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

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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

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**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)

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