Non-trivial edge physics in a featureless Mott insulator BRAYDEN
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BAUER, Station Q, Microsoft Research, Santa Barbara, CA — While the Lieb-
Schultz-Mattis theorem forbids the existence of fully symmetric quantum paramag-
netic phases on lattices with fractional filling of particles per unit cell, such a phase
is in principle allowed with certain fractional numbers of particles per site on non-
Bravais lattices, including half-filling on the honeycomb lattice. It has been shown
that a non-interacting Hamiltonian of spinless fermions or bosons cannot have such
a symmetric insulating ground state, and an explicit construction using interactions
is challenging. Recently, Kimchi et al. constructed a wavefunction for bosons at
half-filling that does not break any symmetries and is not topologically ordered–and
in this sense is a featureless insulator in the bulk. Here, however, we reveal that
this wavefunction exhibits non-trivial structure at the edge. We apply recently de-
veloped techniques based on a tensor network representation of the wavefunction
to demonstrate the presence of a gapless entanglement spectrum and a non-trivial
action of combined charge-conservation and spatial symmetries on the edge. We
will also discuss the possibility of finding a parent Hamiltonian and analyzing the
existence of a symmetry-protected topological phase around this state.

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