Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

**Electronic Transport properties of ultra-thin $BiFeO_3$** DIPANJAN MAZUMDAR, Center for Materials for Information Technology, University of Alabama, Tuscaloosa, AL 35487, OLEG MRYASOV, VILAS SHELKE, Center for Materials for Information Technology, University of Alabama, Tuscaloosa AL 35487, STEPHEN JESSE, ARTHUR BADDORF, SERGEI KALININ, Center for Nanophase Materials Sciences, Oak Ridge National Laboratory, Oak Ridge Tennessee., ARUNAVA GUPTA, Center for Materials for Information Technology, University of Alabama, Tuscaloosa AL 35487 — We have investigated the electronic transport properties of rhombohedral (R) and the nearly-tetragonal (T) phase of $BiFeO_3$ using beyond density functional techniques, and combined with nanoscale I-V transport measurements. Using Quasi-particle GW approximation, we show the R and T phase to have significantly different electronic structures. We find that the T phase has significantly lower effective mass at the conduction band edge compared to the R phase leading to a lower effective barrier height for tunnel electrons (0.38 eV vs 3.6 eV). We therefore anticipate that tunnel devices with T phase BFO to have significantly lower resistances. Local transport measurements performed on ultra-thin BFO R phase are consistent with this inference. Tunneling measurements on the tetragonal phase films are also presented.

Dipanjan Mazumdar
Center for Materials for Information Technology,
University of Alabama, Tuscaloosa, AL 35487

Date submitted: 28 Nov 2010 Electronic form version 1.4