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Generation of energetic electrons in preplasma via parametric instability ALEXEY AREFIEV, BORIS BREIZMAN, VLADIMIR KHUDIK, Institute for Fusion Studies, The University of Texas at Austin — Underdense preplasma is a common feature in experiments with laser-irradiated solid-density targets. The preplasma created by the prepulse can extend many wavelengths along the direction of laser beam propagation. Hot electrons produced in the target are essential for fast proton production. We find that there is a density threshold for electron heating in the preplasma. This is determined by the onset of parametric instability for ultra- relativistic electrons moving within the laser beam. Such electrons are confined in the transverse direction by the ion electric field. Their oscillations in this field become parametrically unstable because the electron γ-factor that determines the oscillation frequency changes itself at double the laser frequency. The effect is illustrated in a 2D setup for an s-polarized Gaussian laser beam. In this case the instability develops in the plane perpendicular to the laser electric field.

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