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Inelastic neutron scattering of the itinerant magnets Cr2Te3 and tr-Cr5Te8 ADAM ACZEL, GARRETT GRANROTH, Oak Ridge National Lab, NIRMAL GHIMIRE, University of Tennessee, MICHAEL MCGUIRE, Oak Ridge National Lab, DAVID MANDRUS, University of Tennessee, STEVE NAGLER, Oak Ridge National Lab — Itinerant magnets based on transition metal chalcogenide compounds are of current interest, in part due to their relationship to the parent compounds of Fe-based superconductors. Two particularly interesting systems in this family are the chromium tellurides Cr2Te3 and trigonal (tr) Cr5Te8. These materials crystallize in layered structures with alternating partially and fully-occupied planes of Cr atoms stacked along the c-axis. Magnetization measurements along different crystallographic directions show a net ferromagnetic response and large magnetic anisotropy. In addition, the saturation moments are smaller than predicted by an ionic model; consistent with itinerant behavior. Previous neutron diffraction results for Cr2Te3 revealed an ordered moment of < 0.2 μB in the partially-occupied planes. We examined the magnetic excitations in these materials by powder neutron spectroscopy measurements using the SEQUOIA instrument at the SNS. We find similar moment sizes for the magnetic Cr atoms of both systems. However, despite their similar crystal structures, ordered moment sizes, and chemical compositions, their magnetic excitation spectra are strikingly different. We compare our data to the predictions of various models in an effort to determine the relevant exchange parameters, put constraints on their magnitudes, and understand the differences between the inelastic magnetic spectra. We find that exchange along the c-direction is critical to explain our data.

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