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Anderson Localization in Degenerate Spin-Orbit Coupled Fermi Gas with Disorder[1] SHENG LIU, XIANGFA ZHOU, GUANGCAN GUO, YONGSHENG ZHANG, Univ. of Sci. Tech. of China — Competition between superconductivity and disorder plays an essential role in undenstanding the metal-insulator transition. Based on the Bogoliubov-de Gennes equation, we studied an s-wave superconductor with both spin-orbit coupling and disorder are presented . With increasing the strength of disorder, the mean superconducting order parameter will vanish while the energy gap will persist which indicates that the system undergoes a transition from a superconducting state to a insulating state which can be conformed by calculating the inverse participation ratio. We also find that, if the strength of disorder is small, the superconducting order parameter and energy gap will decrease if we increase the strength of spin-orbit coupling and Zeeman field. In the large disorder limits, increasing the strength of spin-orbit coupling will increase the mean superconducting order parameter. This phenomena shows that the system is more insensitive to disorder if the spin-orbit coupling is presented. Numerical computing also shows that the whole system breaks up into several *superconducting islands* instead of being superconductive.

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