

Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Doping **Dependence** **of**
Polaron Hopping Energies in $\text{La}_{1-x}\text{Ca}_x\text{MnO}_3$ ($0 \leq x \leq 0.15$)¹ KRISHNA NEUPANE, JOSHUA COHN, University of Miami, JOHN NEUMEIER, Montana State University — Measurements of the low-frequency ($f \leq 100$ kHz) permittivity at $T \leq 160$ K and dc resistivity ($T \leq 430$ K) are reported for $\text{La}_{1-x}\text{Ca}_x\text{MnO}_3$ ($0 \leq x \leq 0.15$). Static dielectric constants are determined from the low- T limiting behavior of the permittivity. The estimated polarizability for bound holes $\sim 10^{-22}$ cm⁻³ implies a radius comparable to the interatomic spacing, consistent with the small polaron picture established from prior transport studies near room temperature and above on nearby compositions. Relaxation peaks in the dielectric loss associated with charge-carrier hopping yield activation energies in good agreement with low- T hopping energies determined from variable-range hopping fits of the dc resistivity. The doping dependence of these energies suggests that the orthorhombic, canted antiferromagnetic ground state tends toward an insulator-metal transition that is not realized due to the formation of the ferromagnetic insulating state near Mn⁴⁺ concentration ≈ 0.13 .

¹This material is based upon work supported by the National Science Foundation under grants DMR-0072276 (Univ. Miami) and DMR-0504769 (Montana State Univ.).

Joshua Cohn
University of Miami

Date submitted: 30 Nov 2006

Electronic form version 1.4