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Chaos and Entanglement with Two Coupled Spins LEIGH NORRIS, PARIN SRIPAKDEEVONG, ARJENDU PATTANAYAK, Carleton College, COLLIN TRAIL, IVAN DEUTSCH, University of New Mexico, SHOHINI GHOSE, Wilfrid Laurier University — We study the correlation between chaos and entanglement in a system consisting of two spins that evolve via hyperfine and Zeeman interactions in the presence of a time-varying external magnetic field. Here, chaos arises due to the coupling between subsystems, in contrast with previously studied cases where two coupled subsystems are independently chaotic (e.g. coupled kicked tops). Using a common Hamiltonian to generate quantum and classical dynamics, we study how the entanglement generated by initially uncoupled spin-coherent states correlates with the mixed nature of the underlying the classical phase space consisting of regular islands and a chaotic sea. We report on the relationship between the mean entanglement of the eigenstates of the Floquet operator and the presence of chaos in the classical phase space. We also analyze the performance of an entanglement measure dependent on the eigenvalues of the Floquet operator.

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