

Abstract Submitted
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Featureless and Non-Fractionalized Bose Insulator on the Honeycomb Lattice at 1/2 site-filling¹ ITAMAR KIMCHI, S. A. PARAMESWARAN, University of California, Berkeley, ARI TURNER, University of Amsterdam, FA WANG, Peking University, ASHVIN VISHWANATH, University of California, Berkeley — We consider bosons on the Honeycomb lattice at filling one half per site. It is known that free fermions at this filling of the tight binding model cannot form an insulating state while preserving all symmetries, even though there is an integer number of particles per unit cell. We argue, however, that interacting bosons can form an insulating state that preserves all symmetries. We propose a wave function for this state and by a mapping to a classical partition function we compute its properties and demonstrate that the state is insulating, fully symmetric and has no topological order. Our construction suggests that featureless insulators are generically allowed for at a filling of one boson per unit cell on any symmorphic lattice in any dimension. We also discuss related wavefunctions of hard core bosons that model spin 1/2 magnets on this lattice.

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