

# **Dissipation as a Resource: From Transient to Steady-State Chaos**

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Ginibre statistics is often taken as an indicator of dissipative chaotic dynamics. However, we have shown that the Grobe-Haake-Sommers conjecture, which associates Ginibre statistics with chaos and 2D Poisson statistics to integrability, can break down. Our results indicate that Ginibre correlations primarily capture short-time dynamical instability, and therefore signal transient, rather than steady-state, chaos. We demonstrate that the quantum-classical correspondence can be restored by adopting a dynamical perspective based on information scrambling. In particular, diagnostics such as the von Neumann entropy and out-of-time-ordered correlators distinguish transient from long-time chaotic behavior. Building on these findings, we further show that dissipation can serve as a tool to regulate the duration of chaotic dynamics and information scrambling, enabling the recovery of coherence at long times.

*This work was supported by the DOE.*

[1] D Mondal, LF Santos, S Sinha, Phys. Rev. Lett. 136, 040401 (2026)

[2] D Villaseñor, LF Santos, P Barberis-Blostein, Phys. Rev. Lett. 133, 240404 (2024)