Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Giant Orbital Paramagnetism in Nanometer Scale 2DEG Strips
MICHAEL HARRISON, Michigan State University — An elementary calculation shows that Landau diamagnetism becomes significantly altered and very large paramagnetic effects emerge at low tempersatures in nanoscale 2DEG strips penetrated by a perpendicular applied magnetic field and bounded by a parabolic potential, such as may arise from negative voltage applied to a split gate. These novel results are described by an expression which manifests the total system magnetization as a difference between evolved orbital paramagnetism and altered diamagnetism. These predicted effects correspond to drift motion of electrons parallel to the strip length arising from Landau eigenstates that are non-degenerate in the combined presence of a perpendicular applied magnetic field and electric fields associated with a confining parabolic potential. A new heterostructured magnetic material based on orbital electronic motion in 2DEG strips is proposed.

Michael Harrison
Michigan State University

Date submitted: 17 Nov 2008 Electronic form version 1.4