IQSE AMO QO Seminar Series

Tuesday, March 7th, 11:30 am ZOOM & IQSE seminar room (MPHY 578)

Pizza will be served for IQSE members at 11:00 am. The talk will start around 11:30 am

Dr. Joaquin Rodriguez-Nieva (Texas A&M University)

Quantifying quantum chaos from microcanonical fluctuations

EVENT DETAILS: The emergence of statistical mechanics in isolated quantum many-body systems has been a topic of foundational interest since the birth of quantum mechanics. Unlike classical systems, notions of chaos and ergodicity in many-body quantum systems still remain ill-defined. For this reason, designing quantitative measures of quantum chaos are of fundamental importance. One widely-accepted definition is through the random matrix behavior of Hamiltonian eigenstates. In this talk, I will introduce an eigenstate metric for quantum chaos that quantifies the distance between the microcanonical distribution of entanglement entropy produced by eigenstates and that produced by pure random states with appropriate constraints. We find that, for chaotic systems, the distribution of entanglement entropy of eigenstates deviates from random matrix theory predictions for all models and systems sizes studied. In particular, we show that the variance of the microcanonical entanglement entropy distribution of eigenstates is an extremely sensitive probe of quantum chaos. I will show numerical results in a variety of physical Hamiltonians having both chaotic and integrable limits as well as Floquet systems with and without randomness. When employing our metric of chaos in Hamiltonian systems known to exhibit strongly chaotic behavior, we find that deviations from random matrix behavior are negligible only in small pockets of parameter space. This suggests that maximally chaotic Hamiltonians, those with eigenstates exhibiting random matrix behavior, exist only in fine-tuned regions of parameter space.

ZOOM information:

https://tamu.zoom.us/j/98156251523?pwd=QVdSdGxtL1UyY0g1L083SU5QR0QrUT09

Meeting ID: 981 5625 1523 Passcode: 297578

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