

Abstract Submitted  
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**Gap Symmetry in  $KFe_2As_2$** <sup>1</sup> SAURABH MAITI, Dept. of Physics, University of Wisconsin-Madison, MAXIM KORSHUNOV, L.V. Kirensky Institute of Physics, Siberian Branch of Russian Academy of Sciences, Russia; Siberian Federal University, Russia., ANDREY CHUBUKOV, Dept. of Physics, University of Wisconsin-Madison — We revisit the issue of the gap symmetry in  $KFe_2As_2$ , which is an Fe-pnictide superconductor with only hole pockets. Previous theoretical studies mostly argued for a  $d$ -wave gap in  $KFe_2As_2$  since transport and thermodynamic measurements point to the presence of the gap nodes. However, a  $d$ -wave gap is inconsistent with recent laser-based angle-resolved photoemission measurements. We propose the scenario for a nodal  $s$ -wave superconductivity induced by a non-magnetic intra-band and inter-band interactions between fermions near the two hole pockets at  $\Gamma$  point. The superconducting gap that we find changes sign between the two hole pockets at  $\Gamma$  point and has  $\cos 4\theta$  angular dependence and can have accidental nodes on one or several hole pockets. We argue that strong angle dependence is the consequence of near-degeneracy between inter-pocket and intra-pocket interaction on the hole pockets. We also provide a connection between the the relative phase of  $4\theta$  oscillations and the shapes of the Fermi surface and discuss the implications in the light of photoemission and tunneling experiments.

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