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In-target electron thermalization by the Weibel instability during intense irradiation of a thin aluminum foil J. FUCHS, C. RUYER, B. ALBERTAZZI, L. LANCIA, V. DERVIEUX, P. ANTICI, J. BOCKER, S.N. CHEN, M. NAKATSUTSUMI, L. ROMAGNANI, R. SHEPHERD, M. SWANTUSCH, M. BORGHESI, O. WILLI, H. PEPIN, M. GRECH, C. RICONDA, L. GREMILLET, LULI, Ecole Polytechnique, 91128 Palaiseau, France — Proton-radiography of the electromagnetic fields developing after irradiation of a 3μm-thick Al foil by a high-intensity laser(5×10^{19}W.cm^{-2}, 700fs, 8μm focal spot) was performed at the Titan facility. The obtained radiographs evidence filamentary structures which develop inside the dense target, 300μm away from the focal spot, a few picoseconds after the laser drive. We will demonstrate that the radiographs' structures are due to magnetic fields triggered by the so-called Weibel instability, inside the dense target. For this purpose, large scale particle-in-cell simulations of hot electrons thermalization in a dense, cold and collisional target have been performed. They demonstrate the ability of the laser-heated electrons to sustain a strong temperature anisotropy during their relaxation in the thin foil. This hot electron anisotropy results in a Weibel instability, thus triggering magnetic fluctuations of spectrum consistent with the experiment over 10 picoseconds.

J. Fuchs
LULI, Ecole Polytechnique, 91128 Palaiseau, France

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