Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Unique properties of parallel-coupled double quantum dots in an Aharanov-Bohm ring ERIC HEDIN, YONG JOE, Ball State University, ARKADY SATANIN, Institute for Physics of Microstructures, RAS, Russia — Stimulated by recent intriguing experiments with a parallel-coupled double quantum dot (QD) [1] and coupled QD's embedded in an Aharonov-Bohm (AB) ring [2], we investigate the electron tunneling conductance and resonance structure in the presence of inter-dot tunnel coupling of double QD's. First, when direct interaction (either Coulomb repulsion or tunnel coupling) between the dots is neglected, lattice and square-like transmission probability features are demonstrated as a function of the size of the two QD's. A modulation of magnetic flux in this system at fixed electron energy, which is equivalent to tuning the inter-dot coupling in experiments, results in the distortion of the lattice-like transmission probability. Second, we show the effect of direct coupling between the QD's, using an exactly-solvable tight-binding model. Contour plots of the transmission properties of the coherently coupled states of the QD's will be presented as a function of coupling strengths and magnetic flux variation through the AB-ring. [1] J. C. Chen *et al*, PRL **92**, 176801 (2004). [2] A.W. Holleitner *et al*, PRL **87**, 256802 (2001). * One of the authors (E. R. H.) is partially supported by a grant from the Center for Energy Research, Education, and Service (CERES) at Ball State University.

Yong Joe
Ball State University

Date submitted: 15 Nov 2006 Electronic form version 1.4