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What is the effect of decoherence on an analog quantum simulator? SEBASTIAN ZANKER, JAN REINER, IRIS SCHWENK, JUHA LEPPKANGAS, MICHAEL MARTHALER, Institute of Theoretical Solid State Physics, Karlsruhe Institute of Technology, Karlsruhe, Germany, INSTITUTE OF THEORETICAL SOLID STATE PHYSICS, KARLSRUHE INSTITUTE OF TECHNOLOGY, KARLSRUHE, GERMANY TEAM — Simulation of interacting electron systems is one of the great challenges of modern quantum chemistry and solid state physics. Controllable quantum systems offer the opportunity to create artificial structures which mimic the properties of a quantum system of interest. An interesting quantity to extract is the spectral function. We study a system of coupled qubits which can be mapped to the fermionic model of interest and discuss, how the coupling of qubits to sources of decoherence can be transformed to a fermionic model using the same mapping. In the spectral function only features larger than the single qubit decoherence rate can be resolved, which we quantify using the fermionic mapping and a diagrammatic approach on Keldysh contour. For simple systems we compare master equation calculations to our more general approach.

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