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Effect of impurity scattering on pairing and superfluidity in ultracold atomic Fermi gases on a 3D lattice[1] QIJIN CHEN, YANMING CHE, Zhejiang Univ — We study the effect of nonmagnetic impurities in two-component atomic Fermi gases on pairing and superfluidity on a 3D optical lattice. For short range s-wave pairing, we find that while Anderson theorem holds for low density weak impurities in the BCS regime, it manefestly breaks as the density and impurity strength grow large. Meanwhile, this leads to a quantum critical phase transition between superconductor and insulator at zero T. As the pairing strength grows towards unitary regime, pairing is very robust and hard to destroy with nonmagnetic impurities. This result is close to the case in 3D continuum, but in sharp contrast to a d-wave or p-wave case, for which the superfluidity is much more sensitive to impurity densities. Preliminary result in the presence of a population imbalance will also be briefly mentioned. References: Q.J. Chen and J.R. Schrieffer, Phys. Rev. B 66, 014512 (2002). Yanming Che and Q.J. Chen, arXiv:1608.02110.

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