

Abstract Submitted
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Design of an ICRH antenna for RF-plasma interaction studies¹

J.B.O. CAUGHMAN, P.M. RYAN, T.S. BIGELOW, S.J. DIEM, R.H. GOULDING, D.A. RASMUSSEN, Oak Ridge National Laboratory — The interaction between an ion cyclotron resonant heating antenna and the near-field plasma can lead to rectified (high voltage) sheath formation and subsequent material erosion. This issue will be studied by using a simple loop antenna operated on the Physics Integration eXperiment (PhIX) at ORNL, which is a linear plasma device that uses an ECH heated helicon plasma source to create a high-density plasma suitable for use in a plasma-material interaction test stand. The antenna consists of a single strap with a single-tier Faraday shield. The antenna is \sim one-quarter wavelength long at 50 MHz and grounded at one end, which will allow for strap voltages of >20 kV to be located near the plasma. The PhIX edge plasma near the antenna is similar to typical edge conditions, with $n_e \sim 1-2 \times 10^{18}/\text{m}^3$ and $T_e = 5-10$ eV, with a magnetic field of 0.1-0.2 Tesla. Several diagnostics will be used to characterize the near-field interaction, including Langmuir and capacitive probes, energy analyzers, Stark effect spectroscopy, and local/remote material erosion measurements. Details of the antenna design and initial characterization will be presented.

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