

Abstract Submitted  
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**Superfluidity of ultracold atomic gases of Fermi-Fermi mixtures on an optical lattice**<sup>1</sup> JIBIAO WANG, QIJIN CHEN, Zhejiang University — Superfluidity of ultracold atomic gases of Fermi-Fermi mixtures has been under active investigation recently. Experimentally, mixtures of  ${}^6\text{Li}$ - ${}^{40}\text{K}$ ,  ${}^{171}\text{Yb}$ - ${}^{173}\text{Yb}$  and  ${}^6\text{Li}$ - ${}^{173}\text{Yb}$ , for example, have been prepared and cooled down to the quantum degeneracy regime, making the superfluid phase accessible in the near future. In this talk, we will address the superfluidity of ultracold Fermi-Fermi mixtures on 1D through 3D optical lattices, with varying mass and population imbalances and different densities, as they undergo BCS-BEC crossover, within a pairing fluctuation theory which includes self-consistently the important pseudogap effects at finite temperatures. We will present various phase diagrams and show the dramatic combined effects of mass and population imbalances and lattice periodicity. Implications for future experiment will be discussed. References: [1] Q. J. Chen, I. Kosztin, B. Janko, and K. Levin, Phys. Rev. B 59, 7083 (1999). [2] C. -C. Chien, Y. He, Q. J. Chen, and K. Levin, Phys. Rev. A 77, 011601(R) (2008). [3] C. -C. Chien, Q. J. Chen, and K. Levin, Phys. Rev. A 78, 043612 (2008). [4] Q. J. Chen, Phys. Rev. A 86, 023610 (2012).

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