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Spin-balanced Fulde-Ferrell superfluids in driven fermionic optical lattices ZHEN ZHENG, The University of Texas at Dallas; University of Science and Technology of China, CHUNLEI QU, The University of Texas at Dallas, XUBO ZOU, University of Science and Technology of China, CHUANWEI ZHANG, The University of Texas at Dallas — The Fulde-Ferrell-Lakin-Ovchinnikov (FFLO) states, Cooper pairs with finite center-of-mass momenta, were predicted to exit in a variety of systems, but so far unambiguous experimental evidence is still lacking. Current schemes for generating FFLO pairing are based on either large Zeeman field or a combination of spin-orbit coupling and small Zeeman field to induce Fermi surface mismatch. The existence of Zeeman field will necessarily induce spin imbalances of the system and suppress the order parameter. In cold atomic gases, both schemes currently face certain practical experimental issues. In this talk, we propose to realize Fulde-Ferrell superfluids in a spin-balanced fermionic optical lattice where s- and p-orbital bands of the lattice are coupled by an additional weak moving optical lattice. We show that such coupling naturally leads to a spin-independent asymmetric Fermi surface, which, together with the s-wave scattering interaction between two spins, yields an FF type of superfluid pairing.

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