

Abstract Submitted  
for the APR09 Meeting of  
The American Physical Society

**Enhanced Neoclassical Transport Caused by Chaos Near an Asymmetric Separatrix**<sup>1</sup> D.H.E. DUBIN, UCSD, YU.A. TSIDULKO, Budker Institute — Plasma loss due to apparatus asymmetries is a ubiquitous phenomenon in magnetic plasma confinement. Recent experiments have investigated the loss rate when a central squeeze potential is applied to a magnetized plasma column, creating two trapped particle populations separated by a separatrix. These populations react differently to the asymmetries, leading to a collisional boundary layer at the separatrix. A loss rate scaling as  $\sqrt{\nu/B}$  due to the boundary layer is expected theoretically,<sup>2</sup> provided that the separatrix itself is axisymmetric. However, when the separatrix is *asymmetric*, particles become trapped and detrapped as they follow collisionless orbits. This can lead to single-particle resonances and/or a chaotic region around the separatrix, giving enhanced transport. This effect may help explain a long-standing discrepancy between experiment and neoclassical theory, and could play an important role in tokamak and stellarator confinement. Theory and simulations of this collisionless chaotic transport will be presented.

<sup>1</sup>Supported by NSF/DOE PHY-0613740 and NSF PHY-0354979.

<sup>2</sup>D.H.E. Dubin, Phys. Plasmas **15**, 072112 (2008).

Daniel Dubin  
UCSD

Date submitted: 08 Jan 2009

Electronic form version 1.4