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Ion acceleration and time-resolved neutral particle analysis on MST[1] S. EILERMAN, J.K. ANDERSON, J.A. REUSCH, J.J. KOLINER, M.D. NORNBERG, J. WAKSMAN, University of Wisconsin - Madison, D. LIU, University of California - Irvine, L. LIN, University of California - Los Angeles, S. POLOSATKIN, V. BELYKH, Budker Institute of Nuclear Physics, J. TITUS, Florida A&M University, G. FIKSEL, University of Rochester — An advanced neutral particle analyzer (ANPA) has enabled new time-resolved analysis of the energetic ion distribution function on MST. The ANPA separates majority deuterons from beam-sourced protons and can be moved between a radial view that samples edge-localized ions with high $v_\perp/|v|$ and a tangential view that is weighted toward core-localized ions with high $v_{||}/|v|$. Interpretation of ANPA signals requires careful consideration of the plasma conditions along each line of sight. The NENE neutral particle tracing code is used with measurements from a 16-chord D_α array to calculate the background neutral density profile, which heavily influences ANPA signal levels and must be accounted for. The ANPA is also very sensitive to the ion velocity-space distribution, which must be considered due to the high pitch of MST's neutral beam ions and the anisotropy observed in reconnection-heated ions. A model of these effects along the ANPA line of sight is presented, as well as studies of ion acceleration due to magnetic mode activity. Energization of beam and bulk ions due to sawtooth crashes is compared to observed acceleration during predominately m=0 activity and quasi-single-helicity (QSH) states.

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