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Atomic hydrogen measurements in laser-induced plasma LAUREN SWAFFORD, CHRISTIAN PARIGGER, University of Tennessee Space Institute — New temporally and spatially resolved experimental results are presented for laser-induced plasma evolution in laboratory air. The measurements of hydrogen alpha and beta Balmer series line shapes are analyzed using various theory results. Plasma is generated using a typical laser-induced breakdown spectroscopy arrangement that employs focused, Q-switched Nd:YAG laser radiation at the fundamental wavelength of 1064 nm. Stark-broadened emission profiles for hydrogen alpha and beta allow us to determine electron density and temperature. Electron density is primarily inferred from Stark-broadening of experimental records for various time delays from plasma generation. Boltzmann plots are used to infer the electron temperature for well-defined Balmer series lines. Of particular interest is diagnostics of electron density from the asymmetric H beta line shape. The correlation of the hydrogen beta line shape asymmetry and of the full width at half maximum is explored. H alpha and H beta lines emerge only for time delays on the order of 0.5 μs and 2 μs, respectively. For earlier time delays we infer electron density from nitrogen emission lines.

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