**Finite-temperature spin dynamics and transport phenomena in Kitaev spin liquids**

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**Abstract:**

Quantum spin liquids (QSLs) have been the subject of great interest since Anderson's suggestion. Recently, Kitaev proposed a canonical model of QSLs termed the Kitaev model, which provides exact realizations of QSLs with topological order and fractional excitations. Moreover, exchange interactions in transition metal compounds with strong spin-orbit coupling such as iridates and ruthenium compounds are suggested to be dominated by the Kitaev-type interaction. To discuss the relevance to real materials, we investigate the thermodynamic properties and spin dynamics in the Kitaev model [1]. Using the quantum Monte Carlo simulations, we calculate the Raman and spin response, NMR relaxation rate, and magnetic susceptibility at finite temperatures [2,3]. We find that the spin fractionalization is observed as anomalous temperature dependence and excitation spectra in these quantities. We also examine the thermal transport governed by the itinerant emergent Majorana fermions in the presence of the magnetic field [4]. We clarify that the thermal Hall conductivity shows nonmonotonic temperature dependence due to the Majorana chiral edge mode and the thermally fluctuating $Z_2$ gauge field emergent from the fractionalization of quantum spins.

**References:**

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