

Abstract Submitted
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Hall effect of triplons in a dimerized quantum magnet JUDIT ROMHANYI, Max Planck Institute for Solid State Research, Stuttgart, Germany, KARLO PENC, Institute for Solid State Physics and Optics, Wigner Research Centre for Physics, RAMACHANDRAN GANESH, The Institute of Mathematical Sciences, Chennai, India — $\text{SrCu}_2(\text{BO}_3)_2$ is the archetypal quantum magnet with a gapped dimer-singlet ground state and triplon excitations. It serves as a realization of the Shastry Sutherland model, up to small anisotropies arising from Dzyaloshinskii-Moriya (DM) interactions. We demonstrate that the DM couplings give rise to topological character in the triplon band structure. The triplons form a new kind of a Dirac cone with three bands touching at a single point, a spin-1 generalization of graphene. An applied magnetic field opens band gaps and as a result topological bands with Chern numbers ± 2 develop. Thus $\text{SrCu}_2(\text{BO}_3)_2$ is a magnetic analogue of the integer quantum Hall effect and supports topologically protected edge modes. At a critical value of the magnetic field set by the strength of DM interactions, the three triplon bands touch again in a spin-1 Dirac cone, and lose their topological character. We predict thermal Hall signature in the topological regime.

Judit Romhanyi
Max Planck Institute for Solid State Research, Stuttgart, Germany

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