Interference and Coherence in 1-d Bose-Einstein-Condensates

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Miniaturization and integration of atom-optical components on atom chips [1] allows to manipulate matter waves with high precision. Our exceptionally smooth atom chips potentials [2,3] allow the formation and manipulation of continuous 1 mm long condensates at strong transversal confinement in the order of ~10kHz resulting in extreme aspect ratio up to >1000.

In these smooth atom chip traps we employ RF induced adiabatic potentials [4] to split a 1d condensate along its long axis. Bringing the two split clouds together we can measure the interference between the two ensembles and study the coherence in the atom manipulation process [5]. In the talk we will present a detailed analysis of the RF induced potentials, the splitting process of the 1d condensate and study the coherence properties of the split 1d trapped cloud by interference.

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[1] For an overview see: *Microscopic atom optics: from wires to an atom chip*. Folman, R., Krüger, P., Schmiedmayer, J.,Denschlag, J. & Henkel,C., Adv. At. Mol. Opt. Phys. **48**, 263 (2002).
[2] Groth, S. *et al.* Appl. Phys. Lett. **85**, 2980 (2004).
[3] Krüger, P. *et al.*, arXiv:cond-mat/0504686 (2005).
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[5] Schumm Th. *et al.* Nature Physics AOP doi: 10.1038/nphys125 (Oct. 2005)