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Low Energy Spectrum of Proximate Kitaev Spin Liquid α -$RuCl_3$ by Terahertz Spectroscopy ARIELLE LITTLE, LIANG WU, Univ of California - Berkeley, PAIGE KELLEY, ARNAB BANERJEE, CRAIG BRIDGES, JIAQIANG YAN, Oak Ridge National Lab, STEPHEN NAGLER, DAVID MANDRUS, Oak Ridge National Lab and Univ of Tennessee, Knoxville, JOSEPH ORENSTEIN, Univ of California - Berkeley and Lawrence Berkeley National Lab — A Quantum Spin Liquid (QSL) is an ultra-quantum state of matter with no ordered ground state. Recently, a route to a QSL identified by Kitaev has received a great deal of attention. The compound α -$RuCl_3$, in which Ru atoms form a honeycomb lattice, has been shown to possess Kitaev exchange interactions, although a smaller Heisenberg interaction exists and leads to a zig-zag antiferromagnetic state below 7 K. Because of proximity to the exactly-solvable Kitaev spin-liquid model, this material is considered a potential host for Majorana-like modes. In this work, we use time-domain terahertz (THz) Spectroscopy to probe the low-energy excitations of α -$RuCl_3$. We observe the emergence of a sharp magnetic spin-wave absorption peak below the AFM ordering temperature at 7 K on top of a broad continuum that persists up to room temperature. Additionally we report the polarization dependence of the THz absorption, which reveals optical birefringence, indicating the presence of large monoclinic domains.

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