Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Three-electron bonding and entanglement in single and molecular quantum dots[1] YUESONG LI, CONSTANTINE YANNOULEAS, UZI LANDMAN, School of Physics, Georgia Institute of Technology — The study of three-electron quantum dots (QDs) is interesting in several ways. First, it was demonstrated[2] recently that detailed ground-state and excited spectra of few-electron elliptic QDs can be measured as a function of the externally applied magnetic field. Second, three-qubit electron spin devices are expected to exhibit enhanced efficiency for quantum computing purposes compared to single-qubit and two-qubit gates. We carry out exact diagonalization (EXD) studies for a three-electron single QD and for a wide range of anisotropies. We analyze the properties of the EXD many-body wave functions with respect to electron localization in a linear geometry, as well as to generation of model quantum entangled states that are often employed in the theory of quantum computing. We further examine three-electron bonding and entanglement in the case of a double quantum dot.

[1]Supported by the U.S. D.O.E. (FG05-86ER-45234).
[2]C. Ellenberger, T. Ihn, C. Yannouleas, U. Landman, K. Ensslin, D. Driscoll, and A.C. Gossard, Phys. Rev. Lett. **96**, 126806 (2006).

Constantine Yannouleas
Georgia Institute of Technology

Date submitted: 16 Nov 2006 Electronic form version 1.4