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Observation of a periodic structure in quantum rings using Scanning Gate Microscopy F. MARTINS, B. HACKENS, T. OUISSE, J.F. MOTTE, M. STARK, H. SELLIER, J. CHEVRIER, S. HUANT, CNRS, UJF, Grenoble, France, V. BAYOT, CERMIN, UCL Belgium, S. BOLLAERT, X. WALLART, A. CAPPY, IEMN, France — Recent advances in scanning gate microscopies (SGM) have made it possible to image electron flow in nanostructures, using the tip as a moving gate (M.A. Topinka et al., Science 289, 2323 (2000)). Our experiment focuses on quantum rings (QR), patterned from a two-dimensional electron gas (2DEG) buried close to the sample surface (25 nm). We can therefore reach a very small tip-sample distance, thereby improving the imaging resolution. Furthermore, the absence of metallic gates on the top of our sample allows to probe the electron flow directly inside the QR. The SGM images, obtained at 4.2 K, reveal striking periodic oscillations of the resistance along the QR circumference as the tip scans over the sample surface. These oscillations respect the radial symmetry of the QR, and their periodicity is much larger than the Fermi wavelength. We analyze the influence of the tip-induced perturbation on the 2DEG by changing the tip voltage (both in accumulation and depletion regimes) and the tip-sample distance.

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