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Evaporative ion cooling in SSX[1] M. KOREIN, D. WEINHOLD, J. SANTNER, T. GRAY, M.R. BROWN, Swarthmore College, V.S. LUKIN, NRL — Reconnection of merged plasmas in SSX results in rapid heating of ions and electrons. The SSX ion Doppler spectrometer shows heating of carbon and helium ions up to 100 eV in a new slightly prolate flux conserver ($R = 0.2\ m, L = 0.4\ m$). A particle orbit simulation in realistic SSX magnetic fields shows that energetic ions are rapidly lost to the walls leaving behind a cooler ion population. We refer to this phenomenon as evaporative ion cooling. A retarding grid energy analyzer and a Mach probe are being used to study energetic ion flux and high velocity flows. Both probes are $\sim$ 1.5 cm in diameter and can be scanned across the radius of the device at the mid-plane. Following reconnection, local flow speeds of greater than 60 km/s (Mach number > 2) have been measured by the Mach probe in the present geometry. Preliminary data indicates bi-directional outflows during merging shots. Energetic ion data will be presented if available. The particle orbit code is being used to simulate $\sim 10^6$ particles with random initial conditions in SSX. The simulation traces particle orbits and models the probe structure in order to generate predictions of actual probe signals.

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