Clocklaser

Put a **paper infront R1 and R2**, when beam adjustment! Too high input power can damage the mirrors of the resonator!

Typical values and datasheets of the clocklaser system

Laserdiode (ECDL)

- Datasheet
- Testsheet [Serial Number: BA-02465]
- Testsheet [Serial Number: BA-02464]

- Temperature Laserdiode (marking 1):
  - act: 24,4°C [Sep, 2019]
  - set: 24,4°C [Sep, 2019]
  - min-max: 15°C - 35,1°C [Sep, 2019]
  - act: 24,5°C [2018]
- Typical Current Laserdiode (marking 1):
  - act: 98 mA [Sep, 2019]
  - set: 97/98 mA [Sep, 2019]
  - act: 96 mA [2018]

Tapered Amplifier (TA)

- Typ: EYP-TPA-0915-01500
- Datasheet:

EYP-TPA-0915-01500

Light with input power of min **10mW** must pass TA! Maximum current is **3A**. Otherwise the TA will be broken

- Temperature TA (marking 2):
  - act: 20°C [Sep, 2019]
  - set: 20,1°C [Sep, 2019]
  - min-max: 15 - 35,1°C [Sep, 2019]
  - act: 20°C [2018]
- Typical Current TA (marking 2):
  - act: 1364/ 1453 mA [Sep, 2019] wieso zwei verschiedene Werte? Beim Einschalten PID

wird Strom größer

- act: 1201 mA [Nov, 2019 nach Einstellen l/2, um mehr Leistung an Leistungsstab. zur Verfügung zu stellen]
- set: 1464 mA [Sep, 2019]
- max < 1,5 A
- act: 1176 mA [2018]

Turning on and off the clocklaser system

Turning on the laser

We use toptica electronics:

1. Turning the main-key to on. The LED´s from the temperature control will go on!
2. Push the green button. The green LED from the button will go on!
3. Switch on the toggle (=Kippschalter) of the laserdiode controller. The green LED of the laserdiode controller will go on!
4. Switch on the toggle of the TA, if he is seeded! The green LED of the TA controller will go on!

Note: If the switches are on, then not steps 3. & 4.

Turning off the laser

Note: Both toggles to switch off the laserdiode and TA are not required!

1. Push the red button. The green LED will go out!
2. Turning the main-key to “mains”

Only turning off the laserdiode

1. Switch off the toggle from the TA. The green LED from the TA module will go out!
2. Switch off the toggle from the laserdiode. The green LED from the laserdiode module will go out!

Only turning off the TA

1. Switch off or on the toggle from the TA. The green LED from the TA module will go out!

Fast Locking of R1

1. Check laser frequency with wavemeter: XXX
2. Check laser power @ upstairs PD: Display should shown stop position
3. Check modes of scan cavity: Has to be single mode

Note: If cases 1, 2 and 3 are given, then lock the laser like:

1. XXX Das darfst du schreiben mit welchen Knopf wann gedrückt wird
2. XXX
3. XXX

Errors

A) To less power @ upstairs PD
B) To less power @ scan cavity
C) Acoustic Signal of TA controller

Solution of **A**, **B** and **C**: In most cases it is sufficient to increase incouple power of TA

Necessary lock power: ~200mW An welcher Stelle?

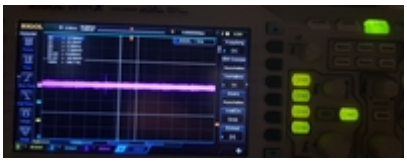
1. turn off the TA lock:
    1. turn off the I and P switch
    2. Note: D is always off
2. Adjust the incoupling power in the TA with mirror XYZ in vertical direction until Errors A and B are fixed
3. Lock of TA
    1. If the incoupling is good → ~1A - after TA (Pos.C): ~200mW

Power up the clocklaser system

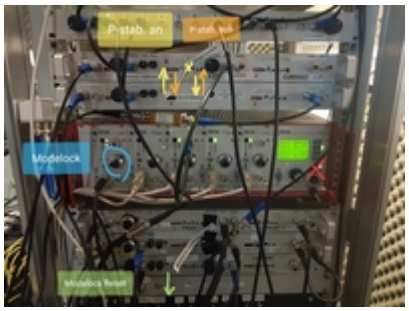
Laser

1. Check power of Laserdiode direct after laser housing (Pos.A)
2. TA Lock
    1. first Check:
        1. *Info: necessary lock power: 200mW*
        2. If the incoupling is good → ~1A - after TA (Pos.C): ~200mW
        3. fast acoustic Signal means the powerstabilisation warning (lock power too low gibt

es noch andere Gründe?)



