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ESR modes in a Strong-Leg Ladder in the Tomonaga-Luttinger Liquid Phase[1] S. ZVYAGIN, HLD-HZDR, D-01328 Dresden, Germany, M. OZEROV, Radboud University, 6525 ED Nijmegen, The Netherlands, M. MAKSYMENKO, Weizmann Institute of Science, Rehovot 76100, Israel, J. WOSNITZA, HLD-HZDR, D-01328 Dresden, Germany, A. HONECKER, Université de Cergy-Pontoise, F-95302 Cergy-Pontoise Cedex, France, C.P. LANDEE, M. TURNBULL, Clark University, Worcester, MA 01060, USA, S.C. FURUYA, T. GIAMARCHI, University of Geneva, CH-1211 Geneva, Switzerland — Magnetic excitations in the strong-leg quantum spin ladder compound $(C_7H_{10}N)_2CuBr_4$ (known as DIMPY) in the field-induced Tomonaga-Luttinger spin liquid phase are studied by means of high-field electron spin resonance (ESR) spectroscopy. The presence of a gapped ESR mode with unusual non-linear frequency-field dependence is revealed experimentally. Using a combination of analytic and exact diagonalization methods, we compute the dynamical structure factor and identify this mode with longitudinal excitations in the antisymmetric channel. We argue that these excitations constitute a fingerprint of the spin dynamics in a strong-leg spin-1/2 Heisenberg antiferromagnetic ladder and owe its ESR observability to the uniform Dzyaloshinskii-Moriya interaction.

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Sergei Zvyagin
HLD-HZDR, D-01328 Dresden, Germany

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