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Aharonov-Bohm oscillations due to ballistic closed trajectories in elliptic self-focusing geometries YUANTAO XIE, J. J. HEREMANS, Virginia Tech, S. VIJEYARAGUNATHAN, T. D. MISHIMA, M. B. SANTOS, The University of Oklahoma, Homer L. Dodge Dept. of Physics and Astronomy — An array of elliptic stadia is defined on an InGaAs quantum well with electron mean free path ˜3 micron at 0.38 K, such that ballistic phase coherent transport prevails. In the structure, classical trajectories starting at one focus will after reflection from the elliptic potential wall pass through the other focus, and then back to the starting focus, generating classical closed orbits with lengths comparable to the mean free path, assuming just two elastic specular scattering events. In perpendicular magnetic fields the magnetoresistance at 0.38 K and 1.2 K shows Aharonov-Bohm oscillations due to quantum interference over the closed trajectories, with h/e periodicity corresponding to the area enclosed by the trajectories. Fourier spectra of the magnetoresistance reveal two peaks, consistent with numeric simulations showing two stable classical trajectories under a wide range of magnetic fields. Ballistic Altshuler-Aronov-Spivak oscillations due to time-reversed trajectories appear absent in the array, likely suppressed by time reversal symmetry breaking due to the local magnetic field at the electron paths at higher fields, and masked by antilocalization from other closed orbits at lower fields (DOE DE-FG02-08ER46532 and NSF DMR-1207537).

Yuantao Xie
Virginia Tech

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