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Many-Body Localization in Simulation of Fermionic Systems
ADRIAN CHAPMAN, AKIMASA MIYAKE, Univ of New Mexico — In the widely-known setting of Anderson localization, noninteracting particles in a disordered potential remain confined to their initial positions, even in the infinite-time limit. Many-body localization (MBL) is the extension of this phenomenon to the regime in which the particles are weakly interacting. Recent results have demonstrated examples of many-body localized systems whose evolution may be approximately simulated classically as a result of this confinement to within a logarithmic light cone. Here we attempt to turn the question on its head and ask whether MBL could be used as a means of simulating quantum computations that na?vely appear difficult. We focus on one-dimensional fermionic systems, which admit techniques for classical simulation in the noninteracting case but are universal for quantum computation upon the introduction of interactions. I will describe some recent progress in this direction as well as discuss possible future endeavours.

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