

AC Transport Measurements of  $\text{Pr}_{0.5}\text{La}_{0.2}\text{Ca}_{0.3}\text{MnO}_3$  /  $\text{YBa}_2\text{Cu}_3\text{O}_7$  /  $\text{Pr}_{0.5}\text{La}_{0.2}\text{Ca}_{0.3}\text{MnO}_3$  Thin Film Multilayers

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Master thesis in Physics

The unconventional recovery of a DC superconducting response through a high magnetic field in a cuprate-based superconductor and manganite oxide multilayer was further explored by AC transport in

$\text{Pr}_{0.5}\text{La}_{0.2}\text{Ca}_{0.3}\text{MnO}_3/\text{YBa}_2\text{Cu}_3\text{O}_7/\text{Pr}_{0.5}\text{La}_{0.2}\text{Ca}_{0.3}\text{MnO}_3\text{LaAlO}_3(\text{cap})$  trilayer grown on LSAT. Holes were drilled through the upper  $\text{Pr}_{0.5}\text{La}_{0.2}\text{Ca}_{0.3}\text{MnO}_3$  layer with an Ar ion beam to enable direct electrical contacts with the YBCO layer in 4-wire contact geometry. The complex impedance was measured versus frequency, field, temperature and current intensity. An anomaly in the DC voltage across the sample during pure AC excitation was detailed and compared to the response of a bare YBCO thin film. The  $t - V$ -hysteresis at the DC anomaly was analyzed in term of higher harmonics and showed high correlated activity up to the 5th order.

The strongly hysteretic AC response of these trilayers shows signatures of a glassy dynamics of macroscopic polar domains. These polar domains, which originate from the charge/orbital ordered state of the manganite, apparently have a strong influence on the electronic response of the thin YBCO layer which recovers a conventional Ohmic (at  $T > T_C$ ) and superconducting (at  $T < T_C$ ) behavior only in high magnetic fields and low frequencies.

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