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Chaotic Neoclassical Separatrix Dissipation in Parametric Drift-Wave Decay[1] C.F. DRISCOLL, A.A. KABANTSEV, D.H.E. DUBIN, UCSD, YU.A. TSIDULKO, Budker Inst. Nucl. Phys. — Experiments and theory characterize a parametric decay instability between plasma drift waves when the standard nonlinear mode coupling is modified by chaotic dissipation on a separatrix. Experimentally, we utilize pure electron plasma columns with a central electrostatic "squeeze" barrier. We launch a large-amplitude $m_\theta = 2$, $k_z = 0$ dioctron mode, and observe it decay into an exponentially growing $m_\theta = 1$, z-anti-symmetric "Trapped Particle Diocotron Mode." Measurements of the growth rates Γ_1 and relative mode phases $\Delta\Theta_{12}$ during exponentiation accurately characterize both the standard nonlinear coupling term and the enhanced dissipation due to chaotic neoclassical transport. Here, the $m = 2$ pump wave dynamically "ruffles" the separatrix, causing chaotic separatrix crossings. Similar enhancements are predicted and observed when the ruffle is static and the plasma drifts along the separatrix.[2] This novel chaotic dissipation is essentially *independent* of collisionality, and may dominate in the low-collisionality regimes of toroidal fusion plasmas where trapped particles and separatrices are endemic.

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[2]Dubin, Kabantsev, Driscoll, Phys Plas 19, 056102 (2012).

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