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Magnetic anisotropy in the frustrated spin-ladder system BiCu_2PO_6 from magnetostriction in pulsed fields ATSUKO UCHIDA, YOSHIMITSU KOHAMA, MPA-CMMS, Los Alamos National Laboratory, USA, SHUANG WANG, Laboratory for Quantum Magnetism, Ecole Polytechnique Federale de Lausanne, Ch-1015 Lausanne, Switzerland Laboratory for Developments and Methods, Pau, MARCELO JAIME, MPA-CMMS, Los Alamos National Laboratory, USA, CHRISTIAN RÜEGG, Laboratory for Neutron Scattering, Paul Scherrer Institute, CH-5232 Villigen, Switzerland — The spin interactions in BiCu_2PO_6 have been studied by inelastic neutron scattering, magnetic susceptibility, and numerical calculation. There is strong frustration between magnetic interactions along the ladder leg, J_{Leg} and J_{NNN} , and it has been pointed out that a spin gap persists in this frustrated system. Both J_{leg} and J_{NNN} are intra-ladder and two-leg ladder is always gapped. Longitudinal magnetostriction (MS) measurements were performed using a fiber optic strain gauge in a 60 T pulsed magnet [1]. Specific heat (C_p) and magnetocaloric effect (MCE) measurements were performed in a 35 T DC magnet. C_p vs T was obtained using both a thermal relaxation time and dual slope techniques. We have in this way determined the (H,T) phase diagram of BiCu_2PO_6 up to 45 T. The 3D character of phase transitions is suggested by the observation of sharp anomalies in CM and $\Delta L/L$. Our MCE and MS data provides direct evidence of first-order phase transitions for H//c, while phase transitions for H//a and H//b are characterized as second-order phase transitions. The anisotropic and complex phase boundaries will be discussed.

[1] Daou R et al., *Rev. Sci. Instrum.* **81**, 033909 (2010).

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