Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Electron pairing in the presence of incipient bands in iron-based superconductors[1] ANDY LINSCHEID, XIAO CHEN, SAURABH MAITI, PETER HIRSCHFELD, University of Florida — Recent experiments on certain Fe-based superconductors (SC) have hinted at a role for paired electrons in incipient bands that are close to, but do not cross the Fermi level. Within a simple multi-band weak-coupling BCS approximation, we categorize the problem into two cases: case(I) where SC arises from the incipient band pairing alone, and case(II) where it is induced on an incipient band by pairing due to Fermi-surface based interactions. Negative conclusions regarding the importance of incipient bands are largely based on case(I). However, we show explicitly that models under case(II) can explain the mild suppression of Tc, as well as robust large gaps on an incipient band. We also model the interplay between phonon and spin fluctuation (SF) driven SC and describe the bootstrap of electron-phonon SC by SF coupling the incipient and the regular bands. We argue that pairing on incipient bands may be important in several Fe-based materials, including LiFeAs, FeSe intercalates and FeSe monolayers on $SrTiO_3$, and indeed may contribute to high Tc in some cases. In addition, we address the question whether this conclusion holds if the SF interaction is derived explicitly in the incipient band scenario and retardation effects are included on the level of the Eliashberg equations.

[1]SM was supported by NHMFL through NSF-DMR-1157490, AL and PJH were supported in part by DOE DE-FG02-05ER46236

Andy Linscheid
University of Florida

Date submitted: 02 Nov 2015 Electronic form version 1.4