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INFLUENCE OF THE ABLATION ANGLE CHANGE ON SPECTRAL LINE INTENSITIES IN LIBS EXPERIMENTS

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Abstract. Laser Induced Breakdown Spectroscopy - LIBS is the most promising technique for the in-situ analysis of the plasma fusion reactor walls, see (Cong Li at al, 2016). The setup which is most frequently used in fusion reactors is so-called remote in-situ RIS LIBS, see (Cai et al, 2019). This configuration uses a scanning system which controls the Mo mirror to direct the laser beam to a different position inside the fusion reactor. In this study, it was investigated how changes in the ablation angles affect the intensity of the emitted spectral lines, considering that the incident beam is not always perpendicular to the PFCs. To this end, the classical LIBS setup at atmospheric pressure was employed. The angle of collection fiber with respect to the laser beam was fixed to 17 degrees. Chosen targets were tungsten-based alloys relevant to fusion research. The spectrum of the plasma was recorded with a Solar MS7504i spectrometer and a fast camera. Results show that there is a non-trivial dependance of the line intensity on the ablation angles, which was attributed to the change of laser focus and ablation surface as the angles were varied both in poloidal and toroidal directions. Additionally, the line intensity correction factor was calculated as the ratio of the intensity for the beam incident at an angle to that of the beam at normal incidence, and it exhibited a complex dependence on both angles.

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