Abstract Submitted
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Decoherence due to contacts in ballistic nanostructures[1] I. KNEZEVIC, University of Wisconsin - Madison — In quasiballistic nanoscale electronic structures, the process of relaxation towards a steady state cannot be attributed to carrier scattering. Rather, the active region of a nanostructure is an open quantum-mechanical system, whose nonunitary evolution (decoherence) toward a nonequilibrium steady state is determined by carrier injection from the rapidly dephasing contacts. I will present a technique for the treatment of contact-induced decoherence in ballistic nanostructures, which is established within the framework of the open system theory. Efficient electron-electron scattering in the contacts enables one to consider them nearly "memoryless" and derive a Markovian kinetic equation for the active region's statistical operator through coarse graining over the contacts' short memory- retention time. By incorporating a first-principles model interaction between the active region and the contacts into the Markovian dynamics derived, nonequilibrium steady-state distribution functions of the forward- and backward-propagating states in the active region are derived analytically. The approach is illustrated on several two- terminal nanostructures. I will also discuss the relationship between the present approach and the Landauer-Büttiker formalism, as well as the inclusion of scattering.

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I. Knezevic
University of Wisconsin - Madison

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