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Quantum chaos: an introduction via chains of interacting spins-1/2 AVIVA GUBIN, LEA SANTOS, Yeshiva University — We discuss aspects of quantum chaos by focusing on spectral statistical properties and structures of eigenstates of quantum many-body systems. Quantum systems whose classical counterparts are chaotic have properties that differ from those of quantum systems whose classical counterparts are regular. One of the main signatures of what became known as quantum chaos is a spectrum showing repulsion of the energy levels. We show how level repulsion may develop in one-dimensional systems of interacting spins-1/2 which are devoid of random elements and involve only two-body interactions. We present a simple recipe to unfold the spectrum and emphasize the importance of taking into account the symmetries of the system. In addition to the statistics of eigenvalues, we analyze also how the structure of the eigenstates may indicate chaos. This is done by computing quantities that measure the level of delocalization of the eigenstates.

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