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Coherent spin-wave excitations in antiferromagnetic Weyl semimetal candidates Mn_3(Sn,Ge)[1] GUY MARCUS, JONAS KINDERVATER, IQM at JHU, MUHAMMAD IKHLAS, NAOKI KIYOHARA, AGUSTINUS A. NUGROHO, SATORU NAKATSUJI, ISSP at U Tokyo, MINORU SODA, TAKATSUGU MASUDA, ISSP at U Tokyo and NSS-MLF at JPARC, MATTHEW B. STONE, Quantum Condensed Matter Divison at ORNL, COLLIN L. BROHOLM, IQM at JHU and Quantum Condensed Matter Divison at ORNL — Multiple theoretical proposals have identified Mn_3X (with X=Sn,Ge) as type-II Weyl semimetals (WSMs). While strong experimental evidence also exists for other WSMs, information regarding magnetic excitations in any of these materials remains lacking. To this end, we present high-resolution neutron scattering measurements of coherent spinwaves in the metallic Mn_3X. Linearly dispersive modes present with bandwidths exceeding 80 meV, approaching the scale of electronic excitations. They are gapped as much as 5 meV, also an important temperature scale ($\sim$50 K) in transport measurements. Mn_3Sn is distinguished by branches arising from incommensurate Bragg locations. The small transverse width of the observed modes is typically associated with localized magnetic moments, contrary to both the itineracy indicated by transport measurements and our generic understanding of d-band magnetism. In an attempt to make sense of this discrepancy and as a first step towards identifying any anomalous magnetic scattering, we compare our results to first principle calculations and linear spinwave theory.

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