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Effective form factors for asymptotics of finite-temperature correlation functions

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The behavior of correlation functions in one-dimensional quantum systems at zero temperature is now very well understood in terms of linear and non-linear Luttinger models. The "microscopic" justification of these models consists in the exact accounting for soft-mode excitations around the vacuum state and, at most few high-energy excitations. At finite temperature, or more generically for finite entropy states, this direct approach is not applicable due to the different structure of "soft" excitations. We focus on physical systems where the strong interaction makes it possible to present correlation functions in terms of Fredholm determinants of the generalized sine kernels. Based on "microscopic" resummations, we develop a phenomenological approach of the effective form factors that allows us to describe the asymptotic behavior of these Fredholm determinants. We demonstrate how this works for correlation functions in the XY model, mobile impurity, and the generic Toeplitz determinants. We explain how this approach is related to the Riemann-Hilbert methods.

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