Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

orbital selective correlation reduce in collapse tetragonal phase
of CaFe$_2$(As$_{0.935}$P$_{0.065}$)$_2$ and electronic structure reconstruction studied
by angle resolved photoemission spectroscopy LINGKUN ZENG, Chinese
Academy of Sci (CAS) — We performed an angle-resolved photoemission spec-
troscopy (ARPES) study of the CaFe$_2$(As$_{0.935}$P$_{0.065}$)$_2$ in the collapse tetragonal(CT)
phase and uncollapse tetragonal(UCT) phase. We find in the CT phase the elec-
tronic correlation dramatically reduces respective to UCT phase. Meanwhile, the
reduction of correlation in CT phase show an orbital selective effect: correlation in
d$_{xy}$ reduces the most, and then d$_{xz/yz}$, while the one in d$_{z^2-r^2}$ almost keeps the same.
In CT phase, almost all bands sink downwards to higher binding energy, leading to
the hole like bands around Brillouin zone(BZ) center sink below $E_F$ compared with
UCT phase. However, the electron pocket around Brillouin Zone(BZ) corner(M) in
UCT phase, forms a hole pocket around BZ center(Z point) in CT phase. Moreover,
the $d_{xy}$ exhibits larger movement down to higher binding energy, resulting in farther
away from $d_{yz/xz}$ and closer to $d_{xy}$. We propose the electron filling ,namely high spin
state in UCT phase to low spin state in CT phase(due to competing between crystal
structure field and Hund’s coupling), other than the Fermi surface nesting might be
responsible for the absent of magnetic ordering.

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Date submitted: 02 Nov 2015
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