Coherence dynamics of kicked Bose-Hubbard dimers: Interferometric signatures of chaos

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We study the coherence dynamics of a kicked two-mode Bose-Hubbard model starting with an arbitrary coherent spin preparation. The model has a mixed phase space, with regular islands embedded in a chaotic sea. Each preparation is characterized by a Floquet participation number, which is a rough measure for the number of eigenstates of the Floquet operator that are overlapped by the coherent wave-packet.

Preparations located within the chaotic regions in phase space show two distinct behaviors, reflecting different wave-function statistics. For a generic point the participation number scales as the entire N-particle Hilbert space, leading to a rapid loss of single-particle coherence. In the vicinity of hyperbolic points embedded in the chaotic sea the participation number is suppressed by a factor related to the Lyapunov instability exponent of the point. These results are contrasted with the low log(N) participation that is responsible for the revivals in the vicinity of isolated hyperbolic instabilities.

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