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Precise Quantization of Anomalous Hall Effect

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In the quantum anomalous Hall effect, electron transport in a magnetically-doped topological insulator takes place through chiral, dissipationless edge channels. In this talk, we discuss the behavior of a nearly ideal implementations of the effect in which the Hall resistance is within a part per 10,000 of its quantized value and the longitudinal resistivity can reach below 1 Ω per square. Nearly all Cr-doped topological insulator samples demonstrate extreme temperature dependence that is well-modeled by a small effective gap, allowing control over quantization with an unexpected magnetocaloric effect. We also discuss measurements of new device geometries and non-local resistances that identify the sources of dissipation that limit the effect.

[1](Now at Rigetti Computing)