Abstract Submitted for the DPP19 Meeting of The American Physical Society

Neutral gas inventory in the PFRC-2 during RMF plasma heating K. R. TORRENS, Princeton University, E. S. EVANS, Princeton Plasma Physics Laboratory, B. M. ALESSIO, Princeton University, J. COHEN, North Carolina State University, C. SWANSON, Princeton Satellite Systems, S. A. COHEN, Princeton Plasma Physics Laboratory — The inventory of hydrogen neutral gas within the PFRC-2 contributes to the ionization rate, axial and radial losses, momentum loss, current-drive efficiency, and plasma duration. We measure the neutral gas using MKS capacitive manometers, Baratron. Two Baratrons, one fast (10 ms) and one slow (1 s), were connected to each of the PFRC-2's three chambers: the source end cell (SEC), center cell (CC), and far end cell (FEC). The CC Baratrons showed a decrease in pressure following each RMF pulse, interpreted as ionization in the CC followed by axial transport of hydrogen out of the CC. The susceptibility of the Baratrons to pickup created by the PFRC-2's RMF current drive and heating system has caused us to use an alternative method to derive the pressure during the pulse. By measuring the pressure after the RMF for pulses of 0.5 to 20 ms we extract the pressure drop during the plasma discharge. Pressure rise seen at pulse initiation is attributed to the creation of Franck-Condon neutrals. Combined with theoretical calculations of electron dissociation rates, gas conductance, and relative pressures of atomic and molecular hydrogen, this experimental data allows us to construct a partial model for the movement of neutral gas within the PFRC during each RMF pulse.

> K. R. Torrens Princeton University

Date submitted: 03 Jul 2019

Electronic form version 1.4