

Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

A 105 GHz ECH System and Initial Plasma Heating Experiments on the Proto-MPEX Facility.¹ TS BIGELOW, TM BIEWER, JF CANESES, JB CAUGHMAN, RH GOULDING, C LAU, J RAPP, Oak Ridge National Lab — A 105 GHz gyrotron system has been utilized to make preliminary plasma heating experiments on the Prototype Materials Plasma Exposure eXperiment (Proto-MPEX) at ORNL. Proto-MPEX is a linear device that utilizes a 200 kW, 13.56 MHz helicon plasma generator and is intended for material sample exposure to plasmas. Additional plasma heating systems include a 25 kW 8 MHz ion cyclotron heating ICH system, and a 75 kW 28 GHz electron Bernstein Wave (EBW) system. Extensive experiments have been performed studying the plasma heating and coupling efficiency of the various heating systems. The higher frequency ECH is of interest for comparison to the 28 GHz EBW heating mode for higher density access and other heating regimes. An existing 140 GHz TE_{15,2} mode gyrotron was tuned to the TE_{10,2} operating mode and a waveguide and launching system were installed. Although the efficiency of the mode converter was not optimized and body current was high, short pulse power at 104.9 GHz was launched into Proto-MPEX of up to 40 kW and 40 ms pulse length. Some preliminary heating experiments were performed that showed some heating at one 2nd harmonic resonance location but the desired core plasma heating has not yet been obtained. Other experiments in support of the MPEX design project are currently being performed.

¹ORNL is managed by UT-Battelle, LLC, for the U.S. DOE under contract DE-AC-05-00OR22725

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Date submitted: 08 Jul 2020

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