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Equilibration and Generalized GGE in Tonks Girardeau Regime[1]

GARRY GOLDSTEIN, NATAN ANDREI, Rutgers University — We study the nonequilibrium properties of the 1-D Lieb-Liniger model in the infinite repulsion Tonks-Girardeau regime, Introducing a new version of the Yudson representation applicable to finite sized systems and appropriately taking the infinite volume limit we are able to study the equilibration of the Lieb-Liniger gas in the thermodynamic limit. We provide a formalism to compute various correlation functions for highly non-equilibrium initial states. In the Tonks Girardeua limit we are able to find explicit analytic expressions for the long time limit of the expectation of the density, density density and related correlation functions. We show that the gas equilibrates to a steady state from arbitrary initial states with "smooth" correlation functions. For nearly translationally invariant states the gas equilibrates to a diagonal ensemble which we show is equivalent to a generalized version of the GGE for sufficiently simple correlation functions, which in particular include density density correlations.

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