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FFLO phase on an optical lattice: a quantum Monte Carlo study[1] CHIA-CHEN CHANG, SHIWEI ZHANG, Department of Physics, College of William and Mary — Recent experimental progress in cold Fermi gases has demonstrated the possibility of realizing exotic quantum phases in optical lattices. One example is the Fulde-Ferrel-Larkin-Ovchinnikov (FFLO) state arising from pairing across the Fermi surfaces in a spin-imbalanced system with attractive interaction. We study ground state magnetic properties in 2D and 3D repulsive Hubbard models at intermediate interaction strengths by means of a highly accurate auxiliary-field quantum Monte Carlo method [1] coupled with Twist-averaged boundary conditions. The sign problem is controlled by a generalized constrained path approximation. It is found that the ground state shows incommensurate spin density wave order with periodic spatial modulation when the model is slightly doped away from $n = 1$. We present our results in 2D [2] and 3D, and discuss their implications, through a particle-hole transformation, on the FFLO phase on an optical lattice of spin-imbalanced fermions with an attractive interaction. This work is supported by ARO. Reference: [1] Chia-Chen Chang and Shiwei Zhang, Phys. Rev. B 78, 165101 (2008) [2] Chia-Chen Chang and Shiwei Zhang, Phys. Rev. Lett. 104, 116402 (2010).

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Chia-Chen Chang
Department of Physics, College of William and Mary

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