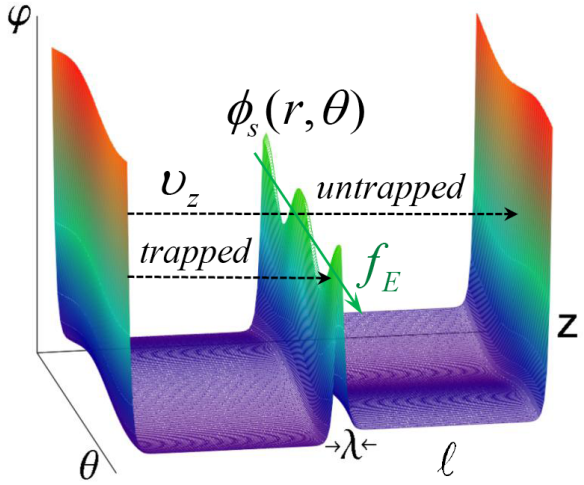
Driscoll /Dubin /O'Neil, UCSD

Chaotic Neo-Classical **Transport** from a "Ruffled" Separatrix



Axial trapping separatrices are ubiquitous in plasmas, and traditional Neo-Classical Transport theory calculates transport effects from *collisional* separatrix crossings.

Recent experiments and theory show that *chaotic* separatrix crossings may dominate, arising from plasma rotation across a "ruffled" separatrix $\Phi_s = V_0 + \Delta V_m \cos(m\theta)$, or from wave-induced separatrix fluctuations.

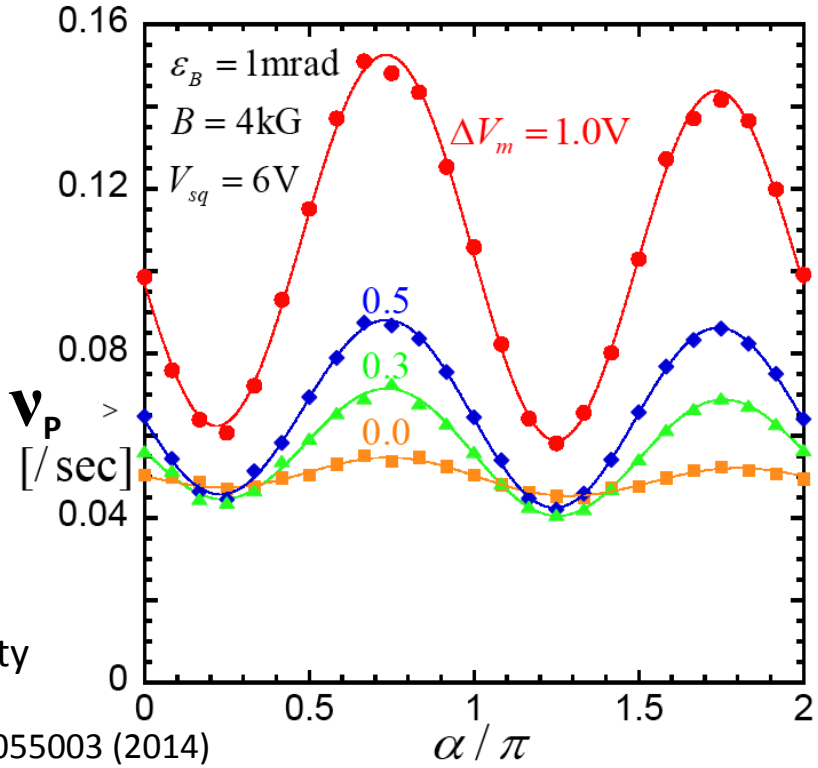
Here, a magnetic tilt "error field" causes plasma **expansion at rate ν_P**. The chaotic transport shows an un-ambiguous $\sin^2\alpha$ signature, where α is the angle between the separatrix ruffle and the magnetic tilt.

Chaotic transport is proportion to the ruffle ΔV_m, and *adds* to the baseline collisional transport (orange).

Two *different* collisionality and magnetic scalings are seen:

Chaotic $\nu_P \sim \nu_c^0 B^{-1}$ Collisional $\nu_P \sim \nu_c^1 B^{-1/2}$

Recent experiments and theory characterize this chaotic separatrix dissipation during the parametric decay instability between drift waves.



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