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Quantum Oscillations and the $\nu = 5/2$ Fractional Quantum Hall State in Mesoscopic Quantum Hall Interferometers[1]

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Magnetotransport study of mesoscopic quantum Hall corrals fabricated from a high mobility GaAs/AlGaAs quantum well structure will be presented. Prominent Aharonov-Bohm-like quantum oscillations are observed at magnetic fields just below even integer quantum Hall plateaus at low temperatures. We establish the fundamental flux period of these oscillations as Φ_0/f, where Φ_0 is the universal flux quantum and f is the integer number of fully filled Landau levels. The flux period of the observed quantum oscillations thus fundamentally differs from that of Aharonov-Bohm effect which has a period of one flux quantum, Φ_0. The observed quantum oscillations in the quantum Hall corrals can be understood within the Coulomb blockade model of quantum Hall interferometers [1] as forward tunneling and backscattering, respectively, through the center island of the corral from the bulk and the edge states. In the second Landau level, we observe an extended series of oscillations with flux period of $\Phi_0/2$. The Aharonov-Bohm-Like oscillations are found to coexist with the $\nu = 5/2$ fractional quantum Hall effect. We detail the transport properties of the $\nu = 5/2$ fractional quantum Hall state and the mesoscopic quantum Hall corral in the second Landau level.

[1] R. Rosenow and B.I. Halperin, Phys. Rev. Lett. **98**, 106801 (2007).

[1]Collaboration with H. Choi, M.D. Godfrey, P. Jiang, S.H. Simon, K.W. Baldwin, L.N. Pfeiffer, and K.W. West; supported by the Microsoft Project Q