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Controlling the Electronic Structure of Bilayer Graphene TAISUKE OHTA, AARON BOSTWICK, JESSICA MCCHESNEY, Lawrence Berkeley National Laboratory, THOMAS SEYLLER, Universitat Erlangen-Nurnberg, KARSTEN HORN, Fritz-Haber-Institut, ELI ROTENBERG, Lawrence Berkeley National Laboratory — Carbon-based materials such as carbon nanotubes, graphite intercalation compounds, fullerenes, and ultrathin graphite films exhibit many exotic phenomena such as superconductivity and an anomalous quantum Hall effect. These findings have caused renewed interest in the electronic structure of ultrathin layers of graphene: a single honeycomb carbon layer that is the building block for these materials. There is a strong motivation to incorporate graphene multilayers into atomic-scale devices, spurred on by rapid progress in their fabrication and manipulation. We have synthesized bilayer graphene thin films deposited on insulating silicon carbide and characterized their electronic band structure using angle-resolved photoemission. By selectively adjusting the carrier concentration in each layer, changes in the Coulomb potential led to control of the gap between valence and conduction bands [1]. This control over the band structure suggests the potential application of bilayer graphene to switching functions in atomic scale electronic devices. [1] T. Ohta, A. Bostwick, T. Seyller, K. Horn, E. Rotenberg, Science, 313, 951 (2006).

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