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Decoherence and heating of two species fermions in optical lattices SAUBHIK SARKAR, JOHANNES SCHACHENMAYER, STEPHAN LANGER, ANDREW J. DALEY, Department of Physics and Astronomy, University of Pittsburgh — Experiments with ultracold fermionic atoms in optical lattices present a unique way to study strongly interacting many-body quantum systems, including the Fermi-Hubbard model, in a microscopically well-understood environment. A key challenge to explore many interesting quantum phases is to reach sufficiently low temperatures and therefore it is necessary to charecterise and control competing heating processes in experiments. Incoherent scattering of light from the lasers that form the lattices can contribute significantly to the heating. We study the robustness of many-body states to this mechanism, deriving a many-body master equation for two-component fermions and investigating how the heating is influenced by choices in the atomic physics and how it depends on the parameteres in the many-body Hamiltonian.

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