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Geometric Resonance in Triangular or Honeycomb Lattices Patterned on Very High-Mobility Quantum Wells[1] YANHUA DAI, R.R. DU, Rice University, L.N. PFEIFFER, K.W. WEST, Princeton University — In our studies of microwave-induced zero-resistance states, we introduce spatial modulation in the 2D electron system by patterning the Hall bar samples with antidot lattices. Our samples are high-mobility GaAs/AlGaAs quantum wells with electron densities (3- 6) x $10^{11}/cm^2$ and mobilities $>$ 9 x 10^6 cm^2/Vs. The antidot lattices (triangular or honeycomb) which have a lattice constant between 3 and 10 μm and a dot diameter between 0. 4 and 2 μm were patterned with e-beam lithography. Our low temperature (300 mK) magnetotransport measurements reveal exceptionally sharp geometric resonances (GR) in R_{xx} up to 8th order in these samples, with the even-peaks commonly stronger than the odd-peaks. The data cannot be explained satisfactorily by the model of localization of pinned orbits. In particular, our data indicate that in the very high-mobility samples, the primary GR peaks are related to the Zener tunneling between electron Landau orbits as their diameter approaches the lattice constant. Ref. Z. Q. Yuan et al, Phys. Rev. B 74, 075313(2006).

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Yanhua Dai
Rice University

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