

Spectral Properties of β Ensemble

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The signature of quantum chaos is often related to the energy level repulsion in random matrix ensembles where the degree of repulsion is called the Dyson's index, β . We study the spectral properties of an ensemble of tridiagonal matrices, isospectral to random matrices, where β can be varied continuously generating a chaotic-integrable transition. We show that the inhomogeneity in β ensemble results in the existence of Non-Ergodic Extended (NEE) states resembling Many-Body Localization (MBL) in physical systems. Interestingly, β ensemble provides a counter-example to Mott's argument that extended and localized states can not exist simultaneously. We also find the relevant time-scales for the onset of spectral correlations and for the saturation of the spectral form factor.
