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Scanning Tunneling Spectroscopy of Suspended Graphene in the Quantum Hall Regime NIKOLAI N. KLIMOV, Maryland NanoCenter, UMD / CNST, PML, NIST, MD, SUYONG JUNG, Maryland NanoCenter, UMD / CNST, NIST, MD, GREGORY M. RUTTER, NIKOLAI B. ZHITENEV, CNST, NIST, Gaithersburg, MD, DAVID B. NEWELL, PML, NIST, Gaithersburg, MD, JOSEPH A. STROSCIO, CNST, NIST, Gaithersburg, MD — The discovery of graphene, a unique two-dimensional electron system with extraordinary physical properties, has ignited tremendous research activity in both science and technology. Graphene interactions with a substrate such as, for example, SiO_2/Si are known to strongly limit the electrical performance of graphene devices. Suspended graphene devices, where interaction with substrates can be strongly reduced, have been studied by macroscopic transport measurements and shown to have a 10-fold increase in mobility. However, a detailed investigation on a microscopic scale is still missing. In this talk we present a scanning probe microscopy (SPM) study of a free-standing graphene membrane. The device was fabricated from a graphene flake exfoliated over an array of 1μm holes etched in SiO_2/Si substrate. Electronic spectra of both suspended and supported regions of single-layer graphene can be probed using SPM in a perpendicular magnetic field and in varying back gate voltages applied to the Si substrate. The significant differences found in electronic spectra of suspended and non-suspended graphene will be discussed.

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