Quench dynamics of the interacting Bose gas in one dimension

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We obtain an exact expression for the time evolution of the interacting Bose gas following a quench from a generic initial state using the Yudson representation for integrable systems. We study the time evolution of the density and noise correlation for a small number of bosons and their asymptotic behavior for any number. We show that for any value of the coupling, as long as it is repulsive, the system asymptotes towards a strongly repulsive gas, while for any value of an attractive coupling the long time behavior is dominated by the maximal bound state. This occurs independently of the initial state and can be viewed as an emerging "dynamic universality".