

Level: PhD				
Course title: Coherent radiation sources and applications				
Status: elective				
ECTS: 15				
Requirements: Plasma physics, Plasma sources and experimental techniques				
Learning objectives To introduce students to the coherent radiation sources, i.e. lasers and their application in plasma physics.				
Learning outcomes After completion of the course, students should possess: - General skills: general knowledge about the types and principles of operation of certain types of lasers. - Specific skills: knowledge about the possibilities of application of certain types of lasers in plasma diagnostics.				
Syllabus <i>Theoretical instruction</i> The processes of emission and absorption of radiation. Stimulated emission. The population of the energy levels of atoms and molecules. Inverse population. Quantum amplifier and a quantum generator. The processes of pumping, gas discharges, light absorption, chemical reactions, flow of current through the pn-junction. Optical resonators, passive and active. Characteristics of laser radiation. The interaction of laser radiation and matter. Damage of optical elements. Characteristics of laser materials. Types of lasers. Helium-neon laser, Ruby laser. Neodymium laser. Argon laser. Nitrogen laser. CO ₂ laser. Chemical lasers. Liquid lasers. Semiconductor lasers. The application of lasers. The elements of nonlinear optics. <i>Practical instruction</i> Helium-neon laser, Neodymium laser.				
Weekly teaching load				Other:
Lectures: 6	Exercises:	Other forms of teaching: seminars	Student research: 4	