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**Direct Detection of Cooper Pair Momentum in Fulde-Ferrell Superconductors** WEI CHEN, RUI SHEN, DINGYU XING, National Laboratory of Solid State Microstructures and Department of Physics, Nanjing University, Nanjing 210093, China, MING GONG, Department of Physics, The Chinese University of Hong Kong, Shatin, N.T., Hong Kong, China — Finite momentum pairing for Cooper pairs in inhomogeneous superconductors is an important conceptual extension of the celebrated Bardeen-Cooper-Schrieffer theory of superconductivity. In the past five decades, great efforts have been paid and only indirect evidences related to the possible finite momentum pairing have been reported. In this work, we propose an Andreev interferometer based on branched Y-junction to directly detect the Cooper pair momentum in the Fulde-Ferrell (FF) superconductor, which can provide the most convincing evidences for finite momentum pairing. The sub-gap conductance of the interferometer is a unique function of the phase difference induced by the FF superconductor, providing full information of the Cooper pair momentums. We demonstrate that the function of the device will not be affected by other uncontrollable phases during the Andreev scattering processes. The interferometer has important applications in non-centrosymmetric superconductors, where FF type pairing is generally expected under proper in-plane magnetic field.

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