Abstract Submitted
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Ion Heating During Local Helicity Injection Plasma Startup in the Pegasus ST[1] M.G. BURKE, J.L. BARR, M.W. BONGARD, R.J. FONCK, E.T. HINSON, J.M. PERRY, J.A. REUSCH, Univ of Wisconsin, Madison — Plasmas in the Pegasus ST are initiated either through standard, MHD stable, inductive current drive or non-solenoidal local helicity injection (LHI) current drive with strong reconnection activity, providing a rich environment to study ion dynamics. During LHI discharges, a large amount of impurity ion heating has been observed, with the passively measured impurity T_i as high as 800 eV compared to $T_i \approx$60 eV and $T_e \approx$175 eV during standard inductive current drive discharges. In addition, non-thermal ion velocity distributions are observed and appear to be strongest near the helicity injectors. The ion heating is hypothesized to be a result of large-scale magnetic reconnection activity, as the amount of heating scales with increasing fluctuation amplitude of the dominant, edge localized, n=1 MHD mode. An approximate temporal scaling of the heating with the amplitude of higher frequency magnetic fluctuations has also been observed, with large amounts of power spectral density present at several impurity ion cyclotron frequencies. Recent experiments have focused on investigating the impurity ion heating scaling with the ion charge to mass ratio as well as the reconnecting field strength. The ion charge to mass ratio was modified by observing different impurity charge states in similar LHI plasmas while the reconnecting field strength was modified by changing the amount of injected edge current.

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