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Interplay of structure, magnetism and superconductivity in the 112 Fe based superconducting family

NI NI, Univ of California - Los Angeles

Both cuprates and Fe-based superconductors, the two known high T_c superconducting families, show rich emergent phenomena near the superconductivity (SC). To understand the mechanism of unconventional SC, it is crucial to unravel the nature of these emergent orders. The 112 Fe pnictide superconductor (FPS), $\text{Ca}_{1-x}\text{RE}_x\text{FeAs}_2$ (CaRE112), shows SC up to 42 K, the highest bulk T_c among all nonoxide FPS [2]. Being an exceptional FPS where the global C_4 rotational symmetry is broken even at room temperature, it is important to extract the similarities and differences between 112 and other FPS so that critical ingredients in inducing SC in FPS can be filtered. In this talk, I will review current progress in the study of 112. The comparison between Co doped CaLa112 and Co doped 10-3-8 will be made and the importance of interlayer coupling will be discussed. The work on 112 is supported by NSF while the work on 10-3-8 is supported by DOE.