Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Universal functions for the transport properties through nanostructured devices[1] LUCAS SALA, LUIZ N. OLIVEIRA, University of Sao Paulo — A renormalization-group analysis of the temperature-dependent transport properties of a nanostructured device will be presented. To be specific, the single-electron transistor geometry, in which a quantum dot bridges two otherwise independent electron gases, will be considered. The renormalization-group analysis will consider the equilibrium electrical and thermal conductances and the thermopower in the Kondo regime and will be based on the spin-degenerate Anderson model for the device. The three properties can be related to the three lowest energy moments $\mathcal{L}_|$ $(j = 0, 1, 2)$ of the temperature-dependent spectral density of the dot level. We will rigorously show that each moment $\mathcal{L}_|$ maps linearly onto a universal function L_j of the temperature scaled by the Kondo temperature T_K, with linear coefficients determined by the ground-state occupation of the quantum dot. Essentially exact numerical renormalization-group results for each of the three universal functions will be presented, showing that they can be related to each other at relatively high temperatures, $T > T_K$. The results will be compared to previous theoretical studies of the transport properties, and the implications concerning the interpretation of experimental data will be discussed.

[1]Supported by the CNPq and FAPESP

Luiz Nunes Oliveira
University of Sao Paulo

Date submitted: 20 Dec 2012 Electronic form version 1.4