Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Variational Monte Carlo Method for Coupled Quantum Dots in Magnetic Fields[1] JIHAN KIM, DMITRIY MELNIKOV, MICHELE CASULA, JEAN-PIERRE LEBURTON, University of Illinois at Urbana-Champaign — The electronic properties of two-dimensional coupled quantum dots (QD) in presence of an external magnetic field are investigated using a variational Monte Carlo (VMC) method. The many-body Schrödinger Equation with fixed model potential for coupled QDs is solved by using two-electron trial wavefunctions made of a product of two-body Jastrow term and single-particle orbitals for both singlet and triplet states. We use the steepest descent (SD) method to optimize the expectation value of energy by iteratively updating the variational parameters. In co-linear triple QDs, we show that the exchange energy between two electrons can be tuned by varying the confinement of the central dot. We also find that the electron separation in the singlet and triplet states evolve differently upon increasing the magnetic field.

[1]Work supported by the Material Computational Center under NSF Grant 0325939

Jihan Kim
University of Illinois at Urbana-Champaign

Date submitted: 22 Nov 2006 Electronic form version 1.4