Abstract Submitted
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The design of a low-cost Thomson Scattering system for use on the ORNL PhIX device T.M. BIEWER, J. LORE, R.H. GOULDING, D.L. HILLIS, L. OWEN, J. RAPP, Oak Ridge National Lab., Oak Ridge, TN, USA — Study of the plasma-material interface (PMI) under high power and particle flux on linear plasma devices is an active area of research that is relevant to fusion-grade toroidal devices such as ITER and DEMO. ORNL is assembling a 15 cm diameter, $\sim$3 m long linear machine, called the Physics Integration eXperiment (PhIX), which incorporates a helicon plasma source, electron heating, and a material target. The helicon source has demonstrated coupling of up to 100 kW of rf power, and produced $n_e \geq 4 \times 10^{19}$ m^{-3} in D, and He fueled plasmas, measured with interferometry and Langmuir probes (LP). Optical emission spectroscopy was used to confirm LP measurements that Te is about 10 eV in helicon heated plasmas, which will presumably increase when electron heating is applied. Plasma parameters (ne, Te, n0) of the PhIX device will be measured with a novel, low-cost Thomson Scattering (TS) system. The data will be used to characterize the PMI regime with multiple profile measurements in front of the target. Profiles near the source and target will be used to determine the parallel transport regime via comparison to 2D fluid plasma simulations. This work was supported by the US. D.O.E. contract DE-AC05-00OR22725.

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