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Physical properties and spin excitations in the lacunar spinels AV_4S_8 (A = Ga, Ge)[1] GANESH POKHAREL, The University of Tennessee, Knoxville, ANDREW CHRISTIANSON, The Oak Ridge National Laboratory, DAVID MANDRUS, The University of Tennessee, Knoxville, LIUSUO WU TEAM, MARK LUMSDEN COLLABORATION, RUPAM MUKHERJEE COLLABORATION, MATTHEW STONE COLLABORATION, GEORG EHLERS COLLABORATION — In the lacunar spinels AV_4S_8 (A = Ga, Ge), the interplay of spin, charge, and orbital degrees of freedom results in a complex phase diagram which includes: ferroelectric, orbitally ordered, and Néel type skyrmion phases. Below 12.7 K GaV_4S_8 exhibits cycloidal and ferromagnetic order and the application of a magnetic field results in a Néel type skyrmion spin structure. On the other hand, GeV_4S_8 orders antiferromagentically below 18 K. To illuminate the underlying physics driving the formation of these novel phases, we have measured the magnetization, resistivity, thermal conductivity, and inelastic neutron scattering spectrum of these spinels. The inelastic neutron scattering data shows broadened spin excitations which extend to 6 meV within the magnetically order phases for both GaV_4S_8 and GeV_4S_8. The similarity of the spectra for ferromagnetic GaV_4S_8 and antiferromagnetic GeV_4S_8 reflects the close balance of ferromagnetic and antiferromagnetic interactions in these materials.

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Ganesh Pokharel
The University of Tennessee, Knoxville

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