

ELECTRONIC SUPPLEMENTARY DATA

for

**Coexistence of Spin Frustration and Long-Range Magnetic
Ordering in A Triangular $\text{Co}^{\text{II}}_3(\mu_3\text{-OH})$ -based Two-Dimensional
Compound**

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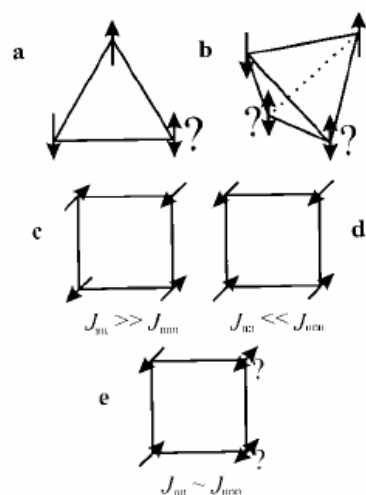
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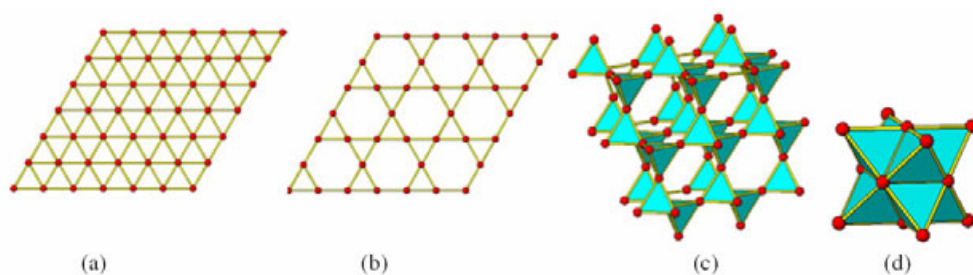
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Scheme 1S Frustrated “plaquettes”: (a) the equilateral triangle, (b) the tetrahedron, (c) the square plane with $J_{nn} \gg J_{nnn}$, (d) square plane with $J_{nn} \ll J_{nnn}$, (e) square plane with $J_{nn} \sim J_{nnn}$.



Scheme 2S Geometrically frustrated lattices of antiferromagnetic bonds: (a) triangular, (b) Kagomé, (c) pyrochlore and (d) fcc lattices.^{3c}

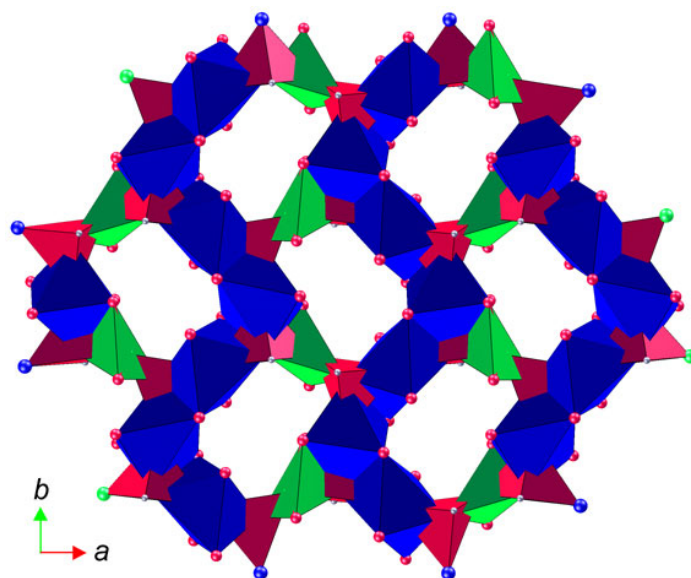


Fig. S1 The 2D $[\text{Co}_3(\text{OH})_2]^{4+}_\infty$ layer (oxygen atoms of $\mu_3\text{-OH}$, octahedral cobalt(II) atoms and tetrahedral cobalt(II) atoms are highlighted in red, blue and green polyhedra

respectively, and the carbon atoms are omitted for clarity) in **1**.

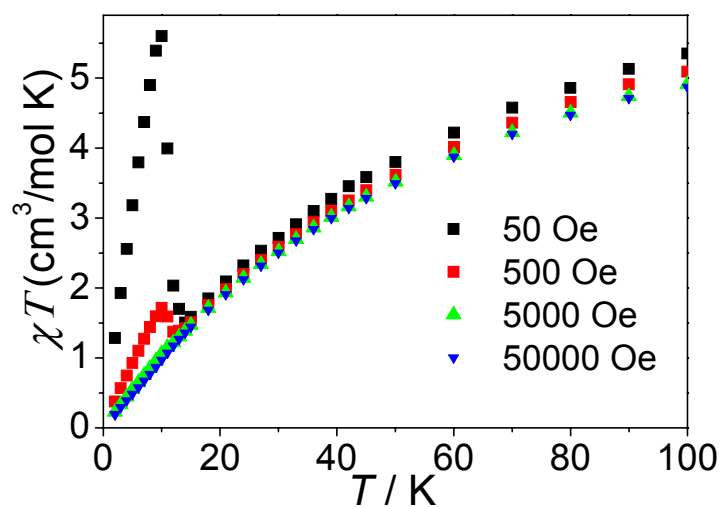


Fig. S2 χT vs. T plot at various fields in **1**.

