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EPR Studies of Magnetically Dilute Ga-Doped Single Crystals of Fe_{18} Antiferromagnetic Molecular Wheels JOHN HENDERSON, CHRISTOPHER RAMSEY, ENRIQUE DEL BARCO, University of Central Florida, THEOCHARIS STAMATATOS, GEORGE CHRISTOU, University of Florida — Studies of the quantum dynamics of the electron spins in solid state systems has gained considerable interest recently due to their potential for use as quantum computing substrates. One class of materials, molecular magnets, are of particular importance, owing to the seemingly limitless array of spin configurations due to synthetic chemical flexibility. Efforts are currently devoted to minimizing decoherence times by diminishing dipolar effects. In this regard, we have carried out EPR measurements on small single crystals of 0.5% Ga doped Fe18 molecular antiferromagnetic wheels at temperatures down to 300 mK using planar resonators patterned on GaAs wafers. This system constitutes a dilute sample of $S = 5/2$ molecules dispersed within a sea of $S = 0$ (at low temperature) molecules, which significantly reduces dipolar interactions and might provide a means of observing Rabi oscillations in crystals of molecular magnets. Detailed angular dependence studies reveal significant anisotropy with $D = 500$ mK and $E = 20$ mK. The presence of second order anisotropy (E) is very unusual for such a high symmetry system and its interpretation will be discussed. Pulsed-EPR measurements and doping concentration dependence will also be discussed.

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