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Effects of disorder and bond angle on the magnetic properties of $ZnCu_3(OH)_6Cl_2$-like materials TYREL MCQUEEN, DANNA FREEDMAN, ROBIN CHISNELL, TIAHENG HAN, YOUNG LEE, DANIEL NOCERA, Massachusetts Institute of Technology — The mineral herbertsmithite, $ZnCu_3(OH)_6Cl_2$, contains two-dimensional Kagome layers of Cu^{2+} (S=1/2) ions. It is a candidate for the long-sought-after spin-liquid ground state as no long range magnetic order is found above T = 50 mK despite strong antiferromagnetic interactions, $\theta_{CW} \sim$ -300 K. However, it is difficult to determine how Zn-Cu site mixing affects the ground state properties, due to difficulties in quantifying the degree of Zn-Cu disorder. Here the structural and magnetic properties on chemically related systems in which Zn^{2+} is replaced by Mg^{2+} and Cd^{2+} are presented. These results permit direct identification of the effect of disorder on the observed magnetic behavior, and highlight the importance of the Cu-O-Cu bond angle in determining the magnetic coupling between Cu^{2+} ions within each layer.

Tyrel McQueen
Massachusetts Institute of Technology

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