Low Dimensional Spin Correlations in Blatter Radical Single Crystals

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Materials exhibiting low dimensional spin properties have recently attracted significant attention due to their potential applications in emerging technologies such as quantum computing and spintronics [1]. However, low dimensional magnetism in metal-free organic materials is rarely reported, mainly due to weak exchange interactions and small magnetic anisotropy [2]. Nevertheless, understanding spin dimensionality in such systems is a key step toward identifying organic materials capable of replacing inorganic ferromagnets as metal-free spin sources. Here, we present an experimental investigation of the spin dimensionality and spin correlations in single crystals of a Blatter radical derivative (BRD) at room temperature. Electron spin resonance (ESR) measurements were performed at X-band frequency ($9.4GHz$), with angular dependent spectra recorded in three mutually perpendicular planes aligned with the crystallographic axes, as determined by single crystal X-ray diffraction. The analysis of both the ESR resonance field and the peak to peak linewidth reveals characteristic anisotropies associated with low dimensional magnetic behavior. These results demonstrate that BRD single crystals constitute a promising metal-free organic platform with well defined low dimensional spin properties, highlighting their potential use as spin sources for organic spintronic devices and spin current generation schemes.

References:

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