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Electronic Structure of $K_{0.8}Fe_2Se_2$ High Temperature Superconductor SHIZHONG YANG, RUI GUO, EBRAHIM KHOSRAVI, GUANG-LIN ZHAO, DIOLA BAGAYOKO, Southern University and A&M College, ELECTRONIC STRUCTURE TEAM, HPC TEAM — Since the synthesis of the first ones in 2008, iron-based high temperature superconductors have been the subject of many studies. This great interest is partly due to their higher, upper magnetic field, smaller Fermi surface around the Γ point, and a larger coherence length. This work is focused on $A_xFe_2Se_2$ structural superconductor (FeSe, 11 hierarchy; A=K, Cs) as recently observed. ARPES data show novel, electronic structure and a hole-free Fermi surface which is different from previously observed Fermi surface images. *Ab initio* density functional theory GW method was used to simulate the electronic structure of the novel superconductor $A_xFe_2Se_2$. We compare this electronic structure with those of other Fe-based superconductors. Possible explanations for the hole-free Fermi surface were discussed.

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