383 nm Laser system (T-MOT)

The 383 nm laser system consists of 767 nm lasers which are then frequency doubled to achieve 383 nm light.

External Cavity Diode Laser (ECDL)

For 767 nm lasers, ECDL in Littrow configuration is used. Typically we used the laser diodes from Eagleyard Photonics: EYP-RWE-0790-02000-1500-SOT02-0000

Recently, Eagleyard has replaced these with new laser diodes: EYP-RWE-0760-02010-1500-SOT12-0000

TA

- Output Power: 1.5 W
- Input Current: 2 A
- Injection Power: 32 mW
- Power behind 30dB Isolator: 1.05 W
- Originally this TA was used: EYP-TPA-0765-01500-3006-CMT03-0000. Is this still true?

Fiber

- PMC-780-5,0-NA012-3-APC-200-P
- Incoupling: 67%
- Power behind fiber: 700 mW

Frequenzy doubling

LBO-Crystal

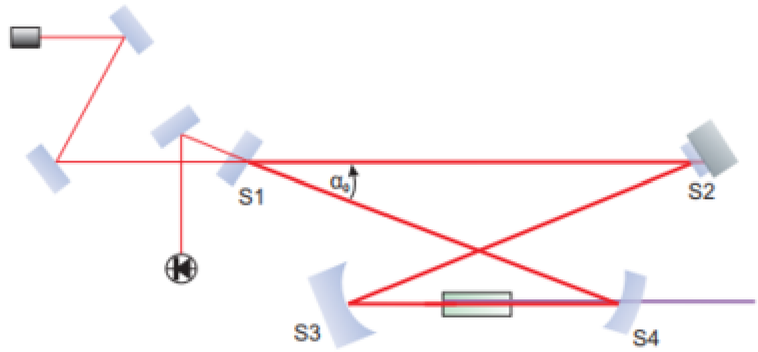
- Lenght: 15 mm
- AR coating

Resonator

- Ring resonator (double Z configuration)
- Length: 280mm
- Curvature of mirrors: 50 mm (S3 and S4)
- Distance of mirrors: 64 mm
- Waist: 30µm (crystal), 130µm (long arm)
- Transmission: TS3 = 0.049%, T1 = 1.2 %
- Conversion efficiency ENL = 6.1*10^(-5)/W

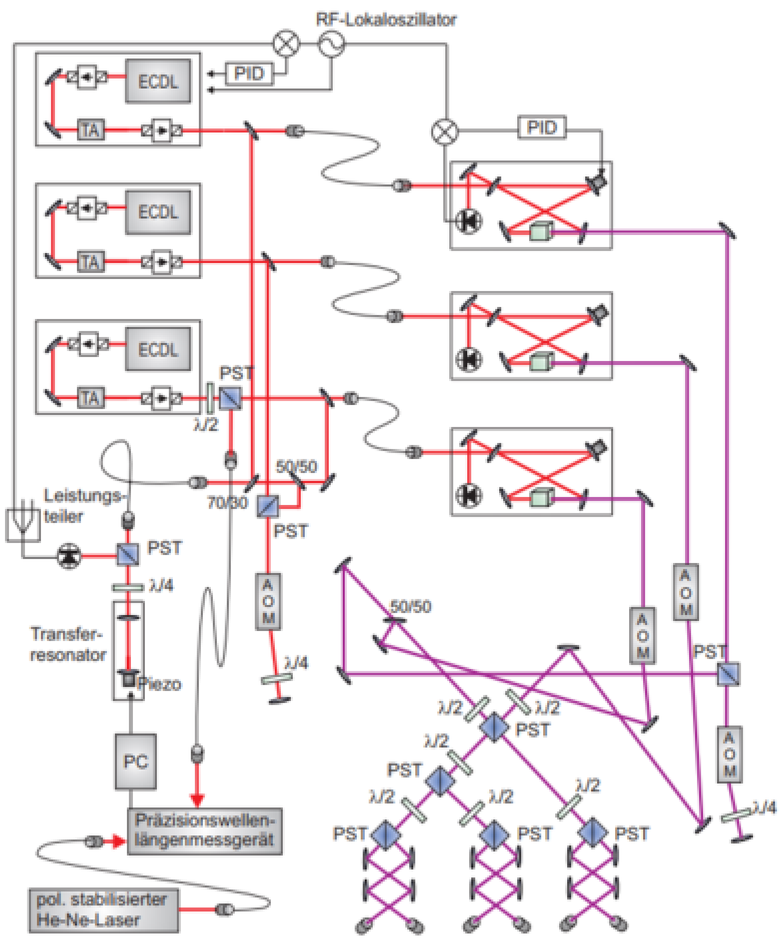
$$E_{NL} = \kappa L_c k_1 h_m (B,\xi) $$

