Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Entanglement of two strongly correlated electrons in a lateral quantum dot[1] CONSTANTINE YANNOULEAS, UZI LANDMAN, Georgia Institute of Technology — Exact-diagonalization calculations for two electrons in an elliptic lateral quantum dot show that the electrons can localize and form a molecular dimer even for screened interelectron repulsion. The calculated singlet-triplet splitting (J) as a function of the magnetic field (B) agrees with cotunneling measurements;[2] its behavior reflects the effective dissociation[3] of the electron dimer for large B. Knowledge of the dot shape and of $J(B)$ allows determination of two measures of entanglement (concurrence and von Neumann entropy for *indistinguishable* fermions), whose behavior correlates also with the dissociation of the dimer. The theoretical value for the concurrence at $B = 0$ agrees with the experimental estimates.

[1]Supported by the U.S. D.O.E. (FG05-86ER-45234) and the NSF (DMR-0205328)
[2]D.M. Zumbühl *et al.*, Phys. Rev. Lett. **93**, 256801 (2004).
[3]C. Yannouleas and U. Landman, Int. J. Quantum Chem. **90**, 699 (2002)

Constantine Yannouleas
Georgia Institute of Technology

Date submitted: 12 Jan 2006 Electronic form version 1.4