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Asymmetry-Induced Transport with Azimuthal Perturbations at the Trapping Separatrix[1] A.A. KABANTSEV, UCSD, YU.A. TSIDULKO, Budker Inst., C.F. DRISCOLL, UCSD — Our experiments show that weak multipolar perturbations added to a trapping separatrix have large effects on asymmetry-induced transport and plasma wave damping, as suggested by recent theoretical models.[2] Here, the pure electron plasma columns have a controlled trapping separatrix created by an applied θ-symmetric wall "squeeze" voltage, and a controlled overall asymmetry such as magnetic tilt. Breaking the θ-symmetry of the separatrix by adding multipolar potential perturbations ϕ_m causes large and easily characterized effects for a variety of asymmetry-induced dissipative processes. For example, the measured bulk expansion rate ν_P is a function of the angle $\Delta\theta$ between the magnetic tilt and the multipolar separatrix perturbation. This function is the sum of phase-constant (c) and phase-variable (θ) parts, i.e., $\nu_P = \nu_c + \nu_\theta \cos(2\Delta\theta)$. For dipole or quadrupole ($m=1,2$) perturbations $\nu_c \approx \nu_\theta$, so $\nu_P \approx 2\nu_\theta \cos^2(\Delta\theta)$; and for higher ($m=3,4...$) perturbations one finds $\nu_\theta \equiv 0$, so the ν_P enhancement is phase-independent. Moreover, the two parts scale differently with magnetic field B, possibly explaining the puzzling $B^{-1.4}$ scalings observed experimentally.

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[2]D.H.E. Dubin and Yu.A. Tsidulko, adjacent poster

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