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Characteristics of Fermion Pairs with d- and extended s-wave Symmetries around BE-BCS Crossover DUSAN VOLCKO, KHANDKER QUADER, Kent State University — We study BE-BCS crossover features for electron pairs with $d_{x^2-y^2}$ and extended-s (s^*) symmetries on a quasi-2D square lattice. The pairing interaction is obtained from an extended Hubbard model with on-site repulsion U, and nearest-neighbor attraction V. We calculate various quantities for different filling f and V: Chemical potential μ(V,f), gap Δ(V,f), coherence length ξ(V,f). Tightly-bound BE pairs appear at some characteristic $V_b(f)$ at both small and large fillings for both symmetries. At the BE-BCS crossover, the quasiparticle distribution function v_k^2 for d-wave is strikingly different from that for s^* wave: While for s^* wave, the central peak in v_k^2 diminishes continuously, for $d_{x^2-y^2}$, it vanishes abruptly at the crossover, and redistributes around $(\pm\pi, 0), (0, \pm\pi)$ in the Brillouin zone. The Fourier transform, v_r^2 exhibits a "checkerboard" pattern. While the general features may be of relevance to the BE-BCS crossover in Fermi systems, the single-particle feature may be of relevance to the field of high T_c cuprates near the pseudogap region. We also explore the density collective modes around the BE-BCS crossover using functional integral techniques within a 1-loop approximation.

Khandker Quader
Kent State University

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