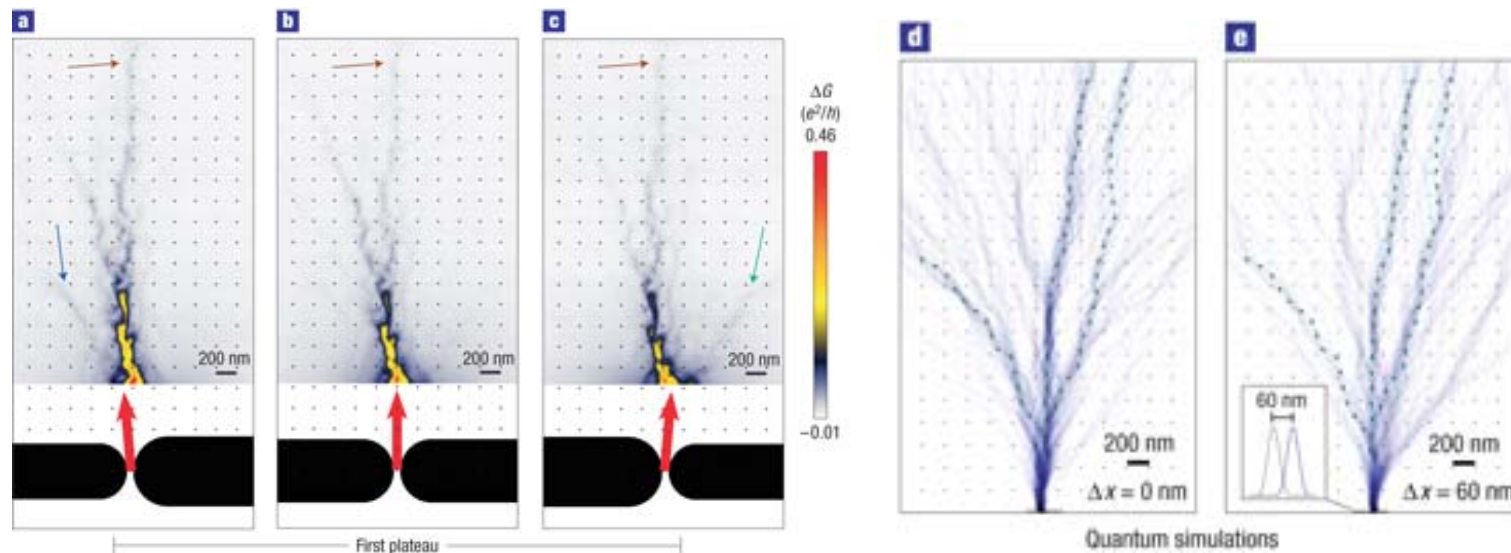


Imaging Electron Flow through Two-Dimensional Electron Gases

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Due in part to their extremely low levels of disorder, GaAs-based two-dimensional electron gases (2DEGs) serve as the basis for fast transistors, prototypes of quantum computing schemes, and research on remarkable electronic states and electrons in nanostructures. Using scanning gate microscopy (SGM) to image electron flow in 2DEGs, we study how disorder affects the microscopic details of electron transport. The images below show the remarkable stability of flow patterns for electrons emanating from a narrow channel as the conditions of injection are varied by electrostatically shifting the injection channel to left or right. (a-c) experimental SGM measurements. Arrows point to paths which recur as injection channel is shifted (d-e) a full quantum simulation shows this same stability -- dashed lines mark paths which recur as injection channel is shifted (classical simulations, not shown, show much less stability).



REFERENCE:

"Unexpected features of branched flow through high-mobility two-dimensional electron gases," M. P. Jura, M. A. Topinka, L. Urban, A. Yazdani, H. Shtrikman, L. N. Pfeiffer, K. W. West and D. Goldhaber-Gordon, Nature Physics, 3, December 2007