Many-body localization in cold atomic gases

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Ergodicity plays a central role in equilibrium statistical mechanics. However, there are important situations where systems are not ergodic and do not thermalize: a famous example is Anderson localization of noninteracting particles in a random potential. In this introductory talk I will discuss what it means for a closed quantum system to thermalize, and what effect interactions have on localization. I will show how one-dimensional lattice models with binary disorder can potentially be realized in experiments with two species of atoms, and present a new technique to compute the average over disorder configurations exactly in a renormalization group framework.