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Prediction of the expansion velocity of ultracold 1D quantum gases for integrable models ZHONGTAO MEI, University of Cincinnati, LEV VIDMAR, FABIAN HEIDRICH-MEISNER, Ludwig-Maximilians-Universitaet Muenchen, CARLOS BOLECH, University of Cincinnati — In the theory of Bethe-ansatz integrable quantum systems, rapidities play an important role as they are used to specify many-body states. The physical interpretation of rapidities going back to Sutherland is that they are the asymptotic momenta after letting a quantum gas expand into a larger volume rendering it dilute and noninteracting. We exploit this picture to calculate the expansion velocity of a one-dimensional Fermi-Hubbard model by using the distribution of rapidities defined by the initial state [1]. Our results are consistent with the ones from time-dependent density-matrix renormalization. We show in addition that an approximate Bethe-ansatz solution works well also for the Bose-Hubbard model. Our results are of interests for future sudden-expansion experiments with ultracold quantum gases. [1] Z. Mei et al., arXiv:1509.00828

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