

Abstract Submitted
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Emergence of the Isotropic Kitaev Honeycomb Lattice with Two dimensional Ising Universality in α -RuCl₃ SEUNG-HWAN DO, Chung-Ang Univ., SANG-YOUN PARK, Max Planck POSTECH, KWANG-YONG CHOI, Chung-Ang Univ., D. JANG, Max Planck, Dresden, T. -H. JANG, Max Planck POSTECH, J. SCHEFER, LNS, PSI, C.-M. WU, J. S. GARDNER, Bragg Institute, ANSTO, J. M.S. PARK, KAERI, J. -H. PARK, SUNGDAE JI, Max Planck POSTECH — The Quantum Spin Liquid(QSL) state is indeed exactly derived by fractionalizing the spin excitation into spinless Majorana fermions in a perfect two-dimensional (2D) honeycomb lattice, so-called Kitaev lattice, and its experimental realization is eagerly being pursued. Here we report the Kitaev lattice stacking with van der Waals (vdW) bonding in a high quality α -RuCl₃ crystal using x-ray and neutron diffractions. Even in absence of apparent monoclinic distortion, the system exhibits antiferromagnetic (AFM) ordering below 6.5 K, likely due to minute magnetic interaction from trigonal distortion and/or interlayer coupling additionally to the Kitaev Hamiltonian. We also demonstrate 2D Ising-like critical behaviors near the Nel temperature in the order parameter and specific heat, capturing the characteristics of short range spin-spin correlations underlying the Kitaev model. Our findings hold promise for unveiling enigmatic physics emerging from the Kitaev QSL.

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