# Theory of induced superconductivity in graphene

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We propose a way of making graphene superconductive by putting on it small superconductive islands which cover tiny fraction of graphene area. Cooper pairs which penetrate from the islands induce superconducting correlations in graphene rendering the system macroscopically superconductive at low temperatures and magnetic fields. We show that the critical temperature, $T_c$, can reach several Kelvins at experimentally accessible range of parameters. Contrary to conventional BCS superconductors, the zero-temperature energy gap in proximity-induced superconducting graphene, $E_g$, is smaller than $T_c$, leading to a number of unusual phenomena. At the smallest temperatures, $T < E_g$, the system behaves like a nearly uniform superconductor with some effective coupling constant, while at higher temperatures, $E_g < T < T_c$, the system can be described in terms of proximity-coupled islands. Finite magnetic field which destroys the spectral gap $E_g$ does not drive graphene in the normal state. Instead, it produce a kind of a superconductive glass with higly frustrated Josephson couplings between the islands.