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Abstract for an Invited Paper
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Experimental study of a 1D Tonks-Girardeau gas

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I will describe our experiments with 1D Bose gases. We use a combination of conservative light traps to prepare and study atoms in 1D both near zero temperature and at finite temperature. We can scan across coupling regimes, including into the regime of the Tonks-Girardeau gas [1]. We have been able to test the exact 1D Bose gas theory [2,3] using several observables, including 1D energy, 1D cloud lengths, and the second order correlation function, $g^{(2)}(0)$.

[1] T. Kinoshita, T. Wenger, and D. S. Weiss, Science 305, 1125 (2004).

[2] E.H. Lieb and W. Liniger, Phys. Rev. 130, 1605 (1963).

[3] M. Olshanii and V. Dunjko, Phys. Rev. Lett. 91, 090401 (2003).