

Application of the tensor renormalization group method to non-Abelian lattice gauge theories

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The tensor renormalization group method is a powerful tool to study lattice models, which works even with models that have sign problem. However, so far, its application to gauge theory has been restricted to the $U(1)$ and $SU(2)$ cases. In this work, we apply it to two-dimensional $U(N)$ gauge theories which are exactly solvable. We are able to extract the large- N behaviors of the model such as the Eguchi-Kawai reduction and the Gross-Witten phase transition. We also study the model with a theta-term, which has the sign problem, and reproduce exact results.

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