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**Lifshitz Transition in the Two Dimensional Hubbard Model**
KUANG-SHING CHEN, Department of Physics and Astronomy, Louisiana State University, ZIYANG MENG, Department of Physics and Astronomy, Center for Computation and Technology, Louisiana State University, THOMAS PRUSCHKE, Institute for Theoretical Physics, University of Göttingen, Germany, JUANA MORENO, MARK JARRELL, Department of Physics and Astronomy, Center for Computation and Technology, Louisiana State University — Using large-scale dynamical cluster quantum Monte Carlo simulations, we study the Lifshitz transition of the two dimensional Hubbard model with next-nearest-neighbor hopping ($t'$), chemical potential and temperature as control parameters. At $t' \leq 0$, we identify a line of Lifshitz transition points associated with a change of the Fermi surface topology at zero temperature. In the overdoped region, the Fermi surface is complete and electron-like; across the Lifshitz transition, the Fermi surface becomes hole-like and develops a pseudogap. At (or very close to) the Lifshitz transition points, a van Hove singularity in the density of states crosses the Fermi level. The van Hove singularity occurs at finite doping due to correlation effects, and becomes more singular when $t'$ becomes more negative. The resulting temperature dependence on the bare $d$-wave pairing susceptibility close to the Lifshitz points is significantly different from that found in the traditional van Hove scenarios.

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