Building a red-detuned optical dipole trap for a ^{87}Rb-BEC

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We report on the status of a laser system for an optical dipole trap to be used on our ^{87}Rb-BEC apparatus. The trapping mechanism, as well as the specific properties of red- and blue-detuned dipole traps will be introduced and a general survey of dipole traps in use on BEC experiments will be given. Furthermore, the important trap parameters subject to the different wavelength regimes will be discussed and an estimate of the significant properties like trap depth and photon scattering rate in our case will be presented.

The laser system for generating an adequately intense laser beam at the demanded wavelength will be explained in detail. To obtain the necessary power, it consists of three laser diodes: a master, a slave and a broad-area laser diode (BAL).

The master laser has an extended cavity to improve its tunability and reduce the linewidth by taking advantage of frequency-selective feedback. It is stabilized to an iodine transition at $\lambda = 785$ nm and utilised for injection locking of the slave laser.

The slave laser seeds the BAL [1], which in turn provides the required optical output power. The system performance will be observed with an optical cavity of strikingly simple design. Finally, the planned integration of the trapping beam in the existing ^{87}Rb-BEC will be shown.

The presented trapping configuration allows the storage of atoms regardless of their magnetic sublevel state and is in some aspects favourable compared to magnetic traps.

[1] I. Shvarchuck *et al.*, *Appl. Phys. B* **71**, 475-480 (2000)