Improving the Hubbard-Lattice Gauge Theory correspondence on optical lattices[1] YANNICK MEURICE , U. of Iowa, ALEXEI BOZAVOV, U. C. Riverside, YUZHI LIU, U. Colorado, Boulder, CHEN-YEN LAI, SHAN-WEN TSAI, U. C. Riverside — There exists a strong coupling equivalence between the Hubbard model with repulsive on site interactions and SU(2) lattice gauge theory with one fermion. The correspondence holds at lowest nontrivial order in degenerate perturbation theory, but fails to reproduce the plaquette interactions of the gauge theory. We discuss modifications that can be implemented experimentally on optical lattices and could improve this situation. This includes bipartite lattices with s and p orbitals (plaquette currents) and dipolar molecules in an external field (long range dipole interactions). We discuss recent numerical calculations based on determinantal Monte Carlo and aimed at testing improvement ideas obtained from mean field theory or strong coupling arguments.

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