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# Magnetic-field Induced Topological Transitions and Thermal Conductivity in a Generalized Kitaev Model

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Recent experiments on Kitaev spin liquid candidate materials reported non-monotonic behavior of thermal conductivity as a function of magnetic field, which lead to conflicting interpretations of its origin. Motivated by this development, we study the magnetic field dependence of thermal conductivity of a generalized Kitaev model, which allows the phase transitions between different flux sectors as a function of the magnetic field. The thermal conductivity due to Majorana fermions shows dip-bump structures as the magnetic field increases, which is caused by either the transitions between different flux sectors of Kitaev spin liquids or the topological transitions that change the Majorana Chern number within the same flux sector. It is shown that the change of Chern number is closely related to the four-Majorana-fermion interaction induced by the magnetic field. The non-monotonic behavior in thermal conductivity emerges at finite temperature, and it becomes weaker when temperature decreases towards zero. Our model provides a generic mechanism for the Kitaev spin liquids to develop non-monotonic magnetic-field dependence of thermal conductivity while the comparison to realistic materials remains an open question for future investigation.

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