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Simulations of ps-laser channeling and fast electron generation in realistic density gradients MARIJA VRANIC, JORGE VIEIRA, GoLP/IPFN - Instituto Superior Tecnico, Lisbon, HIROTAKA NAKAMURA, Blackett Laboratory, Imperial College London, Prince Consort Road, London SW7 2BZ, UK, RICARDO FONSECA[1], GoLP/IPFN - Instituto Superior Tecnico, Lisbon, PETER NORREYS[2], Department of Physics, University of Oxford, Parks Road, Oxford OX1 3PU, UK, LUIS SILVA, GoLP/IPFN - Instituto Superior Tecnico, Lisbon — Energetic electron beams are useful for many aplications such as radiation generation, laboratory astrophysics, energy transport and many more. Laser channel formation in plasmas is particularly interesting for the fast ignition scheme, where a long laser pulse is used to increase efficiency of the ignition laser energy delivery to the core. Electrons generated in the channel can be used to enhance this energy coupling. We have performed full-scale 2D PIC simulations of channeling of $\sim$ 15ps lasers through 2mm plasmas with realistic density gradients relevant for fast ignition scenario using OSIRIS 2.0. Full cavitation is not achieved - a fraction of electrons remains in the channel and is accelerated by the combination of laser and channel fields. We identify different regimes depending on the background plasma density by simulating the same plasma length with flat-density profiles. Evidence of hosing instability is observed at high densities.

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