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Giant magnon-phonon coupling in LiCrO2 SNDOR TTH, Paul Scherrer Institut, Laboratory for Neutron Scattering and Imaging, KATHARINA ROLFS, Paul Scherrer Institut, Laboratory for Scientific Developments and Novel Materials, BJRN WEHINGER, University of Geneva, Department of Quantum Matter Physics, TURAN BIROL, Rutgers University Department of Physics and Astronomy, UWE STUHR, Paul Scherrer Institut, Laboratory for Neutron Scattering and Imaging, BJRN FK, Institut Laue Langevin, KENTA KIMURA, Osaka University, Department of Materials Engineering Science, HIROSHI TAKATSU, Tokyo Metropolitan University, Department of Physics, CHRISTIAN REGG, Paul Scherrer Institut, Laboratory for Neutron Scattering and Imaging — The study of low dimensional and frustrated quantum magnets has been a central problem in condensed matter physics over the past decades. The main feature of frustrated magnets is the macroscopic degeneracy of the ground state that can be lifted by weak additional effects such as quantum fluctuations. This can lead to new exotic ground states without long-range order and novel excitations. Here we present an example, $LiCrO_2$, where frustration (and electronic properties) leads to strong coupling between magnons and phonons in a triangular lattice antiferromagnet. This coupling leads to a novel magnon dispersion with a roton minima at the zone boundary [1]. We show direct evidence using inelastic neutron and X-ray scattering that the roton is the direct result of the magnon-phonon coupling. Furthermore the discovered effect could shed light on the underlying physics of other Cr^{3+} compounds with strange properties, such as the observed flat magnetic modes in the pyrochlore lattice antiferromagnet $MgCr_2O_4$. [1] S. Toth, et al., PRL 109, 127203 (2012).

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