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Abstract for an Invited Paper
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Strong Correlation Condensed Matter Physics in Cold Atom Optical Lattices¹

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I will discuss a few specific examples of non-trivial strong correlation phenomena from condensed matter theory considerations being studied on cold atom optical lattices, involving both bosons and fermions as well as boson-fermion mixtures. Some of the theoretical problems to be discussed in this talk are the quantum phase diagram of the bosonic Hubbard model in the presence of fermions, the possibility of observing a super-solid phase in the bosonic Hubbard model, the quantum phase diagram of multi-component density-imbalanced fermionic systems (i.e. FFLO or not), and exotic quantum order in optical lattices (e.g. d-Mott state, spin liquid, and topological states of matter). I will describe the experimental conditions necessary for observing strong correlation phenomena in cold atom optical lattices.

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