Contribution ID: **77**   Type: **not specified**

Variational tensor network study of the anisotropic Kitaev model under magnetic field

Wednesday, 27 March 2024 18:21 (3 minutes)

We conducted both unconstrained and symmetric infinite projected entangled pair state (iPEPS)[1] simulations for the honeycomb Kitaev model along out-of-plane external magnetic field h and the anisotropic interactions Kz axes. In particular, for the $Kz/K > 2$ region where the Majorana fermion being gapped out and the low energy excitation dominated by the Z_2 fluxes, based on the gauge symmetry and topological entanglement entropy measurements, we showed that the proposed symmetric ansatz - which implements the flux conservation and local symmetry under finite field and anisotropy - well captured the gapped Z_2 quantum spin liquid (QSL) phase and the phase transition point, comparable to the unconstrained iPEPS and agrees with the perturbation theory prediction[2]. The anyon dynamics in this QSL are further explored by the generating function[3] to calculate the excitation spectrum and dynamical spectral function. We include the projector derivative[4] and determine the correct truncation dimension by enforcing the sum rule.

References
[1] Yu-Hsueh Chen, Ke Hsu, Wei-Lin Tu, Hyun-Yong Lee, and Ying-Jer Kao. Variational tensor network operator. Phys. Rev. Res., 4:043153, Nov 2022.
[2] Feng, S., Agarwala, A., Bhattacharjee, S., Trivedi, N. (2023). Anyon dynamics in field-driven phases of the anisotropic Kitaev model. Phys. Rev. B, 108, 035149.
[3] Tu, W.-L. et al. Generating function for projected entangled-pair states. Preprint at http://arxiv.org/abs/2307.08083 (2023).
[4] Ponsioen, B., Hasik, J. Corboz, P. Improved summations of n-point correlation functions of projected entangled-pair states. Phys. Rev. B 108, 195111 (2023).

Primary authors: Mr LIN, Chang-Teng (National Taiwan University); Mr HSU, Ke (National Taiwan University); TU, Wei-Lin (Keio University); KAO, Ying-Jer (Center for Theoretical Physics and Department of Physics, National Taiwan University, Taipei 10607, Taiwan)

Presenter: Mr LIN, Chang-Teng (National Taiwan University)

Session Classification: Poster

Track Classification: Poster presentation