Course Unit Descriptor

Study Programme: Physics

Course Unit Title: Spectral line broadening in plasma

Course Unit Code: FD18SSLP

Name of Lecturer(s): Full Professor Stevica Đurović

Type and Level of Studies: PhD

Course Status (compulsory/elective): Elective

Semester (winter/summer): Winter

Language of instruction: English

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

Number of ECTS Allocated: 30

Prerequisites: Plasma physics, Plasma sources and experimental techniques

Course Aims:

To introduce students to the causes of broadening of the spectral lines emitted from the plasma.

Learning Outcomes:

After completion of the course, students should possess:

- General skills: general knowledge about the causes of the spectral line broadenings.
- Specific skills: knowledge on the theoretical considerations of certain specific conditions in the plasma, and manifested through the influence on the shape of spectral lines. Such knowledge is directly applicable to plasma diagnostics.

Syllabus:

Theory

Spectral line shapes. The causes of the spectral line broadenings.

Natural broadening. Doppler broadening. Pressure broadening. Stark broadening. Resonance broadening. Van der Waals broadening.

The basic elements of Stark broadening theory. Quasistatic approximation. Microfield distribution function. Perturbation theory. Collision approximation. Nonhydrogenic lines. The influence of ions on the broadening of isolated lines. A simplified calculation of the electronic broadening and shift of spectral lines. Hydrogenic lines. The influence of magnetic fields. Ion spectral lines.

Practice

Application of Stark parameters to determine the plasma electron density and temperature.

Required Reading:

1. H. R. Griem, Plasma spectroscopy, McGrow-Hill, New York (1974).
2. H. R. Griem, Spectral line broadening, Academic Press, New york (1974).
3. H. R. Griem, Principles of plasma Spectroscopy, Cambridge University Press (1977).
4. B. Wende Ed., Spectral line shapes, J. Seidel, Theory of hydrogen Stark broadening, Walter de Gruyter, Berlin (1981).
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).

Weekly Contact Hours:	**Lectures:** 5	**Practical work:** 15

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	70
Preliminary exam(s)		…….	
Seminar(s)	30		
The methods of knowledge assessment may differ; the table presents only some of the options: written exam, oral exam, project presentation, seminars, etc.			