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Multi-orbital physics and off-site interactions effects on phase diagram and shell structure in BH models JAMSHID MORADI KURDESTANY, MOHAMMAD MAHDI VALIZADEH, University of Missouri-Columbia — We include two effects beyond the commonly applied Bose-Hubbard models, namely multi-orbital physics and off-site interactions. Both corrections turn out to be of crucial importance for a wide range of parameters. We use an inhomogeneous mean-field theory for three types of Bose-Hubbard (BH) models: (1) Extended Bose-Hubbard model (EBH) for spinless interacting bosons of one species; (2) two-species generalization of the spinless BH model; and (3) single-species, spin-1 BH model and extend it to include multi-orbital and density-induced tunneling in each case. In particular, we show how these change the phase diagram and shell structure in BH models.

Jamshid Moradi Kurdestany
University of Missouri-Columbia

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