Thermal Dephasing in the Laughlin Quasiparticle Interferometer
F.E. CAMINO, WEI ZHOU, V.J. GOLDMAN, Stony Brook University — We report experiments on thermal dephasing of the Aharonov-Bohm oscillations in the novel Laughlin quasiparticle (LQP) interferometer, [1] where quasiparticles of the 1/3 FQH fluid execute a closed path around an island of the 2/5 fluid. In the $10.2 \leq T \leq 141$ mK temperature range, qualitatively, the experimental results follow a thermal dephasing dependence expected for an electron interferometer, and show clear distinction from the activated behavior observed in resonant tunneling and Coulomb blockade devices, both in the chiral Luttinger liquid ($\chi_{LL}$) and the Fermi liquid regimes. The data fit very well the $\chi_{LL}$ dependence predicted for a $g = 1/3$ two point-contact LQP interferometer. [2] The fit yields a value of the chiral edge excitation velocity, $u = 1.4 \times 10^4$ m/s obtained for the first time for a continuous FQH edge excitation spectrum. The small deviation from the zero-bias theory seen below 20 mK indicates yet unrecognized source of experimental decoherence, not included in theory.


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