Abstract Submitted
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Transport of MA electron currents in ultra-fast heated conducting solids[1] YASUHIKO SENTOKU, University of Nevada, Reno, JULIEN FUCHS, LULI, Ecole Polytechnique, EMMANUEL D'HUMIERES, Universite Bordeuax — Transport of MA currents in conducting high Z solids is crucial for number of applications, e.g. the generation of efficient and fast secondary sources (ions, X-rays, g-rays, etc) or cone-guiding fast ignition of inertial fusion. We have simulated the ultra-intense ultra-short laser - solid target interaction with a particle-in-cell code, PICLS, which features the relativistic Coulomb collisions, dynamics ionization in gas and solid target, and have studied the MA current transport by irradiating an ultra-intense laser pulse (5×10^{19}W/cm^2, 300fs) in different conducting metal target, such as aluminum, copper, and gold. We found that the strong resistive magnetic fields are excited inside solid, and the fields become stronger in higher Z target because of ∇Z induced by dynamics ionization. The transport of hot electron currents are affected by these magnetic fields, $\sim$10 MG in a Al target, and $>$ 50MG in Cu or Au targets. The sheath field at target rear is also modulated because of the transport pattern. Simulations results are consistent with MeV proton beam images observed in experiments.

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