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Pairing in doped Hubbard model on a honeycomb lattice: A quantum Monte Carlo study TIANXING MA, Department of Physics, Beijing Normal University — Inspired by the recent discovered graphene, we performed a systematic QMC study of the magnetic and pairing correlation in the t-U-V Hubbard model on a honeycomb lattice. Close to half filling, we find that pairing with d+id symmetry dominates over pairing with extended-s symmetry. As the doping increases, the next-nearest-neighbor t' tends to be important and when $t'<-t/6$, the single-particle spectrum is featured by the continuously distributed Van-Hove saddle points at the band bottom, where the density of states diverges in power-law. We investigate possible unconventional superconductivity in such system with Fermi level close to the band bottom, and our studies reveal a possible triplet p + ip superconductivity with appropriate interactions. By including the spin-orbit coupling, it is shown that the d+id pairing is enhanced while the p+ip pairing is decreased by increasing spin-obit coupling. Our results might provide a possible route to look for triplet superconductivity with relatively-high transition temperature in a doped graphene and other similar systems.

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