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**Superconductivity in metal coated graphene** BRUNO UCHOA, ANTONIO CASTRO NETO, Physics Dept, Boston University — Graphene, a single atomic layer of graphite, is a two dimensional (2D) zero gap insulator with a high electronic mobility between nearest neighbor carbon sites. The unique electronic properties of graphene, from the semi-metallic behavior to the observation of an anomalous quantum Hall effect and a zero field quantized minimum of conductivity derive from the relativistic nature of its quasiparticles. By doping graphene, it behaves in several aspects as a conventional Fermi liquid, where electrons may form Cooper pairs by coupling with a bosonic mode. In this talk, we develop a mean-field phenomenology of superconductivity in a honeycomb lattice. We predict the possibility of two distinct phases, a singlet s-wave phase and a novel p+ip wave phase in the singlet channel. At half filling, the p+ip phase is gapless and superconductivity is a hidden order. We propose a few possible sources of Cooper pairing instability in graphene coated with alkaline and transition metals, and similar low dimensional graphene based devices.

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