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Tailoring Fabry-Perot Interferometers for Fragile Fractional Quantum Hall States[1] DOUGLAS MCCLURE, PATRICK GALLAGHER, CHARLES MARCUS, Harvard University, LOREN PFEIFFER, KEN WEST, Princeton University — Depending on the relevance of Coulomb interactions, electronic Fabry-Perot interferometers can exhibit two qualitatively different types of interference, each of which can shed light on the unique physics of quantum Hall systems. Long observed in the integer quantum Hall (IQH) regime, the so-called "Coulomb-dominated" interference has only recently been confirmed in the fractional quantum Hall (FQH) regime, where its observation has remained limited to the simplest and most robust FQH states. Building on our recent observation and analysis of this type of interference at several fractional filling factors, we report on interferometer design improvements yielding greater visibility, most notably for weaker FQH states. We find that parameters such as the distance from the gates defining the interferometer to the 2DEG, gate layout, and wafer structure affect the visibility much more in the FQH regime than in the IQH regime. High sensitivity to such parameters is also a characteristic of the second type of interference, believed to arise from a pure Aharonov-Bohm effect, which has been clearly observed only in the IQH regime; we discuss efforts to observe this behavior in the FQH regime.

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Douglas McClure
Harvard University

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