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Anisotropy-driven magnetic anomalies in $\mathbf{Pr_{1-x}Sr_xCoO_3}$[1] CHRIS LEIGHTON, DOUG STAUFFER, JING WU, University of Minnesota, QING HUANG, JEFF LYNN, BRIAN TOBY, NIST, JOHN MITCHELL, Argonne National Lab — Interest in the perovskite cobaltites has been growing steadily due to the intriguing phenomena they exhibit. It is well known that the availability of various Co ion spin states in the cobaltites provides an additional degree of freedom in comparison to the manganites. In this work we demonstrate that the cobaltites also possess another factor of considerable importance not present in the manganites – large magnetocrystalline anisotropy. As previously reported [Mahendiran et al PRB 68 024427 (2003)] at x $>$ 0.30 $Pr_{1-x}Sr_xCoO_3$ displays an additional anomaly below the Curie temperature, where the magnetization can dramatically increase or decrease depending on applied field. We demonstrate here, using magnetometry, transport, heat capacity, and neutron diffraction, that this results from a structural phase transition from a low symmetry to higher symmetry (tetragonal) phase on reducing T. Although the Co moment is unaffected, a sharp change in the magnetocrystalline anisotropy takes place and is reflected in the hysteresis loop shape, coercivity, and remnance. The complex and puzzling behavior of the field dependence of the magnetization vs. T curves is then simply explained by the T dependent variations in hysteresis loop shape.

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