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Studying integrability in the 1D Bose gas using atom chips, RF dressing and interference[1] NICOLAAS VAN DRUTEN, PHILIPP WICKE, JAN-JORIS VAN ES, AALDERT VAN AMERONGEN, SHANNON WHITLOCK, Van der Waals-Zeeman Instituut, Universiteit van Amsterdam, The Netherlands — The repulsively interacting one-dimensional (1D) Bose gas is the simplest example of a integrable system, exactly solvable by the (thermodynamic) Bethe Ansatz (BA), a key method in many- body condensed-matter theory. We have recently performed the first experimental test of the thermodynamic BA for the 1D Bose gas, employing ^{87}Rb on an atom chip [PRL 100, 090402 (2008)]. We are now extending these experiments to (*i*) interferometric studies of both phase-coherent and independent 1D Bose gases, employing RF-dressing to create double-well potentials and (*ii*) the two-component 1D Bose gas. For the latter system, the BA yields exact results *only* for the case of component-*in*dependent interactions. RF dressing allows experimental control over the effective 1D interaction strengths, enabling the tuning of the system towards and away from integrability. Our latest results will be presented at the conference.

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