

Abstract Submitted  
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**Incommensurate dynamic correlations and continuum scattering in  $\text{BiCu}_2\text{PO}_6$**  KEMP PLUMB, University of Toronto, G.J. SHU, Center for Condensed Matter Sciences, National Taiwan University, G.E. GRANROTH, Quantum Condensed Matter Division, Oak Ridge National Laboratory, A.T. SAVICI, Neutron Data Analysis Division, Oak Ridge National Laboratory, ZAHRA YAMANI, Canadian Neutron Beam Centre, National Research Council, Chalk River Laboratories, M. MATSUDA, Quantum Condensed Matter Division, Oak Ridge National Laboratory, F.C. CHOU, Center for Condensed Matter Sciences, National Taiwan University, YOUNG-JUNE KIM, University of Toronto — We report comprehensive inelastic neutron scattering measurements on single crystals of the frustrated two-leg ladder  $\text{BiCu}_2\text{PO}_6$ , whose ground state is a spin liquid phase with no static magnetic correlations down to 5 K. A combination of triple-axis and time-of-flight experiments were performed to explore magnetic excitations over a broad range of phase space. Operation of the instruments in a high resolution configuration enabled a detailed measurement of the dynamical structure factor over many Brillouin zones; revealing an extremely rich and highly unusual magnetic excitation spectrum. Two branches of steeply dispersing long-lived spin excitations are observed with gaps of 1.90(9) meV and 3.95(8) meV. Significant frustrating next-nearest-neighbor interactions along the ladder-leg drive the minimum of each excitation branch to incommensurate wavevectors  $0.574\pi$  and  $0.553\pi$  for the lower and upper energy branches respectively. Intriguingly, the spin excitations merge into a broad continuum near the top of each excitation band which persists to an upper boundary of 40 meV.

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