

Abstract Submitted  
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**Interchange instabilities, turbulence and fast ion interactions in the TORPEX device**<sup>1</sup> A. FASOLI, A. DIALLO, L. FEDERSPIEL, I. FURNO, D. IRAJI, E. KUNG, B. LABIT, S. MULLER, G. PLYUSHCHEV, M. PODESTA, F. POLI, P. RICCI, C. THEILER, CRPP-EPFL, Switzerland — Electrostatic turbulence, related structures and their effect on transport are investigated on TORPEX simple magnetized plasmas using high resolution diagnostics and several control parameters, fluid models and numerical simulations. A critical pressure gradient to drive the interchange instability is experimentally identified, consistently with linear theory. Interchange modes nonlinearly develop blobs, radially propagating filaments of enhanced plasma pressure. Blob velocities and sizes are obtained from probe measurements using pattern recognition and are described by an analytical expression that includes ion polarization currents, parallel sheath currents and ion-neutral collisions. Limiter configurations with varying angles between field lines and the metal surface are explored. To complement probe data, a fast framing camera and a movable gas puff system are installed. Density and light fluctuations show similar signatures of drift-interchange activity. Further developments of optical diagnostics, including an image intensifier and LIF, will be discussed. The effect of interchange turbulence on fast ion phase space dynamics is studied using movable fast ion source and detector in scenarios for which the development from linear waves into blobs is fully characterized.

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Ambrogio Fasoli  
CRPP - EPFL

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