Orbital Dependent Band Renormalization in Fe$_{1+y}$Te$_{1-x}$Se$_x$

ZHONGKAI LIU, MING YI, Stanford University, DONGHUI LU, SLAC National Accelerator Laboratory, RUIHUA HE, Boston College, JIN HU, Tulane University, MAKOTO HASHIMOTO, SLAC National Accelerator Laboratory, SUNGKWAN MO, Lawrence Berkeley National Laboratory, TOM DEVEREAUX, SLAC National Accelerator Laboratory, ZHIQIANG MAO, Tulane University, ZAHID HUSSAIN, Lawrence Berkeley National Laboratory, ZHI-XUN SHEN, Stanford University, STANFORD UNIVERSITY TEAM, SLAC NATIONAL ACCELERATOR LABORATORY TEAM, LAWRENCE BERKELEY NATIONAL LABORATORY TEAM, BOSTON COLLEGE COLLABORATION, TULANE UNIVERSITY COLLABORATION — One of the important factors in understanding the Fe-based superconductor is their multi-orbital nature. In this study we present ARPES results on the iron chalcogenide Fe$_{1+y}$Te$_{1-x}$Se$_x$ (known as the 11 system), the structurally simplest member in Fe-based superconductors. Our result shows that as Te substitutes Se, the Fe dxy orbital has seen a significant increase in the band renormalization while the other orbitals stay unchanged. Our discovery indicates that different orbitals in Fe-based superconductors have different correlation levels, evolve distinctly with crystal parameters and may play different roles in the emergence of superconductivity.

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