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Wannier Permanents and Featureless Bosonic Mott Insulators on the 1/3 Filled Kagome Lattice[1] ARI TURNER, University of Amsterdam, SIDDHARTH PARAMESWARAN, ITAMAR KIMCHI, DAN STAMPER-KURN, ASHVIN VISHWANATH, UC Berkeley — We study Bose-Hubbard models on tight-binding, non-Bravais lattices, with a filling of one boson per unit cell – and thus fractional site filling. At integer filling of a unit cell, a fully symmetric insulating state is in principle allowed without triggering topological order. We demonstrate by explicit construction of a family of wavefunctions that such a featureless Mott insulating state exists at 1/3 filling on the kagome lattice. We construct Hamiltonians for which these wavefunctions are exact ground states. Such wavefunctions also yield 1/3 magnetization plateau states for spin models in an applied field. The featureless Mott states we discuss can be generalized to any lattice for which symmetric exponentially localized Wannier orbitals can be found at the requisite filling, and their wavefunction is given by the permanent over all Wannier orbitals.

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