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Electron Bernstein Wave Studies in MST ANDREW SELTZMAN, JAY ANDERSON, CARY FOREST, PAUL NONN, MARK THOMAS, ABDULGADER ALMAGRI, BRETT CHAPMAN, AMI DUBOIS, JOHN GOETZ, KARSTEN MCCOLLAM, University of Wisconsin-Madison — The RFP plasma is inaccessible to ECRH, requiring the electron Bernstein wave (EBW) for edge localized heating and current drive. MST is capable of generating RFPs or overdense tokamaks with Bt(0) $\sim$ 0.08-0.14T in which a 5.55 GHz RF source (450kW, 2ms pulse) can heat at fundamental and harmonic EC resonances. The design of a suitable antenna is challenging in the RFP due to a magnetic field geometry that requires a low-field-side launch. The small vacuum gap between the close-fitting conducting shell and plasma leads to substantial antenna-plasma interaction. A minimized port hole size is required to limit error fields. Even so the port hole induced magnetic field perturbation in the antenna near-field that affects the mode conversion process and introduces EC resonances. A 5cm diameter cylindrical antenna centered in 5cm and 11cm diameter portholes is used. A multi-chord time-resolved x-ray detector and GENRAY ray tracing verifies EBW heating at higher harmonics in an MST tokamak with 10-40keV detected x-ray energies. Evidence of RF-induced emission from absorption at higher harmonics (4th / 5th) in low current RFP discharges has been observed. Simultaneous reflected power changes correspond to termination of x-ray emission indicating power limits. Work supported by USDOE.

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