

Abstract Submitted  
for the MAR10 Meeting of  
The American Physical Society

**Superconducting Graphene Nanoelectronic Devices** JOEL WANG, APS member, MICHELE ZAFFALON, PABLO JARILLO-HERRERO, APS member — Graphene, a single atom-thick sheet of graphite discovered in recent years, has attracted tremendous attention due to its exotic electronic properties. At low energy, its gapless linear band structure results in transport properties described by the Dirac equation, making it an ideal system for the study of exotic quantum phenomena and other new physics. Graphene may also exhibit many novel transport characteristics in the superconducting regime. New phenomena, such as pseudo-diffusive dynamics of ballistic electrons, the relativistic Josephson effect, and specular Andreev reflection are predicted by theoretical models combining relativistic quantum mechanics and superconductivity. We study these phenomena experimentally with superconductor-graphene-superconductor junctions. The supercurrent in graphene is induced by the superconducting contacts through proximity effect. Various superconducting materials are considered for different explorations. Preliminary tests indicate clean electrical contact with graphene and superconducting properties as expected.

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Date submitted: 20 Nov 2009

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