Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Interaction effects in the thermodynamic properties of quantum-dots: a Hartree-Fock study. NELSON STUDART, Departamento de Fisica, Universidade Federal de Sao Carlos, Brazil, LUIS DIAS DA SILVA, Dept. of Physics and Astronomy, Ohio University — We study electron-electron interaction effects in the thermodynamic properties of quantum-dot systems. Using a finite-temperature self-consistent Hartree-Fock method, [1,2,3] we obtain the direct and exchange contributions to the specific heat C_v of square quantum dots of size L with up to $N = 20$ electrons. An exchange-induced phase transition [2] is observed at a finite transition temperature T^*. Our analysis shows that T^* scales with L^{-1} and is on the range of a few Kelvin for dots tens of nanometers across. The exchange contribution to C_v dominates over the direct and kinetic contributions in the intermediate regime of interaction strength ($r_s \sim 1$), similarly to results obtained for the magnetic susceptibility [3]. Furthermore, the specific oscillates as function of an applied magnetic field and both oscillation amplitude and period are modified by the electron-electron interaction. Supported by FAPESP-Brazil.
[1] H. Tamura and M. Ueda, Phys. Rev. Lett. 79 1345 (1997).
[2] D. J. Dean, M. R. Strayer, and J. C. Wells, Phys. Rev. B 64, 125305 (2001).
[3] L. G. G. V. Dias da Silva, C. Lewenkopf, and Nelson Studart, Phys. Rev. B 69, 075311 (2004).

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Date submitted: 01 Dec 2004 Electronic form version 1.4