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Determining the spatial and spin anisotropy of reduced-dimensionality Cu-based magnets using EPR, ultra-high-field magnetization and simulations SUSAN COX, ROSS MCDONALD, JOHN SINGLETON, National High Magnetic Field Laboratory, PINAKI SENGUPTA, Los Alamos National Laboratory, PAUL GODDARD, STEPHEN BLUNDELL, Physics, University of Oxford, JANEZ BONCA, Physics, Ljubljana University, SAMIR EL SAWISH, Jozef Stefan Institute, JAMIE MANSON, Chemistry, Eastern Washington University, JOHN SCHLUETER, Argonne National Laboratory — Pulsed-field magnetization experiments (up to 85 T) and electron paramagnetic resonance (EPR) experiments ($10-110$ GHz) are reported on a family of organic Cu-based two-dimensional (2D) Heisenberg magnets. The low-T $M(H)$ relationship is concave, with a sharp transition to a saturation value at a critical field H_c. Monte-Carlo simulations including a finite interlayer exchange energy quantitatively reproduce the data. Thus, one can obtain accurate values for both intra- and interlayer exchange energies. The EPR spectra show pronounced changes in effective g factor, linewidth and zero-field intercept at temperatures, fields and frequencies of the same energy scale as the dominant exchange parameter. The EPR results are modeled using finite-cluster-size methods, and the data are well matched by an easy-plane spin anisotropy in the range $0.01 - 0.05$. Thus, EPR measurements allow the spin orientation dependence of the exchange interaction to be determined.

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