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Spectroscopic methods for calculation of electron density and temperature in laser generated Hydrogen plasma MOHAMMADREZA REZAEE, Physics and Astronomy Department, The University of Tennessee Knoxville, CHRISTIAN PARIGGER, University of Tennessee Space Institute, Tullahoma, TN — Laser induced plasma spectroscopy has been around for several decades and has generated a lot of interest.Remote analyzing capability makes it favorable in applications where it is difficult to have an experimental probe physically there to do the measurements. One of these applications is in controlled fusion devices like Tokamaks in which Hydrogen and its isotopes are used as fuel. Having accurate knowledge of the plasma density and temperature is a key factor in plasma stability in confined plasma machines. Hydrogen lines are powerful tools in remote plasma diagnostics, and we can infer the plasma density and temperature from their broadening and shift. In a high power nanosecond-pulsed laser generated plasma, which is a transient phase and has a high electron density, Stark broadening is the dominant broadening mechanism and by measuring the FWHM of the broadened Hydrogen Balmer lines we calculated the electron density and temperature. We calculated the electron density by utilizing different available approaches and compared the results. There is difference between the electron density obtained from Stark broadened H_α at initial time after shot in comparison to that obtained from the H_β and H_γ, which is related to the strong self-absorption.

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