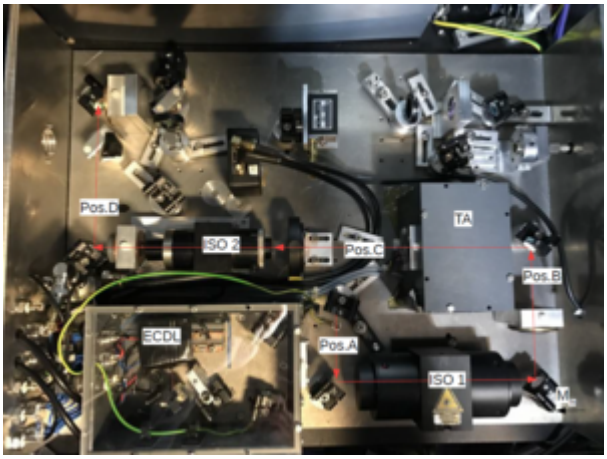
1. If the incoupling is bad (frequent cause of powerstabilisation warning/ show “error 1”):
    1. P-Stab. off (PID) & block the beam!
    2. adjust mirror MTA (horizontal beam way); references are the peaks (CH4) of Single-Mode-Signal (show “ideal situation”)
    3. Test and switch on the P-stab. (beam is blocked!): warn signal on?
    4. if the acoustic signal is off > measure the incoupling power (Pos.E) max. ~120müW
    5. Lock the Resonator

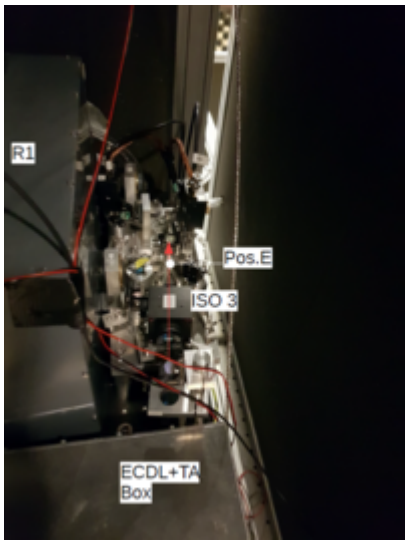


R1

1. Modelocking of R1
    1. Tune the Piezo upto TEM00 is observable
    2. if necessary use Mode-Reset
2. Intensity Lock of R1
    1. after Isolator (ISO3) direct infront R1 (Pos.E): max. ~120müW / min. ~100müW
        1. otherwise improve the optical way to the Isolator for more power
    2. mit Output Offset des Intenstitäts-PID auf 100müW herunterdrehen
3. **HENCE:** Check **always** Power after Isolator of R1: **not more than 100müW!!!**
4. **Only aktivate PDH/TA-Lock + couple into R1, if the power is 100(±20)müW after the Isolator of R1**
5. Modelocking of R1 (Step 1)
6. Lock RAM
7. Lock Fiberstabilization

Littmann design





Typical efficiencies at 916 nm:

- Isolators: 80 %
- AOMs: 50-60 %
- Fiber coupling: 50 %

Typical values for the laser:

- Frequency: 327.5293 THz (doubled upstairs directly behind SHG: 655.058 566 THz)
- Frequency: 327.5294 THz [Sep, 2019]
- Power after ECDL (Pos.A):
  - ~11,2 mW (@~97/98 mA) [Sep, 2019]
  - ~12 mW (@ ~90 mA) [2016]
  - ~XX mW (@ ~96 mA) [2016]

- Power front of TA (Pos.B):
  - ~ 9 mW [Sep, 2019]
- Power after TA (Pos.C):
  - ~290 mW (@~1364 mA) [Sep, 2019]
  - ~XX mW (@ ~1165 mA) [2018]
  - ~200 mW (@ ~1000 mA) [2016]
- Power after TA (Pos.D):
  - ~ 230 mW (@~1364 mA) [Sep, 2019]
- Power in front of ISO3
  - ~ 135müW (@~1364 mA TA) [Sep, 2019]
- Power in front of ISO3
  - ~ 120müW (@~1364 mA TA) [Sep, 2019]

TA current should be <1.2A noch richtig, wenn jetzt 1,4A? otherwise the fiber stabilization will soar (=aufschwingen)

Typical values in front fibers:

- Power before fiber for wavemeter/comb/mode analysis cavity:
  - ~12 mW [2016]
  - ~XX mW [2018]
- Power before AtomLabFiber:
  - ~30 mW → 15 mW upstairs before TA [2016- without fiber stabilization]
  - ~XX mW → 20 mW upstairs before TA [2018]
- Power to R2:
  - ~2.5 mW [2016]
  - ~XX mW [2018]

Typical values after fibers:

- Power before fiber for
  - Comb:
    - ~XX mW [2018]
  - Wavemeter:
    - ~XX mW [2018]
  - Scan cavity:
    - ~XX mW [2018]
- Power after AtomLabFiber:
  - 20 mW upstairs before TA [2018]
- Power after R2 fiber:
  - ~XX mW [2018]

Typical values for the resonators:

- In front of telescope: 2.2 mW
- In front of AOM: 1.5 mW
- In front of fiber: 450 µW
- 100 µW between Isolator and BS
- 50 µW in front of Resonator

Typical values for locking signals:

- PDH error signal locked ~500 mV PP / unlocked ~200 mV PP
- Intensity Error signal ~2 mV PP / DC:
- Fiber Stabilization Locked ~200 mV PP / Unlocked ~2 Volt PP

Manuals and Datasheets