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Fast Ion Transport in the Three-Dimensional Reversed Field Pinch P. J. BONOFIGLO, J. K. ANDERSON, University of Wisconsin - Madison, E. PARKE, University of California Los Angeles, M. GOBBIN, Consorzio RFX, J. KIM, J. EGEDAL, University of Wisconsin - Madison — The reversed field pinch (RFP) provides a unique environment to study fast ion confinement and transport in both 2D and 3D geometries. In the axisymmetric RFP, guiding center drifts are along flux surfaces, resulting in naturally well-confined fast ions. At sufficiently high Lundquist number, the innermost tearing mode can grow and envelop the magnetic axis, creating a helical axis and 3D equilibrium. Experiments on MST reveal reduced confinement of fast ions with the transition to this quasi-single helicity (QSH) state. Current work aims to probe the dynamics of fast ion transport during QSH. Energetic particle modes (EPMs) upshift in frequency with increasing core tearing mode amplitude, disappear in high current QSH plasmas, and depend on NBI isotope. Additionally, FIR interferometry has resolved electron density perturbations associated with EPMs. The FIR measurements show the upshifting EPMs moving radially outward as they grow in frequency, indicating transport associated with the transition to QSH. The Hamiltonian guiding center code ORBIT corroborates rapid fast ion loss times in QSH and is being actively used to simulate diffusion coefficients and particle orbits for examining neoclassical transport. This research is supported by US DOE.

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