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Interband and intraband electron kinetics in non-thermal warm dense gold SHAUGHNESSY BRENNAN BROWN, ZHIJIANG CHEN, CHANDRA CURRY, PHILIPPE HERING, MATTHIAS C. HOFFMANN, SLAC National Accelerator Laboratory, ANDREW NG, University of British Columbia, MATTHEW REID, University of Northern British Columbia, YING Y. TSUI, University of Alberta, SIEGFRIED H. GLENZER, SLAC National Accelerator Laboratory — Single-state warm dense matter may be produced via isochoric heating of thin metal foils using ultrafast high-power lasers. Previous experiments have confirmed that electron temperatures exceed ion temperatures during the initial picoseconds following excitation; however, electron kinetics in non-thermal states preceding establishment of a well-defined electron thermal distribution remain little understood. X-ray and optical probing techniques provide necessary resolution to investigate these electronic properties. Here, we will present a study of electron kinetics in warm dense gold produced by irradiating free-standing 30 nm Au foils with a 400 nm FWHM, 45 fs Ti:Sapphire laser system at SLAC National Accelerator Laboratory. The temporal evolutions of AC conductivity for 400 nm and 800 nm laser pulses are simultaneously determined with sub-100 fs resolution, providing insight into the $5d$-$6s/p$ interband and $6s/p$ intraband transitions respectively. Our results suggest that Auger decay and three-body recombination play important roles in electron thermalization of warm dense gold.

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