

From Boltzmann-Gibbs statistics to Tsallis statistics: q-triplet structure in symplectic maps

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A detailed comprehensive q -statistical numerical description of the paradigmatic area-preserving standard map is achieved. More precisely, when the Lyapunov exponents are neatly positive over virtually the entire phase space, we verify that the q -generalized indices related to the entropy production q_{ent} , the sensitivity to initial conditions q_{sen} , the distribution of the time average of successive iterations q_{stat} , and the relaxation to the equilibrium final state q_{rel} , collapse onto a fixed point, i.e., $q_{ent} = q_{sen} = q_{stat} = q_{rel} = 1$. In remarkable contrast, when the Lyapunov exponents are virtually zero over the entire phase space, consistently with q -statistics, we verify $q_{ent} = q_{sen} = 0$, $q_{stat} \approx 1.935$, and $q_{rel} \approx 1.4$. These results transparently illustrate when BG behavior and/or q -statistical behavior are observed.