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Title:

Spin-orbital liquids in non-Kramers magnet on Kagome lattice

Abstract:

Localized magnetic moments with crystal-field doublet or pseudo-spin  $1/2$  may arise in correlated insulators with even number of electrons and strong spin-orbit coupling. Such a non-Kramers pseudo-spin  $1/2$  is the consequence of crystalline symmetries as opposed to the Kramers doublet arising from time-reversal invariance, and is necessarily a composite of spin and orbital degrees of freedom. We investigate possible spin-orbital liquids with fermionic spinons for such non-Kramers pseudo-spin  $1/2$  systems on the Kagome lattice. Using the projective symmetry group analysis, we find ten new phases that are not allowed in the corresponding Kramers systems. We compute the spin-spin dynamic structure factor that shows characteristic features of these non-Kramers spin-orbital liquids arising from their unusual coupling to neutrons, which is therefore relevant for neutron scattering experiments. We also point out possible anomalous broadening of Raman scattering intensity that may serve as a signature experimental feature for gapless non-Kramers spin-orbital liquids.