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Hydrogen *Balmer* Series Self-Absorption Measurement in Laser-Induced Air Plasma GHANESHWAR GAUTAM, CHRISTIAN PARIGGER, University of Tennessee at Space Institute — In experimental studies of laser-induced plasma, we use focused Nd:YAG laser radiation to generate optical breakdown in laboratory air. A *Czerny-Turner* type spectrometer and an ICCD camera are utilized to record spatially and temporally resolved spectra. Time-resolved spectroscopy methods are employed to record plasma dynamics for various time delays in the range of 0.300 microsecond to typically 10 microsecond after plasma initiation. Early plasma emission spectra reveal hydrogen alpha and ionized nitrogen lines for time delays larger than 0.3 microsecond, the hydrogen beta line emerges from the free-electron background radiation later in the plasma decay for time delays in excess of 1 microsecond. The self-absorption analyses include comparisons of recorded data without and with the use of a doubling mirror. The extent of self-absorption of the hydrogen *Balmer* series is investigated for various time delays from plasma generation. There are indications of self-absorption of hydrogen alpha by comparison with ionized nitrogen lines at a time delay of 0.3 microsecond. For subsequent time delays, self-absorption effects on line-widths are hardly noticeable, despite the fact of the apparent line-shape distortions. Of interest are comparisons of inferred electron densities from hydrogen alpha and hydrogen beta lines as the plasma decays, including assessments of spatial variation of electron density.

Ghaneshwar Gautam
University of Tennessee at Space Institute

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