

Abstract Submitted
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Design and measurement of a Penning discharge plasma¹ K RONALD, T HEELIS, M KING, S MCCONVILLE, D SPEIRS, K WILSON, C ROBERTSON, A PHELPS, SUPA and Department of Physics, University of Strathclyde, Glasgow, UK, M KOEPKE, Department of Physics, West Virginia University, Morgantown, USA — To enable experiments investigating beam-plasma interactions [1,2] plasma columns from 20cm to over 1m in length were required in cylindrical waveguides of diameters 5-8 cm. Penning discharges operating up to 10^{-3} mB with bias voltages from 500 V to a few kV and currents up to a few 10's mA were created to address this requirement. Langmuir probes modify the discharge behavior, whilst the magnetic field made interpretation of the probe IV characteristic difficult, complicating diagnostics. The plasma density at the end of the column was inferred by observing the spectrum of plasma oscillations detected by a small electric dipole antenna polarized along the bias magnetic field. With a 20mA current the plasma density at the end of the trap was estimated to be $1 \times 10^{16} \text{m}^{-3}$. The density averaged along the length of the plasma column was measured by a microwave interferometric technique around 9.5GHz. At 20mA the average density was estimated to be approaching $4 \times 10^{16} \text{m}^{-3}$. [1] S.L. McConville et al, Plasma Phys. and Control. Fusion, 50, 2008, 074010, [2] K Ronald et al, Plasma Phys. and Control. Fusion, 53, 2011, 074015.

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