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Probing the Electronic Structure of Two-Dimensional Materials in the Quantum Hall Regime with Tunneling Field Effect Transistors[1]
JOHN DAVENPORT, EBERTH QUEZADA, JUN-YAN LIU, Univ of California-Santa Cruz, TAKASHI TANIGUCHI, KENJI WATANABE, National Institute for Materials Science, Japan, JAIRO VELASCO, Univ of California-Santa Cruz —
Scanning tunneling spectroscopy (STS) is a powerful tool for the investigation of electronic structure of two-dimensional (2D) materials. However, STS measurements are difficult to implement under experimental conditions that are crucial for quantum Hall phenomena, such as ultra-high magnetic fields and low temperatures. This incompatibility limits the application of STS measurements for studying quantum Hall effects in 2D materials. To address this issue, we utilize tunneling field effect transistors to probe the electronic structure of 2D materials. These transistors, which are comprised of layered 2D materials, function in high magnetic fields and ultra-low temperatures that are required for the study of quantum Hall phenomena. We will discuss our latest experimental progress towards using these nanodevices to measure the electronic structure of graphene and molybdimum disulfide in the quantum Hall regime.

[1]US Department of Education

John Davenport
Univ of California-Santa Cruz

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