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Energy-dependent electron heating processes during high-power operation of the PFRC-2 experiment, as obtained using inversion of X-ray spectra[1] C. SWANSON, Princeton Satellite Systems, B. ALESSIO, Princeton University, S.A. COHEN, Princeton Plasma Physics Laboratory — As part of an experimental program to investigate ion heating via odd-parity rotating magnetic field (RMF-O), the PFRC-2 device was operated at lower frequency and higher power to achieve higher density and enhanced electron heating. The electron heating was measured by SDD pulse-height x-ray detectors in multiple locations. These experiments have produced minority populations of electrons whose effective temperature – to above 600 eV – is many times larger than previously reported. The predicted classical ion heating by these warm and the cooler bulk electrons is evaluated. Also, the energy distribution functions of these electrons disagree with that expected from a single-particle Hamiltonian model, indicating collisional or collective effects affecting electron heating. By using a previously described Poisson-regularized spectral inversion to obtain full Electron Energy Distribution Functions (EEDFs) from x-ray pulse-height spectra, we are able to characterize these processes in an energy-resolved way.

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