



SC

PHYS2700 Physique des interactions laser-atomes-molécules : méthodes expérimentales

[45h] 6 credits

Teacher(s): Pierre Defrance, Xavier Urbain
Language: french
Level: 2nd cycle course

Aims

A: Experimental methods of laser-matter interactions (22.5-0)
Use of intense lasers and experimental methods for the study of laser-matter interactions.
B: Corpuscular optics (22.5-0)
Introduction to methods of production, transport and analysis of charged particle (non relativistic)
C: Experimental methods of atomic collisions (22.5-0)
Experimental study of collision processes, particularly those touching astrophysics and controlled thermonuclear fusion.

Main themes

A : Principles of high intensity lasers and ultra-short pulses
Diagnostics, transport and focalisation of rays, including the security issues
Coherent excitation of atoms
Multiphotonic ionization and dissociation
Harmonic generation, X rays and plasmas
B : Principles of production modes of charged particles (electrons, positrons, ions)
Basic principles of corpuscular optic, general equation of movement, paraxial equations and applications to electric and magnetic fields, notion of emittance, Liouville theorem and beam envelope simulation
Applications: beam production and simulation codes
C : Description of collision processes
Cross section, kinematics, detection and measurement methods, atomic traps
Collisions in presence of a laser field
Processes for astrophysics and thermonuclear fusion