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Small dissimilarity in lattice distortion triggers anomalously large anisotropic magnetoresistance in manganite perovskite.[1] R. LI, Ningbo Institute of Materials Technology and Engineering, CAS, China, H. WANG, X.Z. WANG, Y. MATSUI, National Institute for Materials Science, Tsukuba, Japan, X. WANG, Florida International University, Miami, FL 33199, Z. CHENG, B. SHEN, Institute of Physics, CAS, Beijing 100080, China, E.W. PLUMMER, JIANDI ZHANG, Department of Physics and Astronomy, Louisiana State University, Baton Rouge, LA 70803 — Anisotropic magnetoresistance (AMR) effects are of fundamental importance not only for providing information on spin-orbital coupling and magneto-crystalline anisotropy, but also for enabling technological applications. Here, we report an anomalous AMR effect in a prototype manganite single crystal—$La_{0.69}Ca_{0.31}MnO_3$. We demonstrate that the broken symmetry, through cubic to orthorhombic structural distortion in the crystal, leads to profound anisotropic magneto-transport behavior. The measured AMR behavior shows a direct correlation with the anisotropic field-tuned metal-insulator transition (MIT) in the system and can be understood via a phenomenological uniaxial anisotropy model. It is revealed that a small crystalline anisotropy can trigger a large AMR near the MIT phase boundary of the system.

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