SHOCK IGNITION APPROACH TO ICF: PRELIMINARY EXPERIMENTS ON EUROPEAN LASERS

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The contribution describes the results obtained in experiments performed on the "Shock Ignition" approach to ICF at the LULI and LIL (France) and PALS (Czech Republic) laser facilities, aimed at study the process of shock generation and the physics of laser-plasma interaction at intensities up to 10^{16} W/cm^2. In all experiments we used different laser beams or pulse shaping first to produce a pre-plasma and second to launch a strong shock.

The first goal of the experiments was to study the shock created at 1ω and at 3ω in order to demonstrate the generation of very large shock pressures. The second goal was to study the backscattering of light. We recorded spectra and measured the total reflected energy. The third goal was to study the production of supra-thermal electrons in order to investigate their possible contribution to the generation of the shock wave.

We studied the shock using shock breakout time at the backside of the target from SOP and VISAR diagnostics. Back scattered light (SBS and SRS reflected energy), the plasma extension and temperature with X-ray imager.

At LULI and LIL we also studied shock dynamics in planar plastic targets as compared to "hemispherical" targets, The bigger laser energy and longer pulse duration available at LIL allowed to extend the study in conditions which are closer to a real ICF scenario (LIL is the prototype laser chain for LMJ).

Finally at LULI we used X-ray radiography as a diagnostics of shock dynamics. The shock front was studied at different times by changing the temporal delay between the beam producing the shock and a ps-backlighing beam producing a Kα source .

In all cases, we compared the results with CHIC 2D simulations in order to infer the maximum pressure inside the target.