field of plasma diagnostics by applying optical spectroscopy methods at scientific and industrial level.

- Specific: Ability for setting up and performing experiments. Application of different methods based on optical spectroscopy for the plasma diagnostic purposes – plasma electron density and temperature determination. Ability to discuss the results obtained. Inclusion in scientific and industrial processes based on plasma technologies.

Syllabus:

Theory

Plasma temperature. Plasma tepretaure determination from absolute line intensities. Plasma electron Temperature determination from relative line intensities. Plasma electron temperature determination from lin-to- continuum intensity ratio. Electron temperature deremnination from the slope of continuum. Determination of the tepretaure of heavy particles from Doppler line profiles. Fowler-Milne method for plasma temperature determination. Plsama electron determination from the shift of spectral lines.

Plasma electron density. Plasma electron density determination the absolute line intensities. Plasma electron density determination from Stark broadening of the spectral lines. Plasma electron density determination from Stark widths of hydrogen spectral lines. Ingis-Teler method for plasma electron density determination.

Practical

Application of different methods to plasma electron density determination on pusled and contnuous plasma sorces.

Required Reading:

1. H. R. Griem, Plasma spectroscopy, McGrow-Hill, New York (1974).
2. H. R. Griem, Principles of plasma Spectroscopy, Cambridge University Press (1977).
3. J. Cooper, Plasma spectroscopy, Plasma Physic Group, Imperial College, London
4. M. Venugoplan Ed., Reactions under plasma conditions, Ch. 7, F. Cabannes and J. Chapelle, Spectroscopic plasma diagnostic, Wiley-Interscience, New York
5. R. H. Huddlestone and S. L. Leonard Eds., Plasma diagnostic techniques, Academic Press, New York (1965).
6. W. Lochte-Holtgreven, Ed., Plasma diagnostic, North-Holland, Amsterdam (1968).
7. R. H. Kingston, Optical sources, detectors and systems, fundamentals and applications, Academic Press (1995).
8. A. P. Thorne, Spectrophysics, Chapman and Hall & Science paperbacks, London (1974).

Weekly Contact Hours:	**Lectures:** 6	**Practical work:** 4

Teaching Methods:

Lectures and students group work			
Knowledge Assessment (maximum of 100 points): 100			
Pre-exam obligations	points	**Final exam**	points
Active class participation		written exam	
Test I and Test II		oral exam	60
Preliminary exam(s)		…….	
Seminar(s)	40		
The methods of knowledge assessment may differ; the table presents only some of the options: written exam, oral exam, project presentation, seminars, etc.			