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High-Frequency ESR Studies on the Frustrated quasi-1D Spin-1/2 Chain PbCuSeO₄(OH)₂

Saturday, November 26, 2022 4:00 PM (2 hours)

We report high-frequency ESR studies on a powder sample of the frustrated quasi-1D spin-1/2 chain material PbCuSeO₄(OH)₂, isostructural to the well studied natural mineral linarite (PbCuSO₄(OH)₂). Magnetisation data show the evolution of a magnetically ordered phase below $T_{\rm N}$ = 4.3~K and a spin-flop transition at $B_{\rm SF}$ = 2.8~T.

ESR measurements on a loose powder evidence a gapless linear excitation mode within the ground state, which can be traced across the spin-flop transition, as well as two linear excitation modes within the in-field phase with a zero field gap of -31 ± 9 -GHz and 32.9 ± 1.4 -GHz. Measurements on a fixed powder reveal a gapped magnon mode in the ground state with a zero field splitting of 70 ± 20 -GHz. This mode may be accounted for by assuming an excitation of a spiral spin order in the ground state.

Tracing the resonance positions with temperature suggests an easy-axis type anisotropy with the paramagnetic g-factors 2.3 and 2.07. Changes in resonance position evidence the onset of short range fluctuations at 70-K and the evolution of orthorombic anisotropy.

Category

Solid State (Experiment)

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