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Antidot lattice in AlAs 2D electron system: Electron pinball with elliptical Fermi contours OKI GUNAWAN, YAKOV SHKOLNIKOV, EMANUEL TUTUC, KAMRAN VAKILI, MANSOUR SHAYEGAN, Princeton University, SHAYEGAN GROUP PRINCETON TEAM — We report ballistic transport experiments in AlAs quantum well antidot lattices with isotropic periods ranging from $0.6 \mu\text{m}$ to $1.5 \mu\text{m}$. In this system two conduction-band valleys with in-plane elliptical Fermi contours are occupied. The magnetoresistance exhibits two clear peaks associated with classical commensurability of the electron orbits of these two valleys with the antidot lattice. By analyzing the density dependence of these peaks, we extract an anisotropy ratio for the longitudinal and transverse effective mass of 5.3 ± 0.6 . Our experiment demonstrates ballistic transport in an antidot lattice for a 2D electron system with elliptical Fermi contours, and allows for a direct determination of the mass anisotropy.

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