Abstract Submitted
for the DPP10 Meeting of
The American Physical Society

Fast ion dynamics in the basic plasma physics experiment TORPEX[1] KYLE GUSTAFSON[2], PAOLO RICCI, ALICE BURCKEL, GENNADY PLYUSHCHEV, IVO FURNO, AMBROGIO FASOLI, CRPP EPF Lausanne — The transport of fast ions in interchange turbulence is examined in TORPEX, a basic plasma physics experiment with the essential elements of the scrape-off layer (SOL). Extensive modeling in two and three dimensions has shown that TORPEX plasma is well-described by a drift-reduced Braginskii fluid simulation (GBS). We follow fast ion trajectories using the full Lorentz force, specified by the GBS fields. A large ensemble of trajectories allows us to create a synthetic diagnostic, giving results that compare favorably with experimental measurements of current density using a fast ion source/detector pair. We also explore the properties of fast ion transport on timescales longer than those accessible to the experiment. We find that the rate of radial dispersion is strongly dependent on the ratio of ion energy to plasma (electron) temperature. The dispersion tends to be subdiffusive for $\rho_i \sim \Lambda$, where ρ_i is the fast ion Larmor radius and Λ is the scale length of the turbulence. The effective diffusivity is examined from the perspectives of (1) trajectory dispersion, (2) the flux-gradient Fick's Law relation, (3) velocity correlation, and (4) waiting-time/flight-length distributions.

[1]Supported in part by the Swiss National Science Foundation
[2]Supported by US National Science Foundation IRFP

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Date submitted: 13 Jul 2010 Electronic form version 1.4