Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Noise spectroscopy: a sensitive probe to explore hot electron effect in highly correlated systems[1] SUDESHNA SAMANTA, ARUP K. RAYCHAUDHURI, S N Bose National Centre for Basic Sciences, Block-JD, Sector-3, Salt Lake, Kolkata, India — Non-linear electrical conductance in ferromagnetic insulating (FMI) state of manganites can give rise to reversible colossal electro-resistance and current induced resistance change due to heating of the electrons in the system. In FMI state (<120K), the temperature of the lattices or phonon (T_{ph}) and electrons (T_e) in the sample can decouple by high input power density giving rise to heating of the electronic bath. We investigated whether white noise like Nyquist noise can be used to measure T_e (which is expected to be larger than T_{ph}) when the two baths get decoupled. The use of the Nyquist noise to measure T_e assumes that the electron bath forms a proper temperature bath in equilibrium. A dc stressing current was used to heat the electron bath while a small ac signal was used to measure the noise. With enhanced power input to the electron system, the white noise enhances and there is a large deviation from the simple estimate of Nyquist relation ($4k_BT_eR_{sample}$) indicating that the electron system is not in thermal equilibrium and is a non-ergodic system where Fluctuation Dissipation Theorem has broken down.

[1]Department of Science and Technology, Govt. of India

Sudeshna Samanta
S N Bose National Centre for Basic Sciences,
Block-JD, Sector-3, Salt Lake, Kolkata, India

Date submitted: 22 Nov 2010 Electronic form version 1.4