Abstract Submitted
for the GEC20 Meeting of
The American Physical Society

Characterisation and control of an ion-acoustic plasma instability downstream of a diverging magnetic nozzle SCOTT DOYLE, Dept. of Atomic, Molecular and Nuclear Physics, University of Seville, ALEX BENNET, DIMITRIOS TSIFAKIS, SP3 Research School of Physics, The Australian National University, JAMES DEDRICK, YPI, Department of Physics, University of York, ROD BOSWELL, CHRISTINE CHARLES, SP3 Research School of Physics, The Australian National University — In this investigation, carried out at the Space Plasma, Power and Propulsion laboratory (SP3), electrostatic probes were employed to measure a 4 - 20 kHz instability in the ion saturation current downstream of an electric double layer (DL) in the *'Chi Kung'* expanding helicon plasma source. The amplitude and frequency of the instability were found to vary in inverse proportion to the operating argon gas pressure (0.2 - 0.6 mTorr) and in direct proportion to the applied rf power (100 - 600 W) and applied solenoid current (3 - 8 A). A spatially resolved characterisation of the maximum instability amplitude downstream of the DL determined two radial maxima, corresponding to the locations of most positive radial ion density gradient. Through the application of 2 - 12 kHz voltage amplitude modulations of the 13.56 MHz radio-frequency driving voltage, the instability was reduced by up to 65%; exhibiting a greater reduction at higher applied modulation frequencies. This effect is ascribed to a reduction in the radial ion density gradient via asymmetrically attenuated ion acoustic density perturbations, induced by the applied voltage amplitude modulation. This work demonstrates a novel potential control mechanism for density gradient driven instabilities in magnetised plasmas.

Scott Doyle
Dept. of Atomic, Molecular and Nuclear Physics, University of Seville

Date submitted: 10 Jun 2020 Electronic form version 1.4