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Experimental studies of low-field Landau quantization in two-dimensional GaAs electron systems D.R. HANG, National Sun Yat-sen University, H.D. YEH, CMS/ITRI, Y.W. ZHANG, National Sun Yat-sen University, J.C. HSIAO, H.L. PANG, C.F. HUANG, CMS/ITRI, 1INSTITUTE OF MATERIALS SCIENCE AND ENGINEERING, NATIONAL SUN YAT-SEN UNIVERSITY, KAOHSIUNG 804, TA TEAM, DEPARTMENT OF MATERIALS SCIENCE AND OPTOELECTRONIC ENGINEERING, NATIONAL SUN YAT-SEN UNIVERSITY, KAO TEAM, NATIONAL MEASUREMENT LABORATORY, CENTER FOR MEASUREMENT STANDARDS, INDUSTRIAL TECHNOLOGY RESEARCH IN TEAM — We studied effects of low-field Landau quantization in two-dimensional systems by applying a magnetic field B perpendicular to GaAs electron systems. With increasing B, Shubnikov-de Haas (SdH) oscillations appear in the longitudinal resistivity ρ_{xx} before the appearance of the quantum Hall effect (QHE). Universal properties based on the modular symmetry become invalid at low B, where we should consider SdH theory, low-field localization, and quantum diffusion model. The crossover from SdH oscillations to the QHE is studied by sweeping B and changing the temperature T. By investigating the peak values of the longitudinal resistivity ρ_{xx}^{pk}, it is shown that we shall consider the refinement to the theory for the low-field Landau quantization.

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