

**Abstract Submitted for the 53rd Annual Meeting  
Division of Plasma Physics  
November 14–18, 2011, Salt Lake City, Utah**

Category Number and Subject:

Theory       Experiment

**Measurements of Fast-Ion Transport by Resonant Interaction at a Sawtooth Crash,\*** C.M. Muscatello, W.W. Heidbrink, *UC-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 ( $\leq 100$  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 nonlinear 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.

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