QUANTUM TRANSPORT IN CHAOTIC CAVITIES THROUGH A PRISM OF INTEGRABLE THEORY

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Abstract. The long-time scale universal transport regime in chaotic cavity can be studied within a stochastic approach based on a random matrix description. According to the Landauer-type theories the transport observables such as *conductance*, G, and *shot noise power*, P, are expressed in terms of scattering $\hat{S}$-matrix. Under certain assumptions, when $\hat{S}$-matrix is appeared to be uniformly distributed over the unitary group, the conductance and shot noise power distributions purchase a closed form of a matrix integrals that was studied with the help of an adopted standard string theory method of revealing hidden symmetries. The main outcome of this approach is a set of highly nontrivial relations between various combinations of traces averaged with respect to the measure of original integral. Being reformulated for our particular integrals these relations lead to a system of nonlinear differential equations for the cumulant generation function of the joint $G-P$ distribution. In particular, equation for the conductance cumulant generation function serves as a basis to determine other cumulants and is nothing but Painlevé V transcendent.

The obtained recurrences for cumulants have been solved in the limit of large number of propagating modes in the cavity to get an exponential correction to the known Gaussian behaviour of conductance and shot noise power distributions.

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