

Abstract Submitted  
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**Spectroscopic Mapping of Electronic States near Fermi Energy in GaMnAs<sup>1</sup>** ANTHONY RICHARDELLA, PEDRAM ROUSHAN, Department of Physics, Princeton University, SHAWN MACK, DAVID AWSCHALOM, Center for Spintronics and Quantum Computation, University of California, Santa Barbara, ALI YAZDANI, Department of Physics, Princeton University — We have used atomically resolved spectroscopic mapping with the scanning tunneling microscope (STM) to probe the spatial structure of electronic states in GaMnAs/GaAs heterostructures. Mapping the electronic states over a wide range of energies across the heterostructure, we find significant differences from the p-type buffer layer to the Mn-doped layer. The features include gap narrowing and in gap resonances, some of which are due to the bulk electronic structure of GaMnAs. We focus on these bulk states, in particular a broad state that is observed near the valance band above the Fermi energy. We analyze the spatial distribution of these states in conjunction with our observations of disorder in the sample and variations in the electrostatic potential landscape due to compensation. Finally, we discuss the implications of our results to the questions of localization, band tails and whether highly doped GaMnAs has an impurity band separated from or merged with the host valance band.

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