Interactions in Electronic Mach-Zehnder Interferometers with Copropagating Edge Channels

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We study Coulomb interactions in the finite bias response of Mach-Zehnder interferometers, which exploit copropagating edge states in the integer quantum Hall effect. Here, interactions are particularly important since the coherent coupling of edge channels is due to a resonant mechanism that is spoiled by inelastic processes. We find that interactions yield a saturation, as a function of bias voltage, of the period-averaged interferometer current, which gives rise to unusual features, such as negative differential conductance, enhancement of the visibility of the current, and nonbounded or even diverging visibility of the differential conductance.

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