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Topological phases protected by $Z_N^{\otimes 3}$ symmetry

One of the more recent concepts in condensed matter theory are symmetry-protected topological (SPT) phases. Although the core of the theory exists, particular models as well as models outside the basic paradigm are not studied well yet. Here we study the topological modes protected by the $Z_N^{\otimes 3}$ symmetries in two-dimensional systems. A class of models with massless excitations emerges. By analyzing their properties, the objective is to determine the conformal field theory describing their thermodynamic limit. Further analysis shows signs of integrability. The emergent operator algebra produces the R-matrix resembling the 8-vertex model. Numerical analysis also supports the possibility of integrability.

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