

## Technical Note No. 26

### Magneto Optical Trap (MOT II)

Magneto Optical Traps are a suitable setup for optical cooling and trapping of neutral atoms. There are different setups referred in literature. This technical note refers to simple MOT scheme which already allows high trapping efficiencies. For more details, please compare I.I. Shvachuck, K. Dieckmann, M. Zielonkowski, J. T. M. Walraven, Appl. Phys. B-lasers Opt. 71, 475, 2000.

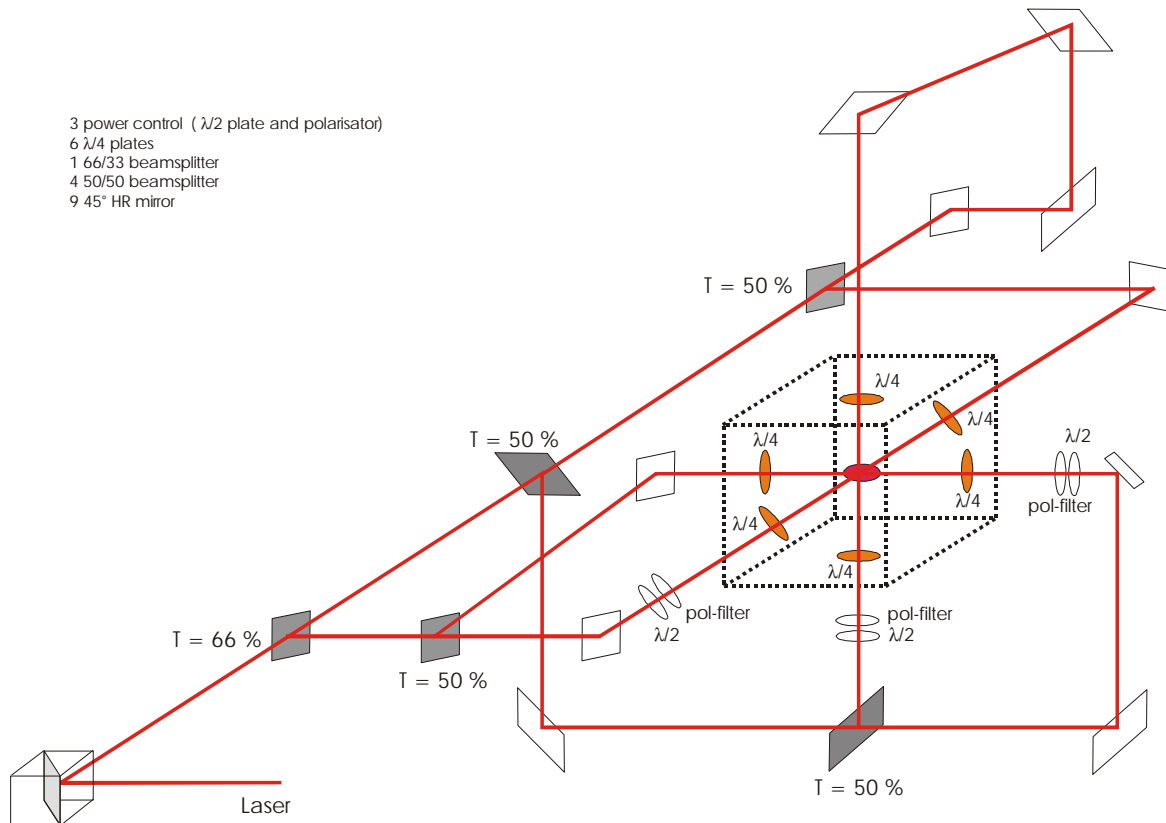


Fig. 1: Schematical Setup and Beam Path of a Magneto Optical Trap II

The laser frequency is stabilized via a Rb Cell and a Lockbox which is not shown in this schematics. The laser beam is drawn red in Fig. 1. After expansion the laser beam to 1.5 cm it is directed into the Magneto Optical Trap via a polarizing beam splitter. Five dielectric beam splitters are used to split the laser beam into 6 equal intensity beams. These beams are circularly polarized with quarter-wave plates. The requirement is to have three orthogonal pairs of nearly counter propagating beams, with opposite polarization. To trap a high quantity of atoms it is necessary that the counter propagating beams have exact the same power. Therefore there is a unit for controlling the power in each of the three orthogonal beams. Such a controlling unit consists of one half-wave plate and a polarizer.

Document: <http://data.sacher-laser.com/techdocs/MOTv2.pdf>  
 Note: Specification are subject to change without further notice

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This setup results in a high trapping efficiency (c/f <http://data.sacher-laser.com/publications/PW2004.pdf>) which is strongly above the MOT I setup.



Fig. 2: Photo of one version of MOTs supplied by Sacher Lasertechnik Group.

If you target moderate trapping efficiencies, we recommend our MOT I setup which is easier to align and has less optical components, c/f <http://data.sacher-laser.com/techdocs/MOTv1.pdf> For further information, please contact us.

Document: <http://data.sacher-laser.com/techdocs/MOTv2.pdf>  
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