Level: PhD

Course title: Spectral line broadening in plasma

Status: elective

ECTS: 30

Requirements: Plasma physics, Plasma sources and experimental techniques

Learning objectives

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

Theoretical instruction

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.

Practical instruction

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

Weekly teaching load				Other:
Lectures: 5	Exercises:	Other forms of teaching: seminars	Student research: 15	