Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Proposal for a pre-exponential dependent Efros-Shklovskii regime
MIGUEL RODRIGUEZ, ISMARDO BONALDE, ERNESTO MEDINA, Centro de Fisica, IVIC, Caracas, Venezuela — We address the variable range hopping regime in the range for which the measured temperatures are of the order of the characteristic Mott or Efros-Shklovskii temperatures T_M and T_{ES} respectively. In such a range present theories imply $R_{hop}/\xi < 1$ where R_{hop} is the hopping length and ξ is the localization length. Using the Mott optimization procedure, including prefactor corrections in the wavefunction overlap, we obtain expressions for the dependence on temperature for the typical hopping length and the resistivity in an Anderson insulator with coulombic interactions. Such expressions lead to a regular Efros-Shklovskii law when $T << T_{ES}$ while for $T \sim T_{ES}$ they can lead to a meaningful pre-exponential dominated regime such that $R_{hop}/\xi > 1$. We propose that the optimization procedure can consistently explain contradictory results in the critical regime and recent experimental results showing a maximum in resistivity due to a interplay between prefactor and exponential terms.

Ernesto Medina
Centro de Fisica, IVIC, Caracas Venezuela

Date submitted: 24 Nov 2005 Electronic form version 1.4