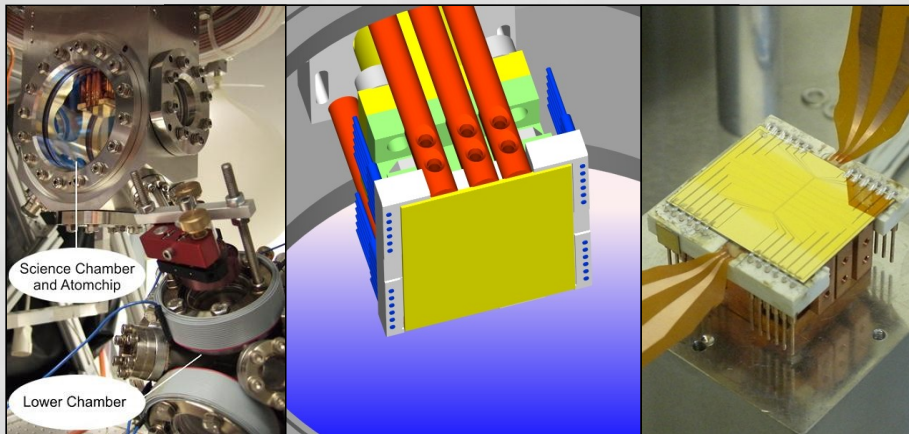


# Call for a Diploma Student

(Posted February 2008)

## Low-Dimensional Quantum Gases

Prof. Jörg Schmiedmayer



Low-dimensional quantum gases, both Bose-Einstein condensates and degenerate Fermi gases, are hot topics in the world of physics research. In the 1D world, bosons can act like fermions (the Tonks-Girardeau regime) and fermions can be forced to form confinement-induced molecules. Although 1D gases have been observed, these observations were in optical lattices with multiple systems present. Here at the Atominstitut, we use atom chip technology that will allow the creation of a single 1D system, which will in turn allow the direct probing and manipulation of 1D quantum gases. We will investigate such topics as Tonks-Girardeau gases, degenerate Fermi gases, and solitons in Bose-Fermi mixtures. The imaging of low-density atom clouds remains a significant problem in the detection and utilisation of such low-dimensional quantum gases. We require an imaging system to allow us to access the 1D regime. The aim of this diploma project is to develop our current imaging system, install it on the actual research experiment, and use it to image 1D quantum gases!

**We offer** research training in the area of ultracold quantum gases on atom chips.

- Knowledge of ultracold quantum gases (both bosonic and fermionic), specifically in low dimensions.
- Extensive knowledge of imaging systems used in ultracold atom experiments.
- A project that has the possibility of having a huge impact on atom chip experiments carried out at the Atominstitut. A successful candidate would have the opportunity to integrate the imaging system onto a Bose-Fermi Mixture experiment, gaining experience in experimental quantum optics/atomic physics (including laser systems, atom chip technology, and degenerate quantum gases).

**We expect**

- Someone who is motivated to learn and is interested in ultracold quantum gases.
- A team-player who is willing to work hard.
- Basic knowledge of atomic and quantum physics.
- Having fun during the project!

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