

Abstract Submitted
for the GEC12 Meeting of
The American Physical Society

Heavy Neutral Beam Probe Space Potential Measurements of the Helimak Experiment ($T_e \sim 10$ eV) ALVARO GARCIA DE GORORDO, GARY A. HALLOCK, KENNETH W. GENTLE, The University of Texas at Austin — The Heavy Neutral Beam Probe (HNBP) for the Helimak low temperature plasma experiment has been developed at the University of Texas at Austin (UT-Austin). The HNBP is based on the highly successful Heavy Ion Beam Probe (HIBP), but is engineered to work in the low temperature plasma regime ($T_e < 40$ eV). The greatest difficulty to operation at low electron temperatures is that the measurement signal is enabled by electron-impact ionization events, which become increasingly rare when the temperature dips to ~ 10 eV. This problem is overcome by probing the plasma with a neutral alkali metal (Na) and by modulating the probing beam with a square wave (chopping) and recovering the signal with phase sensitive detection. The Helimak experiment at UT-Austin approximates the infinite cylindrical slab with open field lines¹. The geometry is like a torus, but with a rectangular cross-section and with vertical field coils, that combined with the toroidal field coils, give rise to a helical magnetic field inside the device. Because of the curved, sheared magnetic field, and its gradient, the Helimak simulates the scrape off layer (SOL) of a tokamak.

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Date submitted: 15 Jun 2012

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