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Chaotic Neoclassical Ripple Transport in Nearly Axisymmetric Penning-Malmberg Trap[1] A.A. KABANTSEV, C.F. DRISCOLL, UCSD — Neoclassical transport (NCT) due to axial asymmetries is ubiquitous in magnetic fusion plasma confinement. Collisional scattering (at rate ν) is often regarded as the main mechanism during the crossing of ripple-caused separatrices. However, in certain cases *collisionless* particle orbits can cross the separatrices. Recent experiments[2] have now characterized a novel *collisionless* form of NCT, where *chaotic* separatrix crossing occurs due to plasma rotation across θ-ruffled separatrices, or due to wave-induced separatrix fluctuations. This mechanism has previously been taken to be ineffective because of presumed symmetries of such crossings.[3] Experiments with controlled separatrix ruffles or temporal variations now unambiguously distinguish the chaotic and collisional contributions. The chaotic NCT dominates when ruffles or waves spread the separatrix energy more than collisional spreading; then, the effects of the ruffled separatrix on both the transport magnitude nad its distinctive $\sin^2\theta$ dependence become clearly dominant in the data, enabling close quantitative comparison to the theory.[4]

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[2]A.A. Kabantsev, Phys. Rev. Lett. (submitted, 2010).
[3]H. Mynick, Phys. Fluids **26**, 2609 (1983).
[4]D.H.E. Dubin, Phys. Rev. Lett. (submitted, 2010).

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