Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Mesoscopic transport in ultrathin films of $La_{0.67}Ca_{0.33}MnO_3$ C. BEEKMAN, J. ZAANEN, J. AARTS, University of Leiden — We investigate the electrical transport in mesoscopic structures of $La_{0.67}Ca_{0.33}MnO_3$ in the regime of the metal-insulator transition by fabricating microbridges from strained and unstrained thin films. We measure current-voltage characteristics as function of temperature and in high magnetic fields and with varying film thickness. For strained films, in warming from the metallic to the insulating state, we find non-linear effects in the steep part of the transition characterized by a differential resistance with a strong peak around zero applied current, and saturating at higher currents after resistance drops up to 60 %. We propose that this nonlinear behavior is associated with melting of the insulating state by injecting charge carriers, signalling the occurrence of an intervening phase which involves the formation of short range polaron correlations.

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Date submitted: 19 Nov 2010 Electronic form version 1.4