

9th Summer School

Plasmas in super-intense laser fields



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Matter in extreme conditions

The lessons will present the interest of studying the behavior of matter in extreme conditions of pressure, density and temperature (Megabar pressure range and beyond). These will include:

1. Matter in extreme conditions: what is “High energy density” (HED) and what is “Warm Dense Matter”. Interest of HED and WDM for material science, astrophysics and planetology, inertial confinement fusion.
2. Equation of State (EOS) of matter and thermodynamic transformations.
3. How to obtain extreme state of matter: laser-induced shock waves. Basics physics of shock waves. Hugoniot-Rankine Relations. Hugoniot and Shock Polar Curves.
4. Measuring EOS with laser driven shock waves. The Impedance Mismatch approach. Diagnostics: SOP, VISAR.
5. Creating extreme states of matter using short pulse lasers. “Quasi isochoric” heating of matter. Blast waves.