Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Electronic Properties of Curved Graphene-Ring Structures[1] DAIARA FARIA, Ohio University / Universidade Federal Fluminense, Brazil, ANDREA LATGÉ, Universidade Federal Fluminense, Brazil, SERGIO ULLOA, NANCY SANDLER, Ohio University — Recently, deformed graphene in the form of bubbles have been produced on different substrates in a variety of controllable shapes [1]. These findings raise the possibility of changing the electronic properties of these structures allowing for band-structure engineering. We have undertaken a study of the electronic properties of graphene-ring systems with circularly symmetric Gaussian curvature in the Dirac approximation. We obtain energy spectra and wave functions using perturbation theory on the gauge field amplitude describing the curvature. We further analyze the competition between curvature-induced magnetic field and real external fields and the resulting persistent currents generated in their presence. As expected, the results depend on the boundary conditions describing the confined ring edges. In addition, we discuss the effects of the angular asymmetry in the probability density due to the curvature [2] on single rings and more complex confined annular geometries.

[1] T. Georgiou et al., APL 99
[2] Wakker et al., PRB 84.

[1]Supported by Capes and NSF - MWN/CIAM

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Date submitted: 07 Dec 2011 Electronic form version 1.4