Abstract Submitted
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Chiral and Critical Spin Liquids in Spin-1/2 Kagome Antiferromagnet[1] DONGNING SHENG, WEI ZHU, SHOUSHU GONG, Department of Physics and Astronomy, California State University, Northridge, GROUP OF PROF. D. N. SHENG TEAM — The spin liquids (SL) and their phase transitions have attracted much attentions. The extended kagome antiferromagnet emerges as the primary candidate for hosting both time reversal symmetry (TRS) preserving and TRS breaking SLs based on DMRG simulations. To uncover the nature of the novel transition between them, we study a minimum XY model with the nearest-neighbor (NN) (J_{xy}), the second and third neighbor couplings ($J_{2xy} = J_{3xy} = J'_{xy}$). We identify the chiral SL (CSL) with the turn on of a small perturbation $J'_{xy} \sim 0.06 J_{xy}$, which is characterized by topological Chern number and conformal edge spectrum as the $\nu = 1/2$ fractional quantum Hall state. On the other hand, the NN XY model ($J'_{xy} = 0$) is shown to be a critical SL, characterized by the gapless spin singlet and vanishing small spin triplet excitations. The phase transition from the CSL to the critical SL is driven by the collapsing of singlet gap. By following the evolution of entanglement spectrum, we find the transition takes place through the coupling of the edge states with opposite chiralities, which merge into the bulk and become gapless neutral excitations. The effect of the NN spin-z coupling is also studied, which leads to a phase diagram with an extended regime for the gapless SL.

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