Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Liquid-Liquid Transition in Kitaev Magnets Driven by Spin Fractionalization JOJI NASU, Tokyo Institute of Technology, YASUYUKI KATO, JUNKI YOSHITAKE, University of Tokyo, YOSHITOMO KAMIYA, RIKEN, YUKITOSHI MOTOME, University of Tokyo — While phase transitions between magnetic analogs of three states of matter — a long-range ordered state, paramagnet, and spin liquid — have been extensively studied, the possibility of "liquid-liquid" transitions, namely, between different spin liquids, remains elusive. By introducing the Ising coupling into the honeycomb Kitaev model with bond asymmetry, we discover that the Kitaev spin liquid becomes a bond-nematic quantum paramagnet before magnetically ordered. The phase transition between the two liquid-like states with different topological nature is of first order, driven by delocalization of the Z_2 gauge fluxes, and persists to a critical point at finite temperature located inside the regime where quantum spins are fractionalized. It is suggested that similar transitions may occur in other perturbed Kitaev magnets with bond asymmetry.

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Date submitted: 10 Nov 2016 Electronic form version 1.4