Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Oriented gap opening in the magnetically ordered state of Iron-pnicitides: an impact of intrinsic unit cell doubling on the Fe square lattice by As atoms NINGNING HAO, Department of Physics, Purdue University, West Lafayette, Indiana 47907, USA., YUPENG WANG, Beijing National Laboratory for Condensed Matter Physics and Institute of Physics, Chinese Academy of Sciences, P. O. Box 603, Beijing 100190, China, JIANGPING HU, Department of Physics, Purdue University, West Lafayette, Indiana 47907, USA. — We show that the complicated band reconstruction near Fermi surfaces in the magnetically ordered state of iron-pnictides observed by angle-resolved photoemission spectroscopies (ARPES) can be understood in a meanfield level if the intrinsic unit cell doubling due to As atoms is properly considered as shown in the recently constructed S4 microscopic effective model. The (0,pi) or (pi,0) col-linear antiferromagnetic (C-AFM) order does not open gaps between two points at Fermi surfaces linked by the ordered wave vector but forces a band reconstruction involving four points in unfolded Brillouin zone (BZ) and gives rise to small pockets or hot spots. The S4 symmetry naturally chooses a staggered orbital order over a ferro-orbital order to coexist with the C-AFM order. These results strongly suggest that the kinematics based on the S4 symmetry captures the essential low energy physics of iron-based superconductors.

Ningning Hao
Department of Physics, Purdue University,
West Lafayette, Indiana 47907, USA.

Date submitted: 27 Nov 2012 Electronic form version 1.4