Surface conductance and one-dimensional edge state transport in topological Kondo insulator SmB$_6$\textsuperscript{1}

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The Kondo insulator compound SmB$_6$, with hybridization between itinerant conduction electrons and localized $f$-electrons driving an insulating gap and metallic surface states at low temperatures, is an ideal candidate for realizing the topological Kondo insulator state. By exploiting the presence of a time reversal symmetry breaking surface ferromagnetic state, we investigate the topological nature of metallic surface states, finding evidence of one-dimensional surface transport with conductance values approaching the quantized value of $e^2/h$ and originating from the chiral edge channels of ferromagnetic domain walls. We will review our milliKelvin magnetotransport measurements of the edge state transport phenomenon in SmB$_6$, as well as thickness and surface gating studies that conclusively prove the surface nature of low temperature conductance.

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