Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Midgap states and the fractional quantum Hall regime in graphene quantum dots[1] IGOR ROMANOVSKY, CONSTANTINE YANNOULEAS, UZI LANDMAN, School of Physics, Georgia Institute of Technology — Graphene quantum dots (QDs) with zigzag edges exhibit midgap single-paticle states associated with such edges. At zero magnetic field (B), these states form a manifold of degenerate states similar to the lowest Landau level that forms in semiconductor QDs at high B. It has been recently suggested[2] that the midgap-state manifold in graphene dots can support correlated many-body states similar to the rotating-electron-molecule (REM) states (also referred to as rotating Wigner crystallites) that are well known in semiconductor QDs at high B.[3] Here, we will report systematic exact-diagonalization calculations (for $N = 4 - 10$ QD electrons) describing the REM states in graphene QDs. We anticipate that the graphene REM states exhibit for all N a single polygonal ring of localized electrons, in contrast to the multiple polygonal-ring configurations known from semiconductor QDs.

[1]Supported by the U.S. D.O.E. (FG05-86ER-45234)
[2]B. Wunsch *et al.*, arXiv:0707.2948v2
[3]C. Yannouleas and U. Landman, Rep. Prog. Phys. **70**, 2067 (2007)

Constantine Yannouleas
School of Physics, Georgia Institute of Technology

Date submitted: 25 Nov 2007 Electronic form version 1.4