Time--Evolving Statistics of Chaotic Orbits of Conservative Maps in the Context of the Central Limit Theorem

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We study chaotic orbits of conservative low--dimensional maps and present numerical results showing that the probability density functions (pdfs) of the sum of N iterates in the large N limit exhibit very interesting time-evolving statistics. In some cases where the chaotic layers are thin and the (positive) maximal Lyapunov exponent is small, long--lasting quasi--stationary states (QSS) are found, whose pdfs appear to converge to q--Gaussians associated with nonextensive statistical mechanics. More generally, however, as N increases, the pdfs describe a sequence of QSS that pass from a q--Gaussian to an exponential shape and ultimately tend to a true Gaussian, as orbits diffuse to larger chaotic domains and the phase space dynamics becomes more uniformly ergodic.

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