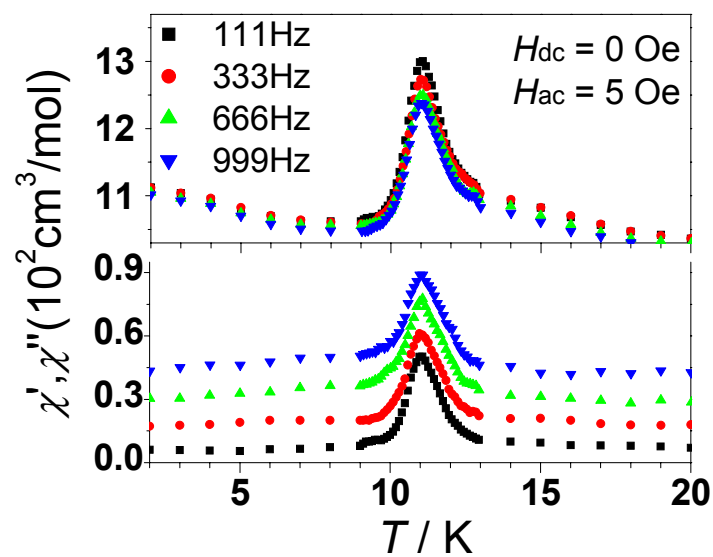
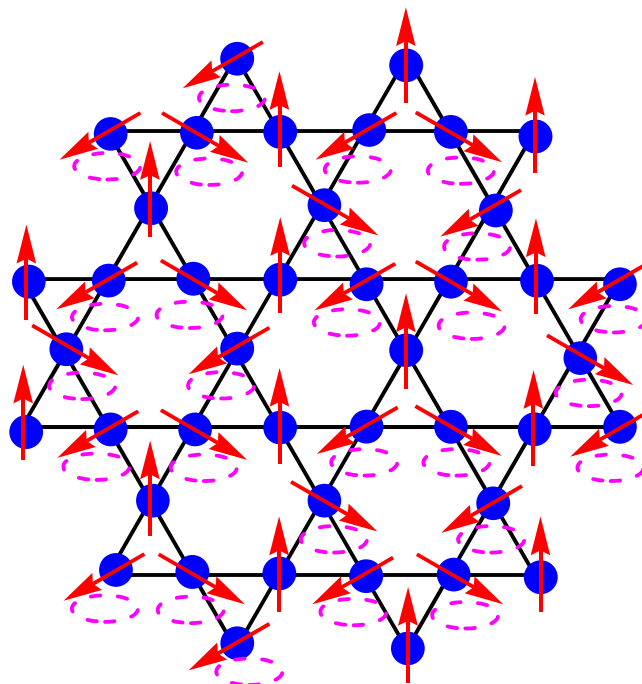


Fig. S3 Temperature dependence of ac susceptibility at various frequencies from from 2-20 K.



Scheme 3S. One possible ground-state configuration in Kagomé lattice, where the spins on a hexagon can be rotated out of the plane about the dotted ellipse without changing the energy, generating an infinite number of degenerate ground states.⁶

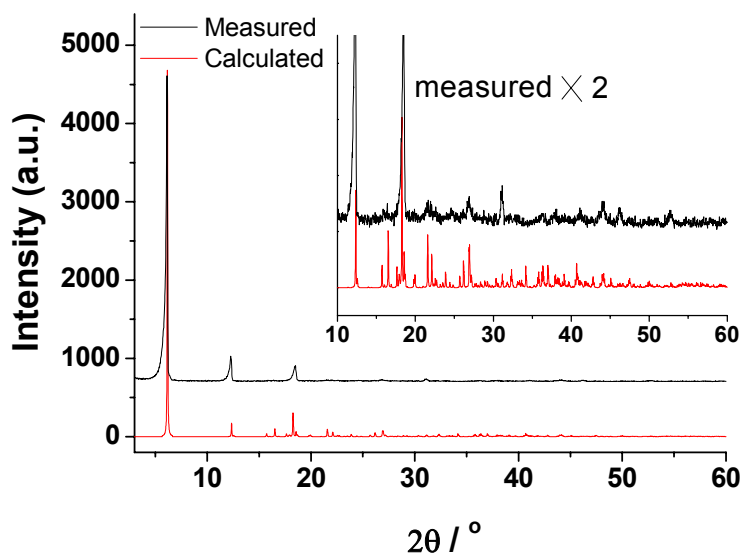


Fig. S4 Measured and calculated X-ray powder diffraction (XRD) pattern of **1** (inset: twice enlarged plot from 10 to 60°).