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Time Resolved Spectroscopic Measurements of Electron Temperature and Ion Density in a High Repetition Rate Experiment[1] ROBERT DORST, PETER HEUER, University of California, Los Angeles, DEREK SCHAEFFER, Princeton University, JESSICA PILGRAM, CARMEN CONSTANTIN, CHRISTOPH NIEMANN, University of California, Los Angeles — Many laboratory plasmas of interest are transient (<1 ms) and tenuous (<10^{15} cm^{-3}) in nature, but measuring time-resolved temperatures and densities in this regime is challenging. The intensity ratios of spectral lines corresponding to successive ionization states are highly dependent on electron temperature, and Stark broadening is a well-established and reliable technique for determining density. However, these techniques are generally performed on steady-state plasmas, or time integrated to the point where valuable information is lost. We present a comparison between high-temporal resolution (˜10 ns) spectroscopic data and a collisional-radiative model in order to characterize the evolution of the temperature and density of carbon ablated plasma in a regime where Thomson scattering and Langmuir probes prove challenging. A high repetition rate laser allows for individual time resolved spectral lines to be assembled into a highly resolved (˜2 Å) composite spectrum for analysis.

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Robert Dorst
University of California, Los Angeles

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