Center-of-mass p-wave fermionic superfluidity ZIXU ZHANG, University of Pittsburgh, HSIANG-HSUAN HUNG, University of California, San Diego, CHIU MAN HO, Vanderbilt University, ERHAI ZHAO, George Mason University, W. VINCENT LIU, University of Pittsburgh — We propose a new kind of pairing between two fermion species where the pairs condense at a finite momentum equal to the sum of two Fermi momenta and exhibit a p-wave center-of-mass wavefunction in a quasi-one dimensional system. This pairing phase is therefore related to but is fundamentally different from both the modulated superfluidity of Fulde-Ferrell-Larkin-Ovchinnikov, where the ordering wavevector is given by the Fermi mometum difference, and the usual p-wave superfluid such as ^{3}He, where the orbital symmetry refers to the relative motion within each pair. Our numerical simulation and mean field calculation confirm that this occurs for spin imbalanced Fermi gases under a new experimental condition– -the spin up and down Fermi levels lie within the p_x and s orbital bands of optical lattices, respectively.

Zixu Zhang
University of Pittsburgh

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