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Mapping Dimensionality and Directionality of Electronic Behavior in $CeCoIn_5$: the Normal State ANDRAS GYENIS, BENJAMIN E. FELDMAN, MALLIKA T. RANDERIA, GABRIEL A. PETERSON, Princeton University, PEGOR AYNAJIAN, Binghamton University, ERIC D. BAUER, Los Alamos National Laboratory, ALI YAZDANI, Princeton University — Materials made from alternating layers of different constituents can exhibit dramatic variability in their electronic properties depending on which layer is probed. This is evident in the heavy fermion compound $CeCoIn_5$, where scanning tunneling microscopy (STM) has revealed preferential coupling to either light or heavy electron states depending on the surface termination. Here we report STM measurements of $CeCoIn_5$ cleaved perpendicular to its basal plane that clearly shows the quasi-two-dimensional nature of the electronic behavior on a single (100) surface. We observe atomic scale modulation of tunneling into the light and heavy electron bands in the c-axis direction, with no variation visible along the basal planes in the b-axis direction. In addition, conductance maps reveal preferential scattering along the two-dimensional basal planes. Our measurements highlight the reduced effective dimensionality of electronic states in $CeCoIn_5$, and underscore the potential insight that can be gained by imaging layered materials perpendicular to their c-axis.

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