Contribution ID: **59** Type: **not specified**

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

Thursday, 5 December 2019 15:00 (3 hours)

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 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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Session Classification: Poster