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Fast electron heating and thermalization using circular polarization[1] ISTVÁN PUSZTAI, ANDRÉAS SUNDSTRÖM, Chalmers University of Technology, EVANGELOS SIMINOS, Gothenburg University, LAURENT GREMILLET, DEA, DAM — Simple laboratory generation of warm dense matter in a spatially homogeneous, thermalized state would be a valuable tool for studies of high-energy-density physics. We use the particle-in-cell code SMILEI to investigate the effect of Coulomb collisions and ionization on the interaction of ultra-short laser pulses with solid-density copper plasmas. In such moderately high-Z materials, electron-ion collisions result in significant laser energy absorption through inverse Bremsstrahlung. We consider the case of circular polarization (CP), which is known to lead to inefficient electron energization through collisionless mechanisms such as $j \times B$ heating. In collisional settings, however, not only is CP comparable with linear polarization (LP) in terms of electron heating efficiency, but it also produces thermalized electrons on $< 100\,\mathrm{fs}$ timescales, i.e., much faster than LP, which yields a more pronounced and longer-lived energetic electron tail. Such isochoric heating can potentially be used to study atomic physics models or equations of state under extreme conditions.

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