Determination of Stark coefficient using plasma generated by laser

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This work we show the study of the plasma dynamics by the analysis of Stark broadening of some spectral lines present in the radiation from plasmas generated by laser. This kind of study is important in many fields of science like plasma pulsed experiment, astrophysics and analytical chemistry. In plasma physics the main importance of this study is the experimental diagnostic making uses of optical technique. The Stark effect enables to measure the electron density of the plasma for example.

The crucial information in the LIPS method is a well determined Radiometric Spectra. So is very important, to obtain quantitative information of a sample, the intensity of spectral lines. Also the basic characteristics of the plasma are mainly determined by the relative intensity of spectral lines, which are strongly influenced by the two fundamental quantities of plasma: the temperature and the electron density. The line intensity are influenced not only by the plasma temperature and density but also by atomic parameter like, the oscillator strength, life time, probability of transition and other self-absorption between.

The plasma is produced by the incidence of a laser beam on a target. The optical radiation emitted by the plasma is collected by a spectrograph with ICCD detector and adjustable slit. The plasma is initially formed by a laser beam with energy range between 30 to 200 mJ per pulse. The acquisition interval of the radiation is at most 500ns to guarantee the condition of local thermo-dynamic equilibrium plasma. The analysis of each spectrum will be held initially considering a Voigt profile for the emission lines. Beside this analysis we determined the instrumental profile depending on the size of the slit and the monochromator resolution of the equipment can be added to the Stark and Doppler enlargements. A technique for determining the coefficient Stark is to obtain spectra with different concentrations of the element of interest. we reproduced experimental conditions where self-absorption of light by the plasma is negligible. The procedure to be adopted is to perform measurements with various samples of different concentrations, so we choose a sample where the concentration of element in the plasma generates a spectrum that is not self-absorbed.