

Abstract Submitted
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Multi-orbital Flat Band Ferromagnetism with a Provable Percolation Representation¹ JUNJIA ZHANG, ERIC BOBROW, YI LI, Johns Hopkins University — We consider a two-layer multi-orbital system consisting of a p_x , p_y -orbital honeycomb lattice layer and an f -orbital triangular lattice layer whose sites aligned with the centers of the honeycomb plaquettes. With an appropriately tuned chemical potential difference between these two layers, the system exhibits a flat band with provably ferromagnetic ground states at half filling of the band in the presence of intra-orbital Hubbard interactions and Hund's coupling. Away from half filling, the interacting system admits a percolation representation, where the ground state space is spanned by maximum-spin clusters of localized single-particle states. A paramagnetic-ferromagnetic transition occurs as the band approaches half filling and the can be analyzed numerically as a weighted percolation problem via monte carlo simulation.

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