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**Gapless superfluid phase with spin-dependent disorder** MI JIANG, RAVINDRA NANGUNERI, Physics Department, UC Davis, NANDINI TRIVEDI, Department of Physics, Ohio State University, GEORGE BATROUNI, INLN, Université de Nice-Sophia Antipolis, CNRS, RICHARD SCALETTAR, Physics Department, UC Davis — Motivated by the recent experimental development on spin-dependent optical lattices and disordered lattices, we show that the presence of a spin-dependent random potential on a superconductor or a superfluid atomic gas leads to distinct transitions at which the energy gap and average order parameter vanish, generating an intermediate gapless superfluid phase. This behavior is in marked contrast to the case of spin-symmetric randomness. The calculations are performed for a two dimensional attractive Hubbard model within Bogoliubov-de Gennes mean field theory. We characterize the different phases by correlating the local order parameter and the density of states.

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