

Abstract Submitted
for the DPP11 Meeting of
The American Physical Society

Measurements of Fast-Ion Transport by Resonant Interaction at a Sawtooth Crash¹ C.M. MUSCATELLO, W.W. HEIDBRINK, University of California Irvine — Tokamak sawteeth consist of a reorganization of the plasma magnetic field and various plasma parameters. Observations indicate that distributions of superthermal ions can also be affected at the crash event. The bulk of energetic ions experiencing redistribution have passing orbits and low to moderate energies (≤ 100 keV) where transport due to flux-attachment is valid. Sawtooth experiments at DIII-D employing the fast-ion deuterium-alpha (FIDA) diagnostic suite indicate that even high-energy ions (>100 keV) can experience appreciable redistribution. The transport mechanism, in this case, is different; a class of trapped particles with near zero toroidal precession velocity and narrow orbit width can satisfy the non-linear wave-particle resonance condition. Trapped within the magnetic well of the helical perturbation, the particle transforms to a “superbanana” orbit through the resonant interaction. The effect manifests as a plateau in the trapped fast-ion profile at the resonance layer.

¹Work supported by the US DOE under SC-G903402 and DE-FC02-04ER54698.

Bill Heidbrink
University of California Irvine

Date submitted: 15 Jul 2011

Electronic form version 1.4