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Imaging quantum Hall Coulomb islands inside a quantum ring
FREDERICO MARTINS, BENOIT HACKENS, SEBASTIEN FANIEL, VINCENT BAYOT, Universite catholique de Louvain, Louvain-la-Neuve 1348, Belgium, MARCO PALA, MINATEC, Grenoble, France, HERMANN SELLIER, SERGE HUANT, Institut Neel, Grenoble, LUDOVIC DESPLANQUE, XAVIER WALLEART, IEMN, Villeneuve d’Ascq, France — In the quantum Hall regime near integer filling factors, electrons are transmitted through edge states confined at the borders of the device. In mesoscopic samples, however, edge states may be sufficiently close to allow electrons to tunnel, or to be transmitted through localized states (“Coulomb islands”) [1]. Here, we use the biased tip of a low temperature scanning gate microscope to alter tunneling through quantum Hall Coulomb islands localized inside a quantum ring patterned in an InGaAs/InAlAs heterostructure. Simultaneously, we map the quantum ring resistance and observe different sets of concentric resistance fringes, due to charging/discharging of each Coulomb island. Tuning the magnetic field and the tip voltage, we reveal the rich and complex behaviour of these fringes [2].


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