Abstract Submitted
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Negative hydrogen ions in a linear helicon plasma device[1] CORMAC CORR, JESSE SANTOSO, CAMERON SAMUELL, Australian National University, HANNAH WILLETT, University of York, ROUNAK MANOHARAN, SEAN O'BYRNE, The University of New South Wales — Low-pressure negative ion sources are of crucial importance to the development of high-energy (>1 MeV) neutral beam injection systems for the ITER experimental tokamak device. Due to their high power coupling efficiency and high plasma densities, helicon devices may be able to reduce power requirements and potentially remove the need for caesium. In helicon sources, the RF power can be coupled efficiently into the plasma and it has been previously observed that the application of a small magnetic field can lead to a significant increase in the plasma density. In this work, we investigate negative ion dynamics in a high-power (20kW) helicon plasma source. The negative ion fraction is measured by probe-based laser photodetachment, electron density and temperature are determined by a Langmuir probe and tuneable diode laser absorption spectroscopy is used to determine the density of the H(n = 2) excited atomic state and the gas temperature. The negative ion density and excited atomic hydrogen density display a maximum at a low applied magnetic field of 3 mT, while the electron temperature displays a minimum. The negative ion density can be increased by a factor of 8 with the application of the magnetic field. Spatial and temporal measurements will also be presented.

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