Conductance plateaus and shot noise in fractional quantum Hall point contacts

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Abstract

Quantum point contact (QPC) devices provide useful tools for probing the edge structure of the fractional quantum Hall (FQH) states. Recent observations of quantized conductance plateaus accompanied by shot noise in such devices call for theoretical explanations. Here we develop a theory of FQH edge state transport through a QPC. We model the QPC as a low-density constriction with a filling factor lower than that of the bulk. We show that the conductance plateaus are pronounced whenever the edge modes at the QPC are fully equilibrated. The shot noise generated on the plateaus has distinct characteristics in the size of the QPC and the size of the full device, depending on nature of charge and heat transport. We also discuss the recent experimental observations of Half-integer conductance plateaus.

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