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CrSb₂ is a S=1 Quasi-one-Dimensional Antiferromagnet
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DAVID MANDRUS, DAVID SINGH, Oak Ridge National Laboratory — First principle calculations have predicted the existence of a quasi-one-dimensional antiferromagnet in the intermetallic compound CrSb₂ (S=1). This is unexpected given that most low-dimensional magnets rely on anisotropies in crystal structure or bonding to produce the anisotropic exchange constants which ultimately lead to their low-dimensionality. We present inelastic neutron scattering measurements of single-crystal samples of CrSb₂ which verify the existence of quasi-one-dimensional magnetism in this compound. Triple-axis and time-of-flight spectrometer measurements indicate a single spin-wave branch in all the three reciprocal space directions. The bandwidth of this excitation is only 25 meV along the H and K directions, but approximately 50 meV along the L reciprocal space direction. This corresponds to quasi-one-dimensional excitations propagating along the crystalline c-axis. These measurements provide the first conclusive evidence of a quasi-one-dimensional intermetallic antiferromagnet.

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