Superconductivity, as one of the fundamental manifestation of quantum physics, refers to the formation of the so called Cooper pairs between two electrons with opposite spin and equal but opposite momentum, when a weak attractive interaction exists between the electrons. Until recently, most of the studies on electronic superconductivity was focused on Bardeen-Cooper-Schrieffer (BCS) limit in ordinary electronic material with large chemical potential whereas the electrons, as non-relativistic particles, occupy essentially parabolic energy bands. In this respect, the question of superconductivity for relativistic electrons was remained unanswered. The recent discovery of graphene, in which electrons at low energies behave like massless Dirac fermions with a pseudo-relativistic chiral property, has made this question of particular importance and relevance. Very recently, this has created a tremendous interest in experimental and theoretical study of superconductivity and its associated proximity effect in graphene materials, which has led to new fundamental physics as well as novel phenomena with potential applications. In this lecture, I will try to review some of these studies and give an overview for future studies.

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