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High Energy Spin Waves in CaFe2As2 Single Crystals SOULEYMANE DIALLO, VLADIMIR ANTROPOV, Ames Laboratory, COLLIN BROHOLM, Johns Hopkins University, TOBY PERRING, ISIS Neutron Facility, SERGEY BUD'KO, Ames Laboratory, NI NI, Iowa State University, PAUL CANFIELD, Ames Laboratory, ANDREAS KREYSSIG, kreyssig@ameslab.gov, ALAN GOLDMAN, ROBERT MCQUEENEY, Ames Laboratory — We present neutron scattering measurements of the magnetic excitations in single crystals of antiferromagnetic ordered CaFe2As2 (TN = 172 K), the parent compound of the newly discovered iron-arsenide based superconductors. The data reveals steeply dispersive and well-defined spin waves up to an energy of approximately 120 meV. The data below 120 meV can be fit to a Heisenberg model consisting of nearest-neighbor interactions (J1a, J1b and J1c) and next-nearest neighbor interaction (J2), yielding constraining values on the magnetic exchange coupling constants. Above 120 meV, the excitations appear weaker or strongly damped. Ab-initio calculations of the dynamic magnetic susceptibility show that the high energy behavior arises from the damping of itinerant spin waves by particle-hole excitations.

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