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Ferromagnetic-antiferromagnetic alternating exchange spinlow-dimensional quantum magnet dynamics \mathbf{in} the DMACuCl₃ MATTHEW STONE, Oak Ridge National Laboratory, WEI TIAN, University of Tennessee, MARK LUMSDEN, GARRETT GRANROTH, DAVID MANDRUS, Oak Ridge National Laboratory, JAE-HO CHUNG, National Institute for Science and Tecnology, STEPHEN NAGLER, Oak Ridge National Laboratory — The spin magnet dimethylammonium trichlorocuprate, DMACuCl₃, has been considered both an alternating ferromagnetic-antiferromagnetic chain along the crystalline a-axis as well as a collection of isolated ferromagnetic and antiferromagnetic spin pairs. However, no spectroscopic probes have been applied until now to determine the underlying nature of the spin dynamics. We present results of single crystal inelastic neutron scattering measurements which clearly indicate that the magnetic excitations in DMACuCl₃ propagate along the crystalline b-axis, not the proposed a-axis. A single magnetic excitation is observed with a gap of 0.98 meV and a bandwidth of approximately 0.67 meV. The quasi-one-dimensional excitation spectrum is dominated by a strongly coupled ferromagnetic spin-pair or dimer with weaker antiferromagnetic interdimer interactions. In light of this classification, we make comparisons to previously measured specific heat and magnetization measurements. We also place a limit on inter-dimer interactions perpendicular to the chain axis and propose a potential multi-chain model for DMACuCl₃.

> Matthew Stone Oak Ridge National Laboratory

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