- Linear losses: eL = 0.85(0.15) %
- Finesse: F = 270



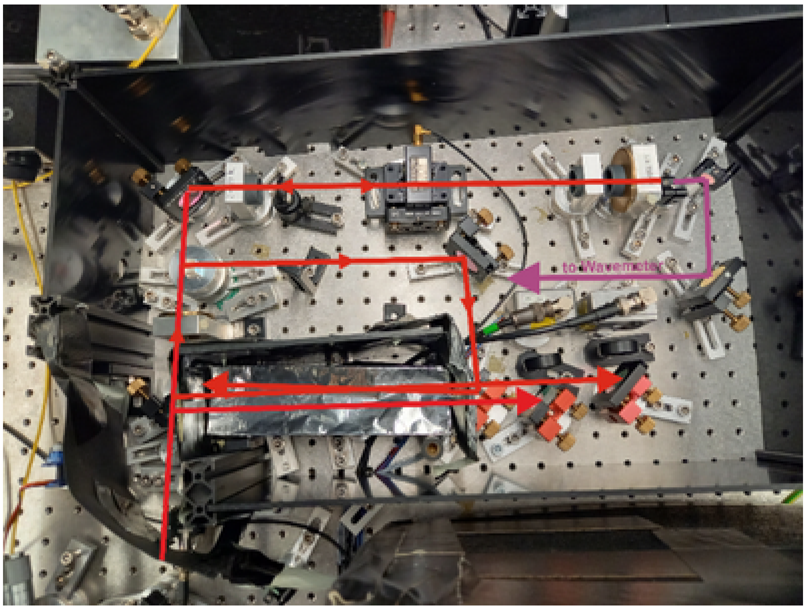
Stabilisation

- PDH-Method
- Error signal at about 20 MHz

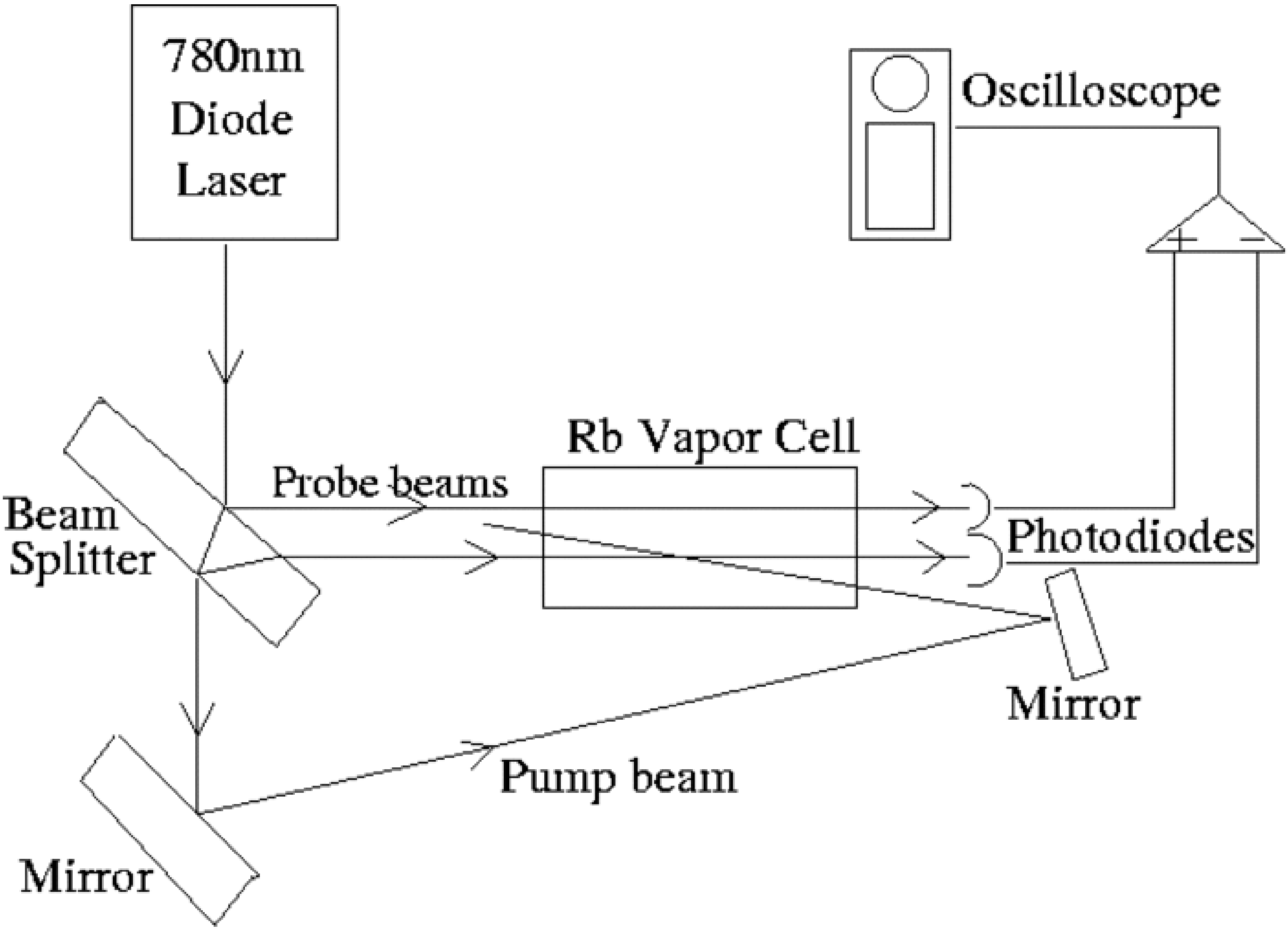


Stabilisation: Laser 4 - Potassium

Dopplerfree Saturation Spectroscopy on D1 line of Potassium:



- 1st the two beams with similar intensity are generated by the beam sampler and are send trough the glas cell
- one part of the initial beam is going trough the sampler to a double pass aom and then in the other direction trough the glas cell, crossing only one beam. Important: the beam coming from the aom must have a much higher intensity!
- the first two beams, coming from the sampler trough the cell are than monitored by the PD. The signal is substracted
- in or case e use the aom to create the peak on one side of the mainpeak. This is important for the lock-in scheme


780nm
Diode
Laser
Oscilloscope
Rb Vapor Cell
Probe beams
Beam
Splitter
Photodiodes
Mirror
Pump beam
Mirror