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Multiorbital Flat Band Ferromagnetism with a Percolation Representation ERIC BOBROW, JUNJIA ZHANG, YI LI, Johns Hopkins University — We consider a two-layer multiorbital system consisting of a $p_x p_y$-orbital honeycomb lattice layer and an f-orbital layer centered on the honeycomb plaquettes. With appropriately tuned layer potentials, 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 space of degenerate ground states becomes dominated by clusters with macroscopic spin. The critical filling of the flat band where this transition occurs can be found through Monte Carlo simulation for spin-weighted percolation.

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