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Magnon breakdown in a two dimensional triangular Heisenberg antiferromagnet $LuMnO_3$ JOOSUNG OH, MANH-DUC LE, JAEHONG JEONG, JE-GEUN PARK, Center for Correlated Electron Systems, Institute for Basic Science (IBS), JUNG-HYUN LEE, WAN-YOUNG SONG, Department of Physics, Sungkyunkwan University, T.G. PERRING, HYUNGJE WOO, ISIS Facility, STFC Rutherford Appleton Laboratory, W.J.L. BUYERS, Chalk River Laboratories, National Research Council, S-W. CHEONG, Rutgers Center for Emergent Materials and Department of Physics and Astronomy — Magnons, the quasiparticles of long range ordered magnetic systems, have long been viewed as long lived excitations with spectra that are well described by linear spin wave theory (LSWT). Recent theoretical works, though, suggest that the magnon spectrum of 2D triangular Heisenberg antiferromagnet (THA) is highly renormalized downward with a roton-like minimum at the M point. This, as well as the decay of single magnons into two magnon states, was interpreted as the effects of a cubic interaction between magnons arising from the noncollinear spin structure $LuMnO_3$ is a good 2D THA candidate to test this prediction since it has a noncollinear 120° spin structure with S=2. We have conducted inelastic neutron scattering experiments using a $LuMnO_3$ single crystal. Much of the observed spectrum is well described by LSWT, but, a closer inspection of the M point show deviations: a minimum at the lowest energy mode, a flat dispersion at upper modes and line width broadening at the top of the dispersion due to magnon decay. These features agree qualitatively with the theoretical predictions, revealing the importance of the cubic interaction between magnons in 2D THA

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