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Title: Quantum Field Theory with Quantum Computers and Cold Atoms?

Abstract:
We review tensorial formulations of lattice gauge/spin theories and algorithmic aspects of their coarse graining. We discuss truncations and show that they preserve the symmetries of the original lattice models (PRD 100, 014506).
We show that tensor reformulations fit the needs of quantum computation. We discuss concrete proposals of quantum simulation experiments with cold atoms for the Abelian Higgs model and other simple models in 1+1 dimensions. We report recent calculations for real time scattering for the quantum Ising model (PR D 99, 094503). We provide a Trotter procedure to implement the evolution on existing quantum computers. We discuss the errors associated with the Trotter step size and gate errors for existing or near term quantum computers (such as IBM or trapped ions devices). We discuss recent progress regarding phase shifts and out of equilibrium processes.