Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

The effect of Coulomb interactions on thermoelectric properties of quantum dots NATALYA ZIMBOVSKAYA, Department of Physics and Electronics, University of Puerto Rico-Humacao, CUH Station, Humacao, PR 00791, VALERY KUZMIN, SKB Kontur, 56 Kosmonavtov st. Yekaterinburg, 62017, Russia — Thermoelectric effects in a quantum dot coupled to the source and drain charge reservoirs are explored using a nonequilibrium Green's functions formalism beyond the Hartree-Fock approxomation. We concentrate on theoretical analysis of the influence of Coulomb interactions on thermopower and the figure of merit ZT. Obtained results show that Coulomb interactions between charge carriers on the dot significantly contribute to its thermoelectric properties. In the present work, we trace the transition from the Coulomb blockade regime to Kondo regime in the thermoelectric properties of the quantum dot which occurs when we gradually strengthen the coupling of the dot to the charge reservoirs. We show that within the Coulomb blockade regime (when the coupling of the dot to the leads is weak compared to the characteristic strength of the charge carriers interactions) thermoelectric characteristics of the dot display distinct features caused by Coulomb interactions. These features indicate possibilities of enhancement of thermoelectric efficiency of the considered systems. Within the Kondo regime, when the couplings of the dot to the leads became stronger, the influence of Coulomb interactions declines bringing a decrease in the the thermoelectric efficiency.

Natalya Zimbovskaya
Dept of Physics and Electronics, University of Puerto Rico-Humacao,
CUH Station, Humacao, PR 00791

Date submitted: 06 Nov 2013 Electronic form version 1.4