**Validation of the synthetic diagnostic model for the imaging Heavy-Ion Beam Probe**

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First measurements with the imaging Heavy Ion Beam Probe (iHIBP) [1-4] have been carried out in recent dedicated experiments at the ASDEX Upgrade tokamak. In this work, we aim to compare against first experimental results and validate the synthetic diagnostic framework, i-HIBPsim [5], that simulates the evolution of the heavy-ion beam through the plasma until it hits a scintillator detector placed in the limiter shadow. The created light pattern (so-called strikeline) contains information on the plasma potential, magnetic field and the plasma density at the plasma edge. The numerical code of the synthetic diagnostic has been upgraded to fully include a realistic finite beam width, beam divergence and a 3D model of the optical head, which allows the simulation of the beam blocking by the optical head, as observed in experiments. The optical model of the diagnostic, including magnification, photon emission and distortion has been included, allowing a more realistic comparison between experimental measurements and simulated signals. Dedicated plasma pulses were carried out at the ASDEX Upgrade tokamak consisting of a ramp in the plasma current ranging from 200 kA to 700 kA. Changes in the plasma current translate into a visible shift of the strikeline pattern on the scintillator images up to one centimeter, that are reproducible by the synthetic model. Filaments propagating in the Scrape-Off Layer (SOL) may have an important impact on the scintillator signals, generating blob-like patterns on the strikeline. A realistic model of the filaments has also been implemented and tested in the synthetic model. We show the 3D effects of the filaments on the simulated signals and compare them to experimental measurements, which show blob-like structures.

[1] J. Galdon-Quiroga et al., Journal of Instruments 12 C08023 (2017)

[2] G. Anda et al., Review of Scientific Instruments 89 013503 (2018)

[3] G. Birkenmeier et al., Journal of Instrumentation 14 C10030 (2019)

[4] G. Birkenmeier et al., Fusion Engineering and Design 168 112644 (2021)

[5] P. Oyola et al., Review of Scientific Instruments 92 043558 (2021)

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