

Abstract Submitted
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Exotic Quantum Spin Models in Spin-Orbit-Coupled Mott Insulators JURAJ RADIC, University of Maryland, College Park, ANDREA DI CIOLO, University of Maryland, College Park and Georgetown University, KAI SUN, University of Maryland, College Park and University of Michigan, Ann Arbor, VICTOR GALITSKI, University of Maryland, College Park — We study cold atoms in an optical lattice with synthetic spin-orbit coupling in the Mott-insulator regime. We calculate the parameters of the corresponding tight-binding model using Peierls substitution and “localized Wannier states method” and derive the low-energy spin Hamiltonian for bosons and fermions. The spin Hamiltonian is a combination of Heisenberg model, quantum compass model and Dzyaloshinskii-Moriya interactions and it has a rich classical phase diagram with collinear, spiral and vortex phases. We discuss the state of the art of experiments to realize and detect magnetic orderings in strongly correlated optical lattices.

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