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### **Observation of neutral modes via shot noise measurements**

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Current propagates in the quantum Hall regime along the edges of a two-dimensional-electron gas via chiral edge modes, with chirality dictated by the applied magnetic field. In the fractional regime, for some fractional states - the so called “holes-conjugate” states - e.g., between filling factor  $1/2$  and  $1$  - early predictions suggested the presence of counter propagating edge modes: a “downstream” mode with the expected chirality and an “upstream” mode with an opposite chirality. Since experiments in the ubiquitous  $2/3$  state did not find upstream propagating edge modes, it had suggested that in the presence of interactions and disorder edge reconstruction may take place with a resultant downstream charge mode accompanied by upstream neutral mode - with the latter carrying only energy - thus explaining why the upstream modes were not detected thus far. Moreover, a neutral upstream Majorana mode is also expected for selected wavefunctions proposed for the even denominator state  $5/2$ . I will review some of our observations of neutral modes in selected quantum Hall states. Neutral mode detection was performed by allowing a chiral mode to impinge on a quantum point contact (QPC) constriction. The partitioning of the neutral mode led to current fluctuations propagating in the downstream chirality. The main following effects that were observed were: (a) Current noise, being proportional to the applied voltage on the injecting contact, without net current; (b) Similarly, partitioning charge current in a QPC led to generation of an upstream neutral mode; (c) The neutral mode decays fast with length and temperature; (d) Having a neutral mode impinge simultaneously with a charge mode affects strongly the Fano factor and the temperature of the partitioned charged quasiparticles; (e) For the  $5/2$  fractional state, our observation of an upstream neutral mode is likely to single out the proposed reconstructed Pfaffian or anti-Pfaffian wavefunctions for non-abelian quasiparticles.