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Solution to new sign problems with Hamiltonian Lattice Fermions

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We present a solution to the sign problem in a class of particle-hole
symmetric Hamiltonian lattice fermion models on bipartite lattices
using the idea of fermion bags. The solution remains valid when
the particle hole symmetry is broken through a staggered chemical
potential term. This solution allows, for the first time, simulations
of some massless four-fermion models with minimal fermion doubling
and with an odd number of fermion flavors using ultra-local actions.
One can thus study a variety of quantum phase transitions that have
remained unexplored so far due to sign problems.

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