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Magnetic Correlations in the Quasi-2D Semiconducting Ferromagnet $CrSiTe_3$ TRAVIS WILLIAMS, ADAM ACZEL, MARK LUMSDEN, STEVE NAGLER, MATT STONE, JIANQIANG YAN, Oak Ridge National Laboratory, DAVID MANDRUS, University of Tennessee — The quasi-two-dimensional, semiconducting ferromagnet $CrSiTe_3$ is a particularly attractive candidate for spintronics applications due its relatively accessible transition temperature and large magnetic moment. In this study, we use neutron scattering to measure the static and dynamic magnetic properties. Neutron diffraction shows 3D ordering below T_C=33K, but two dimensional static correlations persist up to at least 300K. The inelastic neutron scattering data shows two distinct spin wave bands, which are nearly dispersionless along the c-axis. The exchange constants extracted from the data suggest that the spins are very nearly Heisenberg, but only weakly coupled perpendicular to the 2D planes. Above the Curie temperature, the spin wave intensity decreases drastically but, like the static correlations, these dynamic magnetic correlations persist within the 2D planes up to room temperature.

Travis Williams
Oak Ridge National Laboratory

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