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Calculations of Electron Transport on the Si(111) 7×7 Surface MANUEL SMEU, WEI JI, McGill University, ROBERT WOLKOW, National Institute for Nanotechnology, HONG GUO, McGill University — The surface conductivity of a material becomes more and more relevant as the size of electronic devices continues to shrink. This is particularly true for the 7×7 reconstruction of the Si(111) surface that is believed to behave as a two-dimensional metallic conductor. When two electrodes are connected to this surface and a voltage is applied, experiments indicate that the majority of the current flows through surface states. Additionally, the potential is relatively uniform along terraces and sharp drops coincide with steps separating them, indicating that the resistance of the entire surface is dominated by contributions from such steps. The potential profile of a single step has been carefully measured but its absolute resistivity is yet to be determined due to experimental uncertainty. We have carried out first principles calculations on the conductance properties of the Si(111) 7×7 surface to elucidate some of these details, which will be presented in this talk.

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