Abstract Submitted
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Neutral Beam Injection In MST B. HUDSON, G. FIKSEL, R.M. MAGEE, UW-Madison and Center For Magnetic Self-Organization, A.D. BEKLEMISHEV, Y. TSIDULKO, Budker Institute of Nuclear Physics, Novosibirsk, Russia — A high power (20 kV, 30A), short-pulse (1.5 ms) neutral beam injector is used to study fast ion confinement and the feasibility of neutral beam heating of an RFP. The confining magnetic field is believed to be stochastic based on both theoretical estimates as well as experimental data on electron heat transport. If fast ions from NBI were also stochastic no significant heating could result before they were lost. The injected fast deuterium ions undergo D-D fusion with the bulk ions and the product 2.45 MeV neutron flux is measured outside the vessel with a scintillator and a photomultiplier tube. The observed neutron signal indicates the presence of a well-confined fast ion population with a characteristic loss time in excess of 30 ms, which is not consistent with a stochastic loss scheme. Analytical and computational studies show that the guiding center drifts alter the safety factor of the guiding center motion and tend to bring it out of resonance with the background magnetic field. The 'ion guiding center islands,' which are in direct analogy to magnetic islands, are typically smaller and more separated than the magnetic islands. As a result, the stochasticity of the fast ion population is reduced. The ions are predicted to become stochastic after having lost sufficient energy that their rotational transform approaches that of the background magnetic field. Work supported by D.O.E. and N.S.F.

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