Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Single nonmagnetic impurity resonance in FeSe-based 122-type superconductors as a probe for pairing symmetry QIAN-EN WANG, ZI-JIAN YAO, FU-CHUN ZHANG, Department of Physics and Center of Theoretical and Computational Physics, the University of Hong Kong — The effect of a single nonmagnetic impurity in $A_yFe_{2-x}Se_2$ (A=K, Rb, or Cs) superconductors has been studied based on a three-orbital model. The local density of states on and near the impurity site has been calculated by solving the Bogoliubov-de Gennes equations self-consistently. Both repulsive and attractive impurity scattering potential are considered in our calculations. The impurity-induced in-gap bound states are found only for attractive scattering potential in the state of $d_{x^2-y^2}$ wave pairing, and it turns out that they are very sensitive to the magnitude of the scattering potential. The emergence of the impurity-induced bound states in the vicinity of the Fermi level demonstrates a strong violation of the electron-hole symmetry which is originated from the nodeless $d_{x^2-y^2}$ wave pairing state. The results obtained in our calculation, which simulate the doping of Co and Ni in FeSe-based 122-type superconductors, as an approach to examine the pairing symmetry of this novel superconducting material, can be a proposal of STM observation.

Qian-En Wang
Department of Physics and Center of Theoretical and
Computational Physics, the University of Hong Kong

Date submitted: 04 Oct 2012 Electronic form version 1.4