Abstract Submitted
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**Probing Noise and Coherence in 1d Quantum Systems**[1] T. BETZ, ST. MANZ, A. PERRIN, T. SCHUMM, I. MAZETS, J. SCHMIEDMAYER, Atominstitut, TU-Wien — We investigate experimentally and theoretically the interference between two one-dimensional quasi-condensates of ultra cold atoms, either independent or tunnel-coupled. The coherence, the noise and their dynamics in these 1d quantum systems is revealed by the full distribution function of the shot to shot variation of the interference patterns. We find that the universal behavior of the contrast distribution can be characterized by two dimensionless parameters related to the ratio of the thermal coherence length to the sampling length or to the coupling-induced phase-locking length, respectively. We compare numerically three models based on the Luttinger liquid theory, Bogoliubov theory, and Ornstein-Uhlenbeck stochastic-process method and estimate the range of parameters where the fundamental quantum noise is important. The "semi-classical" approach (arXiv:0910.5337) is found to be an accurate approximation in the typical range of experimental parameters.

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Joerg Schmiedmayer
Atominstitut, TU-Wien

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