

Quantum simulation in the age of color

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Alkaline-earth and ytterbium cold atomic gases make it possible to simulate $SU(N)$ -symmetric fermionic systems in a very controlled fashion. Such a high symmetry is expected to give rise to a variety of novel phenomena ranging from molecular Luttinger liquids to (symmetry-protected) topological phases.

I will discuss some of the phases that can be stabilized in a one dimensional lattice, including e.g. gapped valence-bond solids in frustrated chains, non-Landau quantum phase transitions in modulated $SU(N)$ Heisenberg spin chains, as well as chiral spin liquids found numerically on various two-dimensional lattices.

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