Angular dependence measurements of Magnum-PSI plasmas using MAST-U flush mounted Langmuir probes

JACK LELAND, University of Liverpool, CCFE, SARAH ELMORE, ANDREW KIRK, CCFE, HENNIE VAN DER MEIDEN, DIFFER, JAMES BRADLEY, University of Liverpool — Langmuir probe measurements in tokamaks are difficult to interpret when operating at grazing angles of magnetic field incidence due to the effects of sheath expansion on the probe collection area. A probe array from MAST-U, with a novel tip design, was taken to Magnum-PSI to investigate whether temperature ($T_e$) and density ($n_e$) measurements could be performed at the low angles of incidence (0-10°) possible in the MAST-U divertor. Incidence angle scans were made at a range of plasma parameters, with temperatures and densities measured using the Bergmann 4-parameter model and compared to the Thomson scattering system on Magnum-PSI. Comparisons are also made to simulations of the probe tip using particle-in-cell code SPICE. The measured plasma parameters suggest that the tip design is successfully mitigating the effects of sheath expansion at low angles of magnetic field incidence.

1This work was supported by the Engineering and Physical Sciences Research Council [EP/L01663X/1]