Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

RKKY interaction in monolayer and bilayer graphene: Exact results in terms of the Meijer-G functions FARIBORZ PARHIZGAR, School of Physics, Institute for Research in Fundamental Sciences (IPM), Tehran, Iran, MOHAMMAD SHERAFATI, Department of Physics and Astronomy, University of Missouri, Columbia, Missouri, USA, REZA ASGARI, School of Physics, Institute for Research in Fundamental Sciences (IPM), Tehran, Iran, SASHI SATPATHY, Department of Physics and Astronomy, University of Missouri, Columbia, Missouri, USA — We present the results for the RKKY interaction in monolayer and bilayer graphene in terms of Meijer-G functions for the undoped, doped and biased cases. The results are obtained from the linear-response expression for susceptibility written in terms of the integral over Green's functions and using Dirac bands. The salient features of the large-distance behavior in each case will be discussed. For instance, for doped monolayer graphene, the interaction falls off as R^{-2} and oscillates as the product of two terms, one being a $\{1+\cos[(K-K').R]\}$-like interference term from both Dirac cones and the second term scaled by Fermi momentum k_F. For doped and unbiased bilayer graphene, the interaction decays as $R^{-2}\cos(k_F R)[e^{-k_F R}+\sin(k_F R)]\Phi_{K,K'}$ where $\Phi_{K,K'}$ is a similar Dirac-cone factor. For the gated bilayer graphene, k_F must be replaced by another scaled momentum k_U, which depends on Fermi energy, gate voltage and the interlayer hopping energy, allowing the possibility of tuning of the interaction by gate voltage. References: M. Sherafati and S. Satpathy, PRB, 83, 165425 (2011); PRB, 84, 125416 (2011); AIP Conf. Proc. 1461, 24 (2012)

Mohammad Sherafati
Department of Physics and Astronomy,
University of Missouri, Columbia, Missouri, USA

Date submitted: 12 Mar 2013 Electronic form version 1.4