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Magnetotransport of surface states in HfNiSn single crystals[1] LUCIA STEINKE, Texas AM Univ, JEDEDIAH J. KISTNER-MORRIS, Stony Brook Univ, HUA HE, SHELBY ZELLMAN, Texas AM Univ, TIMOTHY F. LOVORN, ALLAN H. MACDONALD, UT Austin, MEIGAN C. ARONSON, Texas AM Univ
— The large family of half-Heusler compounds hosts a number of topological insulator materials and potential topological superconductors, making these compounds interesting candidates to study physical phenomena on the verge of a topological phase transition. Here we present first magnetotransport measurements on high-quality single crystals of HfNiSn, which according to density functional theory calculations is a nonmagnetic, topologically trivial semiconductor without a bulk band inversion. Our samples show unconventional transport properties already at moderately low temperatures $T < 200$ K. Instead of the thermal carrier freeze-out expected for a bulk semiconductor, electrical conduction in HfNiSn is increasingly dominated by metallic surface states, with a saturation of the longitudinal resistance and highly nonlocal transport. X-ray diffraction shows no structural transitions that could potentially lead to anisotropic conduction in this temperature regime. Magnetoresistance measurements are consistent with weak anti-localization, a signature of low-dimensional transport in a system with strong spin-orbit coupling. Nonlinearities in $I(V)$ curves at low temperatures suggest a possible role of electronic correlations.

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