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Displacement and annihilation of Dirac gap-nodes in d-wave iron-based superconductors ANDREY CHUBUKOV, University of Minnesota, OSKAR VAFEK, Florida State University, RAFAEL FERNANDES, University of Minnesota — It is a common belief that a $d-$wave gap in the Fe-based superconductors must have nodes on the Fermi surfaces centered at the Γ point of the Brillouin zone. Here we show that, while this is the case for a single Fermi surface made out of a single orbital, the situation is more complex if there is an even number of Fermi surfaces made out of different orbitals. In particular, we show that for the two Γ-centered hole Fermi surfaces made out of d_{xz} and d_{yz} orbitals, the nodal points still exist near T_c along the symmetry-imposed directions, but are are displaced to momenta between the two Fermi surfaces. If the two hole pockets are close enough, pairs of nodal points can merge and annihilate at some $T < T_c$, making the $d-$wave state completely nodeless. These results imply that photoemission evidence for a nodeless gap on the d_{xz}/d_{yz} Fermi surfaces of KFe_2As_2 does not rule out $d-$wave gap symmetry in this material, while a nodeless gap observed on the d_{xy} pocket in $K_xFe_{2-y}Se_2$ is truly inconsistent with the $d-$wave gap symmetry.

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