Abstract for ICAMDATA05, Meudon, France
October 15–19, 2006

Numerical modelling for intense laser physics.

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Domain : Astrophysics

The recent start-up of large intense laser facilities such as the Ligne d'Intgration Laser (LIL) or the LULI2000 and the arrival in the near future of the Laser Megajoule (LMJ) gives a great perspective for laboratory astrophysics, dense matter studies and inertial fusion. To make the most of these opportunities, several teams have set up a program which aims at satisfying simulation needs in the fields of Astrophysics, Hot Dense Matter and Inertial Confinement Fusion. A large part of the scientific production in these fields relies upon simulations of complex unsteady hydro flows, coupled to non equilibrium transport and chemical kinetics. As the characteristic time scales of transport may be much shorter than the fluid time scale, implicit numerical methods are often required. Atomics physics data, and in particular equation of states and opacities, are a key and critical ingredients for the simulations done in stellar physics, laboratory astrophysics and in many other fields of astrophysics. We will show the different codes used in the various fields of the project and the different methods used to capture the desired physics. We will also present ODALISC, a new opacity database aiming at providing the community with spectral opacities and numerical tools to use them efficiently in radiation-hydrodynamics codes.