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Real space imaging of quantum hall edge states in graphene YONGTAO CUI, GEORGI DIANKOV, ERIC YUE MA, FRANCOIS AMET, YONGLIANG YANG, MICHAEL KELLY, DAVID GOLDHABER-GORDON, Stanford University, CORY DEAN, The City College of New York, ZHI-XUN SHEN, Stanford University — At integer quantum hall filling factors in a two-dimensional electron gas, electrons in the bulk are localized, while near the edge it remains conductive as energy bands bend and cross the Fermi level. These conductive channels, known as the "edge states," are immune to back scattering, giving rise to quantized resistance values – the hallmark of the quantum hall effect. Here we use microwave impedance microscope to study the quantum hall edge states in graphene devices. Scanning images clearly show dividing regions of insulating bulk and conductive edges. We study the evolution of the edge patterns as the carrier density is tuned through multiple filling factors. Correlation between real space images and transport measurement demonstrates the robustness of the quantum hall effect – even though the real space patterns are strongly affected by disorder, the quantization of resistance is retained due to the topological nature of the edge states.

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