Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

ARPES Study of the Phase Diagram of $Fe_{1+y}Te_{1-x}Se_x$ ZHONGKAI LIU, MING YI, Stanford University, YULIN CHEN, SLAC National Laboratory, RUIHUA HE, Stanford University, DONGHUI LU, ROB MOORE, SLAC National Laboratory, JIN HU, TIJIANG LIU, ZHIQIANG MAO, Tulane University, ZHI-XUN SHEN, Stanford University, STANFORD UNIVERSITY TEAM, SLAC NATIONAL LABORATORY COLLABORATION, TULANE UNIVERSITY COLLABORATION — Iron chalcogenide $Fe_{1+y}Te_{1-x}Se_x$ is a unique member among the iron-based superconductor family due to its simplicity in structure and richness in physics. The end member $Fe_{1+y}Te$ has an antiferromagnetic order with Neel temperature $\sim$72K. Substitution of Se for Te suppresses this long-range magnetic order and enters a "spin-glass" phase where (π,0) short-range magnetic order contributes to weak charge carrier localization. Superconductivity emerges by further substitution of Se and suppression of the short-range magnetic order. Here we present ARPES study on this system, providing evidence of the underlying physics in the phase diagram by analyzing electronic structure information. The comparison of iron chalcogenide and other iron-based systems help us identify the governing physics in this new family of superconductors.

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Date submitted: 30 Nov 2010 Electronic form version 1.4