Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Electron localization in graphene quantum dots VADYM APALKOV, PRABATH HEWAGEEGANA, Georgia State University — We study theoretically a localized state of an electron in a graphene quantum dot with a sharp boundary. Due to Klein's tunneling, the relativistic electron in graphene cannot be localized by a confinement potential. In this case electron states in a graphene quantum dot become resonances with finite trapping time. We consider these resonances as the states with complex energy. To find the energies of these states we solve the time-independent Schrodinger equation with outgoing boundary conditions. The imaginary part of the energy determines the width of the resonances and the electron trapping time. We show that if the parameters of the confinement potential satisfy a special condition, then an electron can be strongly localized by such quantum dot, i.e., the trapping time becomes infinitely large. We show how a deviation from this condition affects the electron trapping time. We also analyze the energy spectra of an electron in a graphene quantum ring with a sharp boundary. We show that in this case the condition of strong trapping can be tuned by varying parameters of confinement potential, e.g. internal radius of the ring.

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Date submitted: 09 Dec 2008 Electronic form version 1.4