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Title: Emergent Majorana and Dirac fermions in spin and electronic systems.

We will review quantum Monte Carlo simulations of the Su-Shrieffer-Heeger (SSH) model on a two-dimensional square lattice as well as of realistic models for Kitaev materials, in particular $RuCl_3$. Aspects of our calculations for the SSH model can be understood in terms of emergent Dirac orthogonal fermions that undergo exotic quantum phase transitions akin to de-confined quantum criticality.

Our simulations for $RuCl_3$ reproduce experimental findings for the magnetotropic coefficient k. In particular for temperature scales down to 30 K, we observe an approximate scaling: $k/T = f(B/T)$ with B the magnetic field and T the temperature. We interpret our findings in terms of fractionalization.