Abstract Submitted
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Large thermal Hall effect in a frustrated pyrochlore magnet[1] MAX HIRSCHBERGER, Department of Physics, Princeton University, JASON KRIZAN, ROBERT J. CAVA, Department of Chemistry, Princeton University, N. PHUAN ONG, Department of Phsyics, Princeton University — In frustrated magnetism, the nature of the ground state and its elementary excitations are a matter of considerable debate. We present a detailed study of the full thermal conductivity tensor κ_{ij}, including the Righi-Leduc (or thermal Hall) effect, in single crystals of the frustrated quantum spin-ice pyrochlore $Tb_2Ti_2O_7$. The off-diagonal response κ_{xy}/T is large in this insulating material, despite the absence of itinerant electrons experiencing the Lorentz force. Our experiments over the temperature range of $0.8 - 200\,\mathrm{K}$ and in fields up to $14\,\mathrm{T}$ reveal a remarkable phenomenology: A sizeable field-linear Hall effect κ_{xy}/T is observed below $100\,\mathrm{K}$, and its slope with respect to magnetic field increases strongly as we cool the sample. We observe significant curvature in the field dependence of κ_{xy}/T below $15\,\mathrm{K}$. At the lowest temperatures, both κ_{xx}/T and the initial slope $\lim_{B\to 0}[\kappa_{xy}/TB]$ are constant in temperature, behavior reminiscent of fermionic heat conduction in dirty metals. Experimental methods and verification of the intrinsic nature of the effect will be discussed.

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