Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Momentum dependence and nodes of the superconducting gap in the iron pnictides ANTON VORONTSOV, Montana State University, ANDREY CHYBUKOV, MAXIM VAVILOV, University of Wisconsin - Madison — Using general symmetry arguments and model calculations we analyze the superconducting gap in materials with multiple Fermi-surface pockets, with applications to iron pnictides. We show that the gap in the pnictides has an extended s-wave symmetry but is either nodeless or has nodes, depending on the interplay between intraband and interband interactions. We argue that the nodes in the gap emerge without a phase transition as the tendency toward a spin-density-wave order gets weaker. These findings provide a way to reconcile seemingly conflicting results of numerical and experimental studies of the pnictides. In particular, we argue that isovalent-P doped $BaFe_2As_2$ superconductors likely has an extended s-wave gap with nodes. On the other hand, electron or hole doped $BaFe_2As_2$ superconductors have a nodeless gap. Still even these materials exhibit a gapless behavior at strong disorder.

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Date submitted: 27 Nov 2009 Electronic form version 1.4