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Terahertz excitations in the 1D Ising chain quantum magnet $CoNb_2O_6$[1] CHRISTOPHER M. MORRIS, R. VALDÉS AGUILAR, S. KOOPAYEH, C. BROHOLM, N.P. ARMITAGE, The Institute for Quantum Matter, Department of Physics & Astronomy, The Johns Hopkins University — The one-dimensional magnet $CoNb_2O_6$ was recently demonstrated to be an excellent realization of a one-dimensional quantum Ising spin chain. It has been shown to undergo a quantum phase transition in a magnetic field oriented transverse to its ferromagnetically aligned spin chains. Low energy spin-flip excitations in the chains were recently observed via inelastic neutron scattering.[2] The energy spectrum of these excitations was shown to have a interesting energy scaling governed by symmetries of the E8 exceptional Lie group. Here, time-domain terahertz spectroscopy (TDTS) is used to investigate optically active low energy excitations in $CoNb_2O_6$. We take advantage of the polarization sensitivity of this technique to characterize both electric and magnetic dipole active excitations in this compound. A connection is made from the $q = 0$ response observed here to the excitations observed by neutron scattering. In addition, we will show preliminary data on the terahertz spectra of this material as it undergoes the magnetic field-tuned quantum phase transition.

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[2]R. Coldea, *et al*, Science **327**, 177 (2010)

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