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Destruction of long-range magnetic order in Cu_2GaBO_5 and Cu_2AlBO_5 ludwigites by an external magnetic field.

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Ludwigites are oxyborate compounds with the general formula $M_2^{2+}M'^{3+}BO_5$. Their structure consists of low-dimensional zigzag walls with triangular motifs, making them an interesting playground for the realization of magnetic frustration on quasi-low-dimensional lattices. Of particular interest are copper ludwigites, in which the divalent transition-metal ion is Cu^{2+}, carrying a quantum spin 1/2, whereas the trivalent ion is nonmagnetic. Cu_2GaBO_5 and Cu_2AlBO_5 ludwigites have been careful characterized. Both compounds order antiferromagnetically with $T_N \approx 4.1$ K and 3 K, respectively. Propagation vector for Cu_2GaBO_5 is $(0.45\ 0\ -0.7)$, which was determined by diffraction measurement. We also collected μSR data as a function of temperature and weak longitudinal magnetic field. They indicate a decoupling in weak fields of about 2000 gauss, which suggests that the internal field experienced by the muon is unusually weak. On the other hand, magnetic field also induces a very fast depolarization of some small fraction of the muons, leading to a decrease in initial asymmetry, which is consistent with field-induced magnetic disorder. We also present inelastic neutron scattering measurements evidencing diffuse low-energy spin fluctuations associated with such a crossover. We suggest that these investigation help understand magnetic ordering and will be an additional step towards understanding the quantum spin system.

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