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Isochoric heating of matter by laser-accelerated high-energy protons JULIEN FUCHS, ANA MANCIC, JEROME ROBICHE, PATRIZIO ANTICI, LIVIA LANCIA, PATRICK AUDEBERT, LULI, CNRS, France, PATRICK COMBIS, PATRICK RENAUDIN, DPTA, CEA/DAM-Ile-de-France, France, TOMOAKI KIMURA, RYOSUKE KODAMA, MOTOAKI NAKATSUTSUMI, ILE, Osaka University, Japan — Producing matter at a high temperature (1-25 eV) and solid density is of prime interest for fundamental plasma physics or ICF. The use of laser-based high energy proton beams to achieve such state of matter is interesting since they are short ($<$ 1 ps) and they deposit their energy volumetrically; thus can heat, before they expand, much thicker samples than allowed using laser-heating. We performed, using two intense short pulses of the LULI 100 TW facility, experiments to characterize the achieved state of matter, coupled to a detailed hydro-modeling. A laser-generated proton beam irradiated and heated a secondary target positioned after a vacuum gap. Three diagnostics were used: (i) 1D time-resolved optical self-emission of the heated target rear-surface at two wavelengths, (ii) time-resolved interferometry of a chirped probe beam reflecting off the heated target rear-surface, (iii) x-ray absorption spectroscopy through the heated target using a laser-produced backlighter detecting its Kα-edge softening.

Julien Fuchs
LULI, CNRS, France

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