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Functional renormalization group and variational Monte Carlo studies of the electronic instabilities in graphene near 1/4 doping FA WANG, Department of Physics, MIT, QIANG-HUA WANG, National Lab of Solid State Microstructures, Nanjing University, China, FAN YANG, Department of Physics, Beijing Institute of Technology, China, DUNG-HAI LEE, Department of Physics, UC Berkeley; Materials Sciences Division, LBNL — We study the electronic instabilities of near 1/4 electron doped graphene using the functional renormalization group (FRG) and variational Monte-Carlo method. A modified FRG implementation is utilized to improve the treatment of the von Hove singularity. At 1/4 doping the system is a chiral spin density wave state exhibiting the anomalous quantized Hall effect, or equivalently a Chern insulator. When the doping drops below 1/4, the $d_{x^2-y^2} + id_{xy}$ Cooper pairing becomes the leading instability. Our results suggest near 1/4 electron- or hole-doped graphene is a fertile playground for the search of Chern insulators and superconductors.

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