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NMR study of the spin-1/2 near-kagome system Vesignieite JEFFREY QUILLIAM, FABRICE BERT, Laboratoire de Physique des Solides, Universite Paris-Sud, ROSS COLMAN, DAVID BOLDRIN, ANDREW WILLS, Department of Chemistry, University College London, PHILIPPE MENDELS, Laboratoire de Physique des Solides, Universite Paris-Sud — The spin-1/2 kagome lattice antiferromagnet is understood to be an ideal setting in which to find novel quantum spin liquid physics. Here, ^{51}V NMR results are presented on the quantum spin system Vesignieite, which closely approximates such an antiferromagnetic kagome model, possessing a minute 0.7% length difference between inequivalent Cu-Cu bonds. We obtain a measure of the intrinsic magnetic susceptibility of the near-kagome lattice, which shows commonalities with other kagome systems, in particular Herbertsmithite. Meanwhile, the system is found to undergo partial spin freezing at a surprisingly high temperature of $T_C = 9K \simeq J/6$. Through a loss of NMR intensity and detailed analysis of the spectral linewidth, we infer a heterogeneous ground state in which 50% of the spins are very weakly frozen, with a moment of $\sim 0.2\ \mu_B$ and the remaining 50% remain dynamic down to very low temperatures. These results are found to be highly consistent with μSR studies, which find a similar frozen fraction and small size of magnetic moment. We propose that the elevated transition temperature and weakly frozen ground state are explained by the Dzyaloshinskii-Moriya interaction and a proximity to the resulting quantum phase transition.

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