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Field-induced Tomonaga-Luttinger liquid phase of a two-leg spin-1/2 ladder with strong leg interactions[1] TAO HONG, Oak Ridge National Laboratory, Y.H. KIM, University of Florida, C. HOTTA, Kyoto Sangyo University, Y. TAKANO, University of Florida, G. TREMELLING, M.M. TURNBULL, C.P. LANDEE, Clark University, H.-J. KANG, National Institute of Standards and Technology, N.B. CHRISTENSEN, ETH Zurich and Paul Scherrer Institute, K. LEFMANN, University of Copenhagen, K.P. SCHMIDT, G.S. UHRIG, TU Dortmund, C. BROHOLM, The Johns Hopkins University — We study the magnetic-field-induced quantum phase transition from a gapped quantum phase that has no magnetic long-range order into a gapless phase in the spin-1/2 ladder compound bis(2,3-dimethylpyridinium) tetrabromocuprate (DIMPY) [1]. At temperatures below about 1 K, the specific heat in the gapless phase attains an asymptotic linear temperature dependence, characteristic of a Tomonaga-Luttinger liquid. Inelastic neutron scattering and the specific heat measurements in both phases are in good agreement with theoretical calculations, demonstrating that DIMPY is the first model material for an $S = 1/2$ two-leg spin ladder in the strong-leg regime.

[1] T. Hong et al., Phys. Rev. Lett. 105, 137207 (2010)

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