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Imaging coherent transport in mesoscopic graphene[1] JESSE BEREZOVSKY, MARIO BORUNDA, ERIC HELLER, ROBERT WESTERVELT, Harvard University — To understand the coherent flow of electrons through a graphene device, we must employ nanoscale probes that can access the relevant length scales. At low temperatures and small size scales, diffusive trajectories of electrons interfere with each other, resulting in a coherent correction to the conductivity known as universal conductance fluctuations (UCF). Here, we use a liquid-He-cooled scanning probe microscope (SPM) tip to induce an additional, movable scatterer in a graphene device. By scanning the tip over a device, we map the conductance fluctuations vs. scatterer position. We find that the conductance is highly sensitive to the position of this scatterer, producing $\delta G \sim e^2/h$ fluctuations when the scatterer is displaced by a distance comparable to the electron wavelength. These measurements, in combination with numerical simulations, demonstrate the value of this cooled SPM technique to probe coherent transport in graphene.

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