457 nm-Laser (Wutz)

Laser parameters

The system was build by Toptica (TA-SHG 110)

914 nm Master-Laser

- DL current: ~ 100 mA
- DL power: ~20-50 mW
- TA current: 1.67 A
- TA power: ~ 490 mW

457 nm SHG

- Operation outputpower: ~ 130 mW
- Max outpupower: 200 mW

Doublepass AOM (for Wutz)

- Modulation frequency: 104.674 MHz @ 7 dBm (1.7.2013)
- Diffraction Order: 2 x -1

AOM 1 (Transfer Light)

- Modulation frequency: 79.111 MHz
- Diffraction Order: +1
- Power infront the AOM: ~ 117 mW
- Power behind the AOM in 1. order: ~ 35 mW

Wutz Resonator

- EOM frequency: 9.7 MHz @ 15 dBm
- After fiber: ~ 300 µW
- Infront of iris next to resonator: ~ 200 µW

Wutz Resonator Adjustment

If there is no light coupled into the resonator

Adjust the beam with the mirror on the periscope so it passes the iris after that mirror. Then use the second mirror so the backreflected light overlaps with the incoming light. Alternatively, adjust the beam so it hits the center of the iris on the PDH photodiode. Modes should be visible now.

Finding and optimizing TEM00

Search for the smallest TEMnm mode you can find and lock the resonator too. Optimize the incoupling via the two incoupling mirrors by increasing the signal of the transmission photodiode. Now search for a smaller TEMnm mode and repeat the process until you can see/lock to TEM00. As a tip: Sometimes it is helpful to set the laser to scan mode and keep the lock enabled (without piezo-lock/integrator). Modes will occasionally be locked. Now adjust these “peaks”.

Adjusting RAM-compensation

Residual amplitude modulation happens when the input polarization of the EOM is incorrect (waveplate incorrect/temperature drifts) or residual etalons in the EOM are present (adjustment through EOM under biggest angle to reduce etalons).

Generally the paramters for the RAM-Compensation do not need to be adjusted. Here is the procedure on how to compensate the RAM.

- Disable the light-modulation by unplugging the input-cable of the EOM-amplifier
- Use the lambda infront of the cube of the resonator to split the power to PDH and RAM photodiode equally. Check this by taking a look at the DC ports of both photodiodes.
- Now go to RAM-Compensation box and set the offset of the PDH and RAM error signals to be zero by tuning the poti and looking at the corresponding monitor ports.
- Enable the light-modulation again (put back the input-cable to the EOM-amplifier)
- Turn the waveplate infront of the EOM a bit. The RAM error signal on the RAM-Monitor of the RAM-Compensation-Box should increase now. (Also the PDH signal should shift now but that is unimportant now).
- Adjust the RAM-gain on the RAM-Compensation-Box until the RAM-compensated error signal (see output port of the Box) is symmetrically centered around zero volts.
- Now turn the waveplate infront of the EOM again until the the RAM error signal on the RAM-Monitor of the RAM-Compensation-Box is at zero volts.
- RAM is now minimized (waveplate/polarization is correct) and actively measured and compensated (RAM-Compensation-BOX).