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The realization of Majorana fermions in Kitaev Quantum Spin Lattice SEUNG-HWAN DO, Chung-Ang Univ., SANG-YOUN PARK, Max Plank POSTECH, JUNKI YOSHITAKE, University of Tokyo, JOJI NASU, Tokyo Institute of Technology, YUKITOSHI MOTOME, University of Tokyo, Y. S. KWON, DGIST, D. T. ADROJA, D. VONESHEN, ISIS Facility, RAL, J.-H. PARK, Max Plank POSTECH, KWANG-YONG CHOI, Chung-Ang Univ., SUNGDAE JI, Max Plank POSTECH — The Kitaev honeycomb lattice is envisioned as an ideal host for Majorana fermions that are created out of the spin liquid background. Combining specific heat and neutron scattering experiments with theoretical calculations, here, we establish a hitherto unparalleled spin fractionalization to two species of Majorana fermions in the Kitaev material α-$RuCl_3$. The specific heat data unveil a two-stage release of magnetic entropy by (R/2)ln2 and the T-linear dependence at intermediate temperatures. Our inelastic neutron scattering measurements further corroborate two distinct characters of fractionalized excitations: an Y-like, dispersive, magnetic continuum at higher energies and a dispersionless excitation at low energies around the Brillouin zone center. These dual features are well described by a Ferromagnetic Kitaev model, providing a smoking gun proof of the itinerant and localized Majorana fermions emergent in Kitaev magnets.

Seung-Hwan Do
Chung-Ang Univ.

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