

Title : Hydrodynamics of inertial fusion
Acronym : B1
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Pre-requisites : First year of MSc in Physics or Engineering Schools.
Credits : 3 ECTS
Language : French/English
Keywords : Inertial confinement fusion - Power lasers - Fusion hydrodynamics - Fast ignition – Hot plasmas.
<i>Additional information on inertial confinement fusion is provided, as well as an introduction to the use of a hydrodynamic code for the simulation of laser implosions. The module is completed by experimental work on a power laser.</i>
<p>Physics and modeling of CFI Compression of a fuel shell : velocity, implosion and stagnation, flow diagram - Hydrodynamic efficiency for a spherical target - Evolution of a hot spot: thermal transport, radiative transport and alpha particle production - CFI modeling methods - Introduction to the CHIC radiative hydrodynamics code - Description of the code modules: Lagrangian hydrodynamics, thermal transport, radiative transport, laser absorption by "ray tracing", equations of state and opacities, MHD module, fusion reaction - Fast ignition and physics of fast electron transport - Hybrid modeling for fast ignition.</p> <p>Tutorial on the computer with the CHIC code One-dimensional simulation of a pusher - Design of a 1D spherical target - Optimization of a gain target.</p> <p>Experimental work on the "Eclipse" power laser Interaction of the laser pulse with a solid target: measurements of plasma parameters with optical and particle diagnostics.</p>