Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Two-dimensional electron gas in $SrTiO_3$ BHARAT JALAN, Materials Department, UCSB, S. JAMES ALLEN, Department of Physics, UCSB, SUSANNE STEMMER, Materials Department, UCSB — We report on Shubnikov-de Haas (SdH) oscillations in a two-dimensional electron gas (2DEG) in delta-doped $SrTiO_3$ thin films. The existence of a 2DEG is confirmed by the angular dependence of the SdH oscillations. The observed SdH oscillation frequency corresponds to a carrier concentration of, which is only 4% of the total Hall carrier density. We show that the only electrons in one of the sub-bands confined by the delta-doping potential have sufficient mobility to exhibit quantum oscillations. Guided by the similarity of the confined *d*-band electron states in $SrTiO_3$ to the confined hole systems in conventional semiconductors, quantum oscillations are interpreted in terms of spin and Landau level splitting. Despite the inherent complexity of a sub-band that is derived from four *d*-band states near the conduction band minimum of $SrTiO_3$, we show that the quantum oscillations can be modeled quantitatively. Alternative routes to realize high mobility 2DEGs in $SrTiO_3$ will also be discussed.

Bharat Jalan
Materials Department, UCSB

Date submitted: 21 Nov 2010 Electronic form version 1.4