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Localization of Fractionally Charged Quasi-Particles[1]

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In this work we address several outstanding questions pertaining to the microscopic properties of the fractional quantum Hall effect: What is the nature of the particles that participate in the localization but do not contribute to transport and can fractionally charged quasi particles localize in space? Using a scanning single electron transistor we image the individual localized states in the fractional quantum Hall regime and determine the charge of the localizing particles. Highlighting the symmetry between filling factors 1/3 and 2/3, our measurements show that fractionally charged quasi particles localize in space to sub-micron dimensions with e*=e/3, where e is the electron charge. In addition, at filling factors 2/3 we follow the behavior of the fractionally charged localized states through the spin phase transition.

[1]In collaboration with: J. Martin, S. Ilani, B. Verdene, J. Smet, V. Umansky, D. Mahalu, D. Schuh, and G. Abstreiter.