Abstract Submitted
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Self-Absorption Corrections for Aluminum Neutrals and Ions in Laser-Induced Plasma[1] DAVID SURMICK, CHRISTIAN PARIGGER, University of Tennessee Space Insitutute — Laser ablation of an aluminum surface is investigated in the study of rapidly expanding plasma and shock phenomena using time and space resolved spectroscopy. The initial 100 ns following optically-induced breakdown are of interest due to the significant number of free electrons in the plasma expansion. Breakdown is initiated using a 14 ns pulsed Nd:YAG, Q-switched laser. The experiments are performed using a gas cell containing 90 percent hydrogen and 10 percent nitrogen so that nitrogen ion and hydrogen Balmer series lines may be used to infer the electron density in addition to using neutral and ionic aluminum line width diagnostics [1]. At early time delays from plasma generation, self-absorption is likely to be present and causes spectral line shapes to appear broader and exhibit line shape distortions. In turn the electron density and temperature diagnostics are skewed. We discuss self-absorption of ground state aluminum transitions 394.4 and 396.15 nm, as well as ionic transitions at 281.6 and 464.3 nm. Saha-Boltzmann plots are used to evaluate the temperature from both neutral and ionic species. The self-absorption test is performed using a plane mirror to re-image the plasma prior to spectroscopic mapping. [1] D.M. Surmick and C.G. Parigger, *J.Phys. B: Atom. Mol. Opt. Phys.* **48** (2015) 115701.

[1]Self-Absorption Correction for Aluminum Neutrals and Ions in Laser-Induced Plasma

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