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Role of spin-orbit fluctuations in spin decoherence[1] MATHEW MARTENS, Florida State University, National High Magnetic Field Lab, JOHAN VAN TOL, National High Magnetic Field Lab, NARESH DALAL, Florida State University, SYLVAIN BERTAINA, Aix-Marseille Universite, CNRS, IM2NP UMR7334, 13397 cedex 20, Marseille, France, IRINEL CHIORESCU, Florida State University, National High Magnetic Field Lab — We performed a systematic study of the decoherence mechanism in the molecular compound $K_6[V_{15}^{IV}As_6^{III}O_{42}(D_2O)] \cdot 8D_2O$, in short V_{15}[2], utilizing high-field electron spin resonance at 120 GHz, 241 GHz, and 336 GHz. This system has shown important quantum effects such as coherent spin oscillations[3] as well as interesting out-of-equilibrium spin dynamics due to phonon bottlenecking[4]. The spectra of a single V_{15} crystal were measured and linewidths as a function of orientation, temperature, and field were extracted. By analyzing the shape and orientation anisotropy of the linewidths, we study how fluctuations in each term of the spin Hamiltonian contribute to the spin decoherence with much attention given to the spin-orbit coupling that generates g-factor anisotropy. Our conclusion is that fluctuations in the spin-orbit coupling can play an important role in the linewidth of a spin resonance.

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Mathew Martens
Florida State Univ

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