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Chaos and statistical relaxation in quantum systems of interacting particles LEA SANTOS, Yeshiva University, USA, FAUSTO BORGONOVI, Universita Cattolica, FELIX IZRAILEV, Universidad Autonoma de Puebla, Mexico — Recent experimental progresses in the studies of quantum systems of interacting particles with optical lattices have triggered the interest in basic problems of many-body physics. One of the issues that has been widely discussed in the literature is the onset of thermalization in an isolated quantum system caused by interparticle interactions. A prerequisite for thermalization is the statistical relaxation of the system to some kind of equilibrium and its viability has been associated with the onset of quantum chaos. We propose a method to study the transition to chaos in isolated quantum many-body systems, which is based on the concept of delocalization of eigenstates in the energy shell. We show that although the fluctuations of energy levels and delocalization measures in integrable and non-integrable systems differ, global properties of the eigenstates may be quite similar, provided the interaction between particles exceeds some critical value. In this case the quench dynamics can be described analytically, demonstrating the universal statistical relaxation of the systems irrespectively of whether they are chaotic or not.

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