Abstract Submitted
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The New Pegasus-III Experiment and Plans for RF Heating and Current Drive[1] S.J. DIEM, M.W. BONGARD, R.J. FONCK, J.A. GOETZ, B.A. KUJAK-FORD, B.T. LEWICKI, M.D. NORNBERG, A.C. PALMER, J.A. REUSCH, A.C. SONTAG, G.R. WINZ, University of Wisconsin-Madison, PEGASUS TEAM — Solenoid-free startup techniques such as helicity injection (HI) and radiofrequency (RF) wave injection offer the potential to simplify the cost and complexity of reactor-class devices by reducing the technical requirements of, or possibly the need for, a central solenoid. PEGASUS-III is the next generation of the PEGASUS experiments, with increased B_T to 0.6 T and extended pulse duration (<100 ms). It is a solenoid-free, low aspect ratio ST that will serve as a dedicated US platform for comparative non-solenoidal tokamak startup studies. It will be equipped with a new local helicity injection (LHI) system capable of $I_p < 0.3$ MA, a coaxial helicity injection (CHI) system, and an 8 GHz klystron-based system for sustained electron Bernstein wave (EBW) heating and current drive. While the RF system will be initially employed for heating HI-initiated plasmas, EBW modeling indicates that up to 50 kA of current can be driven near $\rho \sim 0.3$ near the fundamental EC resonance. RF on PEGASUS-III will provide a key enabling reactor relevant technology to directly test proposed plasma startup and ramp-up scenarios envisioned for NSTX-U, investigating methods to synergistically improve the target plasma for consequent bootstrap and NBI current sustainment.

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