Abstract Submitted
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Modeling of nanoscale transport using fractional exclusion statistics[1] GEORGE ALEXANDRU NEMNES[2], University of Bucharest, Faculty of Physics, DRAGOS VICTOR ANGHEL, Horia Hulubei National Institute of Physics and Nuclear Engineering, The Department of Theoretical Physics — In recent years, with the continuous development of nanostructured materials, many-body quantum effects were observed in the charge, spin or phonon transport. Fractional exclusion statistics (FES) has already proved to be an important tool in the study of thermodynamical properties of interacting Bose and Fermi systems, which are regarded as ideal FES gases. Recently, the transition rates for FES gases were established [1], which opens the possibility of analyzing interacting boson and fermion systems in non-equilibrium. We make here a step further and introduce a transport model based on FES, using Monte Carlo simulations. The transport model based on FES is applied on quasi-1D systems, such as core-shell structures. The statistical FES parameters are extracted from the interacting electron gas, taking into account the Coulomb interaction. We also investigate transport in systems with quenched disorder [2]. Within our approach we are able to point out some particularities of charge transport of interacting fermions in nanoscale systems with multiple interfaces.

[1] G.A. Nemnes, D. V. Anghel, J. Stat. Mech. P09011 (2010) [2] G.A. Nemnes, D. V. Anghel, "Fractional exclusion statistics in systems with localized states," J. Phys.: Conf. Series (accepted, 2012)

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