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Tunneling Spectroscopy of Heavily Underdoped Bi2212 Films NICKOLAS GROLL, Argonne National Laboratory, CHAOYUE CAO, IIT Chicago and Argonne National Laboratory, MIKE HINTON, THOMAS LEMBERGER, Ohio State University, THOMAS PROSLIER, Argonne National Laboratory, JOHN ZASADZINSKI, IIT Chicago and Argonne National Laboratory — SIS break junctions exhibiting quasiparticle and Josephson tunneling were obtained on heavily underdoped Bi2212 films grown by sputtering, with Tc values as low as 5K. Well defined, but extraordinarily large gap values ( $\Delta$ ) were reproducibly observed, even as the Josephons  $I_c R_n \ll \Delta$ . The largest values of  $\Delta$  were close to J, the antiferromagnetic exchange energy. When the new data are combined with previous break junction data on Bi2212 crystals an abrupt change of slope of  $\Delta$  vs. doping is found, suggesting a second, magnetic energy scale is being observed in the underdoped region.

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