

Abstract Submitted
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Superfluid-insulator transition in two-dimensional superfluids on the triangular lattice ANTON BURKOV, LEON BALENTS, University of California at Santa Barbara — We report on a study of superfluid to Mott insulator transition in two-dimensional superfluids on the triangular lattice at rational fillings, with a particular emphasis on $1/2$ and $1/3$ fillings. This is a continuation of our earlier study (cond-mat/0408329) of superfluids on the square lattice. At $1/3$ filling, not unexpectedly, we find a picture of the transition that is very similar to the $1/2$ filling square lattice case. On the other hand, at $1/2$ filling on the triangular lattice strong geometric frustration leads to a very different picture, with features that have no analogs in square lattice superfluids. We find that the low-energy action, describing the transition in this case, has an emergent nonabelian symmetry, not present at the microscopic level, and explore the physical consequences of this symmetry. We also identify the essential features of the insulating phases at $1/2$ filling, in particular the prevalence of valence bond solid (VBS) phases over simple site-centered charge density wave phases. This has important implications for the search of microscopic models where VBS phases may be realized.

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