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Stark broadening measurements of Hydrogen lines for electron density measurements in SPARC_LAB plasma-based acceleration experiments.

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The high accelerating gradient of the plasma-based techniques is one of the most attractive property of this new generation of particle accelerators. The quality and the energy gain of the accelerated beam depend on the electron density of the plasma and its variation. Therefore in order to control the efficiency of the acceleration and the quality of the accelerated beam the knowledge of the plasma electron density is mandatory. Both particle-driven and laser-driven Plasma Wakefield Acceleration experiments are foreseen at SPARC_LAB with the aim to demonstrate the stable and repeatable acceleration of high brightness beams externally-injected inside a plasma. The Stark broadening of the Hydrogen spectral lines is a promising candidate to characterize plasma density for these experiments. The implementation of this diagnostic for plasma-based experiments at SPARC_LAB will be presented.

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