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Measurement of the Electron-Ion Temperature Relaxation Rate in a Dense Plasma J.M. TACCETTI, R.P. SHURTER, P.M. GOODWIN, J.F. BENAGE JR., Los Alamos National Laboratory — Current theoretical approaches to temperature relaxation, which can be categorized as binary-collision and many-body approaches, disagree. Existing experimental evidence infers a lower relaxation rate compared to the binary-collision approach, but is insufficient to determine which approach is correct. We present the most recent results from an experiment aimed at obtaining the temperature relaxation rate between ions and electrons in a dense, strongly coupled plasma by directly measuring the temperature of each component. The plasma is formed by heating a gas jet with a 10 ps laser pulse. The electrons are preferentially heated by the short pulse laser ($T_e \approx 100$ eV), while the ions, after undergoing very rapid (sub-ps time-scale) disorder-induced heating, should only reach a temperature of 10-15 eV. This results in a strongly coupled ion plasma with an ion-ion coupling parameter $\Gamma_{ii} \approx$ 3-5. We plan to measure the electron and ion temperatures of the resulting plasma independently during and after heating, using collective Thomson scattering for electrons and a high-resolution x-ray spectrometer for the ions (measuring Doppler-broadened absorption lines).

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