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Current noise in the edge states of InAs/GaSb quantum well interfaces.[1] LOAH STEVENS, PAVLO ZOLOTAVIN, TINGXIN LI, RUI-RUI DU, DOUGLAS NATELSON, Rice Univ — We present an investigation of current noise in the edge states of InAs/GaSb quantum wells using a broadband RF measurement approach. In these systems, a hybridization of the bound quantum well states at the interface of InAs and GaSb layer can open a gap in the spectrum of the bulk 2d electron gas, such that only topologically protected 1d edge states are available to contribute to charge transport. In preliminary measurements of a 2-terminal edge state device, at temperatures comparable or above the hybridization gap (40-60K), shot noise is linear with bias, as expected for a short diffusive conductor. At lower temperatures the noise power displays an anomalous bias dependence. The noise power is observed to decrease with increasing bias until a threshold bias level is reached, after which, noise magnitude begins to grow. The threshold bias and rate of noise decrease appear to be dependent on device length, temperature, magnetic field, and gate voltage. The leading candidate mechanism behind this phenomenon is the contribution of the silicon dopants, used to quell residual bulk conduction, to generation-recombination noise in the quantum wells. Investigations of structures without such dopants are underway.

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Loah Stevens
Rice Univ

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