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Different temperature evolution of electronic states in superconducting state and normal state in underdoped Bi2212 high-Tc superconductor KIYOSHISA TANAKA, W.S. LEE, Stanford University, D.H. LU, Stanford Synchrotron Radiation Laboratory, R. MOORE, T. SASAGAWA, Stanford University, Z. HUSSAIN, Lawrence Berkeley National Laboratory, Z.-X. SHEN, Stanford University — One of the most mysterious issues in high-Tc superconductor is an energy gap called "pseudogap" well above Tc, which exists over a wide region of compositions and temperatures. The origin of this pseudogap and its relation to the superconducting gap are believed to hold the key for understanding the mechanism of high-Tc superconductivity. Recent angle-resolved photoemission spectroscopy (ARPES) revealed the coexistence of two distinct energy gaps in heavily underdoped samples which have opposite doping dependence [1]. One gap can be assigned as pseudogap and the other gap as superconducting gap because of the positive correlation between the gap magnitude and Tc. This result suggests that pseudogap arises from another mechanism and gives profound implications on the mechanism of high-Tc superconductivity. More recently, this two gap feature has been observed in the temperature dependence even in near optimally doped samples [2]. Detailed temperature dependence of ARPES spectra will be shown and the special character of pseudogap state will be discussed. [1] K. Tanaka et al., Science, 314, 1910 (2006). [2] W.S. Lee et al., Nature, 450, 81 (2007).

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