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Observations of temperature rise during electron cyclotron heating application in Proto-MPEX[1] T.M. BIEWER, T. BIGELOW, J.F. CANESES, S.J. DIEM, J. RAPP, M. REINKE, ORNL, N. KAFLE, H.B. RAY, M. SHOWERS, Univ. Tennessee-Knoxville — The Prototype Material Plasma Exposure eXperiment (Proto-MPEX) at ORNL utilizes a variety of power systems to generate and deliver a high heat flux plasma (1 MW/m2 for these discharges) onto the surface of material targets. In the experiments described here, up to 120 kW of 13.56 MHz helicon waves are combined with 20 kW of 28 GHz microwaves to produce Deuterium plasma discharges. The 28 GHz waves are launched in a region of the device where the magnetic field is axially varying near 0.8 T, resulting in the presence of a 2nd harmonic electron cyclotron heating (ECH) resonance layer that transects the plasma column. The electron density and temperature profiles are measured using a Thomson scattering (TS) diagnostic, and indicate that the electron density is radially peaked. In the core of the plasma column the electron density is higher than the cut-off density (0.9x1019 m-3) for ECH waves to propagate and O-X-B mode conversion into electron Bernstien waves (EBW) is expected. TS measurements indicate electron temperature increases during 28 GHz wave application, rising (from 5 eV to 20 eV) as the neutral Deuterium pressure is reduced below 1 mTorr.

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Theodore Biewer
ORNL

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