

Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Can electrons in Graphene be localized?—hint from a numerical study of single and double impurities and disordered systems. ZHOU LI, Department of Physics, University of Alberta, STEPAN GRINEK, MING LI, JIE CHEN, Department of Electrical and Computer Engineering, University of Alberta, FRANK MARSIGLIO, Department of Physics, University of Alberta — Different from long range coulomb impurities [1], we found that for single or double on-site attractive impurities in gapped graphene, the bound state in the gap will not enter the lower energy continuum as the strength of the impurity is increased. Instead, the spectral weight of the bound state will decrease to zero before the LDOS peak reaches the lower energy continuum. Moreover, the asymptotic behavior of the electronic wave function for different attractive potentials is quite different. The probability distribution for a quantum well will decay exponentially while for a screened coulomb potential it will decay as $1/r^2$. For disordered systems, first we are interested in studying a type of bond length disorder, which will change the hopping energy in a specific direction in a random way. By examining the wave functions we are able to visualize the localization of the electrons. It is straightforward to examine systems with other kinds of disorder, such as randomly distributed dimers, trimers and so on. Reference: [1] V. M. Pereira et.al, Physical Review B, 78, 8, 2008, pp. 085101

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Date submitted: 18 Nov 2009

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