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Exotic Superconducting Phases of Ultracold Atom Mixtures on Triangular Lattices SHAN-WEN TSAI, University of California, Riverside, LUDWIG MATHEY, Harvard University, ANTONIO H. CASTRO NETO, Boston University — We study two-dimensional Bose-Fermi mixtures of ultracold atoms on a triangular optical lattice, in the limit when the velocity of bosonic condensate fluctuations is much larger than the Fermi velocity[1]. Interactions, lattice geometry and frustration lead to a rich phase diagram in this system. Using functional renormalization group techniques we show that this phase diagram contains exotic superconducting and spin-density wave phases. For spin-1/2 fermions on an isotropic lattice we find a competition of s-, p-, extended d-, and f-wave symmetry, as well as antiferromagnetic order. For an anisotropic lattice, we further find an extended p-wave phase. A Bose-Fermi mixture with spinless fermions on an isotropic lattice shows a competition between p- and f-wave symmetry.

[1] L. Mathey, S.-W. Tsai, A.H. Castro Neto, cond-mat/0609212

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