

Han Ma

Title: Z_2 spin liquids in the Higher spin Kitaev Honeycomb model: an exact Z_2 gauge structure in a non-integrable model

Abstract: The higher spin Kitaev models have extensive locally conserved quantities the same as the spin-1/2 Kitaev honeycomb model, although they are not exactly solvable. In this talk, I will present their exact gauge structure by introducing a Majorana parton construction for a general spin-S. These conserved quantities are exactly the Z_2 gauge fluxes. Particularly, we find an even-odd effect that the Z_2 gauge charges are fermions in the half integer spin model, but are bosons in the integer spin model. We further prove that the fermionic Z_2 gauge charges are always deconfined; hence, the half integer spin Kitaev model would have nontrivial spin liquid ground states regardless of interaction strengths in the Hamiltonian. The bosonic Z_2 gauge charges of the integer spin model could condense, leading to a trivial product state, and this is indeed the case at the anisotropic limit of the model.