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Landau-level mixing, floating-up extended states, and scaling behavior in a GaAs-based two-dimensional electron system containing self-assembled InAs dots[1] CHI-TE LIANG, CHIEH-WEN LIU, CHIEH-I LIU, Graduate Institute of Applied Physics, National Taiwan University, Taipei, Taiwan 106, R.O.C., GIL-HO KIM, Sungkyunkwan University, Korea, C. F. HUANG, 2nd Patent Division, Intellectual Property Office, Ministry of Economic Affairs, Taipei, Taiwan 106, R.O.C., DA-REN HANG, Department of Materials and Optoelectronic Science, National Sun Yat-sen University, Kaohsiung, Taiwan 804, R.O.C., D. A. RITCHIE, Cavendish Laboratory, University of Cambridge, United Kingdom — Temperature-driven flow lines corresponding to Landau level filling factor $\nu = 2 \sim 4$ were studied in the $\sigma_{xx} - \sigma_{xy}$ plane in a GaAs-based two-dimensional electron system with self-assembled InAs dots. In the insulator-quantum Hall (I-QH) transition resulting from the floating-up extended states, the flow diagram showed the validity of the scaling and we observed the expected semicircle. On the other hand, the curve $\sigma_{xx}(\sigma_{xy})$ in the low-field insulator demonstrated the existence of Landau-level mixing. By decreasing the effective disorder, we found that such flow lines can leave the I-QH regime and follow the scaling for the plateau transition between $\nu = 4$ and 2. The semicircle in the observed I-QH transition, in fact, originated from the distortion on the plateau-transition curve due to Landau-level mixing. Our study showed the importance of the level-mixing effects to the scaling and semicircle law as the extended states float up.

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