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Electron-ion recombination in laser-produced plasmas using optical interferometry NATHAN HEILMANN, JUSTIN PEATROSS, SCOTT BERGESON, Brigham Young University — We are developing methods to measure electron-ion recombination in laser-produced plasmas. A high intensity fs laser pulse is focused into a gas jet and forms a plasma. A weaker probe beam first passes through a slightly mis-aligned Michelson interferometer and is also focused into the plasma. The probe "beam" is actually two temporally coincident but spatially offset laser beams. One of the laser beams passes through the plasma and the other does not. These beams expand and produce interference fringes in the far field, similar to a Young's double slit experiment. The spatial position of these fringes depends on the differential phase shift in the two probe beams. This differential shift is due to the electron density in the plasma, which is probed by only one beam. By measuring the fringe shift as a function of time after the plasma is formed, we should be able to measure the time-evolving electron density. At sufficiently high densities, three-body recombination will become important. In that regime, the measured recombination rate can be used to determine the electron temperature.

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