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Measurements of Electron Density Profiles of Plasmas Produced by Nike KrF Laser for Laser Plasma Instability (LPI) Research[1] JAECHUL OH, Research Support Instruments, J.L. WEAVER, S.P. OBENSCHAIN, A.J. SCHMITT, D.M. KEHNE, M. KARASIK, L-Y. CHAN, V. SERLIN, U. S. Naval Research Laboratory, L. PHILLIPS, Alogus Research Corporation — Knowing spatial profiles of electron density (n_e) in the underdense coronal region ($n < n_c/4$) of plasma is essential to understanding LPI initiation in inertial confinement fusion research. In the recent Nike LPI experiment, a side-on grid imaging refractometer (GIR)[2] was deployed for measuring the underdense plasma profiles. Plasmas were produced from flat CH targets illuminated by Nike KrF laser with total energies up to 1 kJ of $0.5 \sim 1$ nsec FWHM pulses. The GIR resolved n_e up to $3 \times 10^{21}/cm^3$ in space taking 2D snapshot images of probe laser ($\lambda = 263nm$, $\Delta t = 10ps$) beamlets ($50\mu m$ spacing) refracted by the plasma at a selected time during the laser illumination. The individual beamlet transmittances were also measured for T_e estimation. Time-resolved spectrometers with an absolute-intensity-calibrated photodiode array and a streak camera simultaneously detected light emission from the plasma in spectral ranges relevant to Raman (SRS) and two plasmon decay instabilities.[3] The measured spatial profiles are compared with simulation results from the FAST3D radiation hydrocode and their effects on the LPI observations are investigated.

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[2]R.S. Craxton, et al, Phys. Fluids B 5, 4419 (1993)
[3]J. Oh, et al, GO5.4, APSDPP (2010)

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