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Block magnetic excitations in the orbitally-selective Mott insulator $BaFe_2Se_3$[1] M. MOURIGAL, Johns Hopkins University and Georgia Institute of Technology, SHAN WU, Johns Hopkins University, M.B. STONE, Oak Ridge National Laboratory, J.R. NEILSON, Johns Hopkins University and Colorado State University, J.M. CARON, Johns Hopkins University and Cornell University, T.M. MCQUEEN, Johns Hopkins University, C.L. BROHOLM, Johns Hopkins University and Oak Ridge National Laboratory — We investigate the spectrum of magnetic excitations in the Fe-based two-leg ladder material $BaFe_2Se_3$ by means of broad-band inelastic neutron scattering. $BaFe_2Se_3$ garnered recent attention due to its quasi-1D structure and as hosting an exotic block magnetic ground-state where 4 Fe spins co-align to form Fe_4 plaquettes. Our neutron results provide a detailed understanding of magnetic excitations originating from the Fe_4 block ground-state. Consisting of a 50 meV wide band of quasi-1D acoustic spin-waves and three high-energy modes around 100 meV and 200 meV, the spin fluctuations and the static moment carry a total squared magnetic moment of 16 μ_B^2 per Fe, indicative of orbital selectiveness for localized spins. We develop an effective Heisenberg model that accounts for the observed spectrum and provides a set of exchange interactions to understand how exotic magnetism stems from strong lattice, orbital and electronic correlations in iron chalcogenides.

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