Nonlinear Sciences > Chaotic Dynamics

Chaos in Fermionic Many-Body Systems and the Metal-Insulator Transition

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We show that finite Fermi systems governed by a mean field and a few-body interaction generically possess spectral fluctuations of the Wigner-Dyson type and are thus chaotic. Our proof is based on an analogy to the metal-insulator transition. We construct a sparse random-matrix ensemble $H^{\rm cr}$ that mimicks that transition. Our claim then follows from the fact that the generic random-matrix ensemble modeling a fermionic interacting many-body is much less sparse than $H^{\rm cr}$.

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