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Probing Interactions between Graphene and Cu(111) Surface State LIUYAN ZHAO, Physics Department, Columbia University, SCOTT GONCHER, GEORGE FLYNN, Chemistry Department, Columbia University, ABHAY PASUPATHY, Physics Department, Columbia University, PHYSICS DEPARTMENT COLUMBIA UNIVERSITY COLLABORATION, CHEMISTRY DEPARTMENT COLUMBIA UNIVERSITY COLLABORATION — Monolayer graphene and the surface state of Cu(111) are both examples of two-dimensional electronic states. The quasiparticles in monolayer graphene behave as massless Dirac fermions, whereas the ones in the Cu(111) surface state obey the non-relativistic Schrodinger equation. What is the nature of the interactions when these two states are coupled electronically? We probe these interactions using Scanning Tunneling Microscopy/Spectroscopy (STM/S) to investigate how the Cu(111) surface state has been modified with monolayer graphene overlaid on it. In this presentation, we will show that graphene decreases the band width of the Cu(111) surface state and renormalizes the effective mass of the quasiparticles in the Cu(111) surface state. Further, we will show that the modification of the Cu(111) surface state is independent of the registry between Cu(111) and the graphene crystalline orientations.

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