

RECENT HIGH SPECTRAL AND SPATIAL RESOLUTION SPECTROSCOPY  
OF LASER-PRODUCED PLASMAS AND ELECTRON-ION BEAM PLASMAS

G.A. Doschek, U. Feldman, D.J. Johnson and D.J. Nagel  
Naval Research Laboratory, Washington, D.C., USA

Spectra of plasmas produced by a  $\text{CO}_2$  laser have recently been obtained using a normal incidence slitless spectrograph and a high spectral resolution ( $0.028 \text{ m}\text{\AA}$ ) grazing incidence spectrograph. The slitless spectrograph forms images of the plasmas in spectral lines and is similar to the instrument flown by NRL on Skylab. The total wavelength coverage is from about  $100 \text{ \AA}$  to about  $600 \text{ \AA}$ . The shapes of the images depend markedly on the type of atomic transition. Time-averaged electron densities in the expanding plumes are calculated, and the expansion velocity is estimated from the profiles of lines recorded by the grazing incidence spectrograph. In addition, spectra of electron-ion beam plasmas between  $\sim 200 \text{ \AA}$  and  $2000 \text{ \AA}$  were obtained using a stigmatic normal incidence slit spectrograph. The distribution of plasma emission between the anode and cathode, and the mass motions in the plasmas are discussed.