

Condensed Matter Theory Center Seminar



Tuesday, October 17
11:00 am – 12:15 pm
2205 John S. Toll Physics Building

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“Hunds interaction, spin-orbit coupling and the mechanism of superconductivity in heavily hole-doped iron pnictides”

Abstract: Argument will be made for a novel unconventional mechanism for s-wave (A_{1g}) Cooper pairing in heavily hole doped iron pnictides. This mechanism avoids large on-site intra-orbital repulsion, and is favored when the renormalized Hunds interaction exceeds the renormalized onsite inter-orbital Coulomb repulsion. In the absence of spin-orbit interaction, the Cooper pairing has A_{2g} spin triplet character, but with spin-orbit included, the gap transforms as A_{1g}. This is not just a change in bookkeeping. Rather, it results in a qualitative difference in the nature of the pairing instability, and in the temperature dependence of the Knight shift. The resulting gap has most of the features of the structure and gap anisotropy observed in laser angle resolved photoemission, including the possibility of accidental nodes. It explains why, when such nodes are observed, they appear only on the outer (E_g) Fermi surface, as well as why the overall gap magnitude is smaller there than on the inner (E_g) Fermi surface.

References:

- O. Vafek and A.V. Chubukov, Phys. Rev. Lett. 118, 087003 (2017)
- V. Cvetkovic and O. Vafek, Phys. Rev. B 88, 134510 (2013)

Host: Robert Throckmorton

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