

# USLO



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## Setup

### Resonator

- [Mirrors/Contamination](#)
  - [Substrates](#)
- **Finesse measurement**
  - **Finesse measurement outside vacuum**
    - [Finesse measurement without spacer](#)
    - [Finesse measurement with spacer](#)
    - [Birefringence measurement with spacer](#)
  - **Finesse measurement inside vacuum**
- [ULE-compensations-rings](#)
- [Spacer](#)
- [Optical Mask](#)
- [Optical Contacting](#)
- **Calculations**
  - [Calculation of Finesse outside vacuum](#)
  - [Calculation of reflectiondip / Impedance of the cavity](#)
  - [Calculation between cavity spectrum and frequency distance](#)
  - [Calculation of EOM frequency](#)
  - [Calcualtion of linewidth](#)

## Mounting

- [Mounting](#)
- [Cleaning of the mounting](#)

## Vacuum

- **Vacuum tests**
  - [Vaccum tests](#)
- **Bake out**
  - [Bake out tips](#)
  - [Bake out List](#)
  - [Bake out protocol](#)
- **Vacuum Components**
  - [Vacuum chamber](#)
    - [CF-components: Pump, Sensor, Valves, etc.](#)
      - [Attaching of the vacuum feedthroughs](#)
    - [Seal material and vacuum suitable glue](#)
    - [Anpressring für die Fenster](#)
- **Heat shield´s**
  - [Components: Heat shield and vacuum suitable screws](#)
    - [Electrolytic polishing](#)
    - [Mass spectrometry](#)
    - [Determination of transport screws for the resonator](#)
    - [Attaching of the windows on the heat shields](#)
- **Vacuum optics**
  - [Optical components inside the vacuum: Windows and isolator](#)
  - [Attaching of the windows on the vaccum chamber](#)

## Optics

- **Incoupling breadboard**
  - [Incoupling breadboard](#)
  - [Components](#)
  - [Mode Matching](#)
- **Outcoupling breadboard**
  - [Outcoupling breadboard](#)

## Electronics

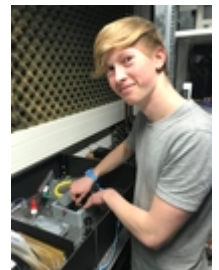
- **Electronics inside the vacuum**

- Components for the electronics inside the vacuum and accessories
- Instructions for attaching the electronic and labelling of the NTC's
- Characterization of the NTC's
- **Electronics outside the vacuum**
  - PTB electronic assignment
  - Components for the electronics outside the vacuum
  - Labelling of the cables

## Laser at PTB

- Company: NKT Photonics
- Fiber laser Koheras Basik Module
- Product type: K122-102-665
  - Wavelength: 1542.14 nm
  - Power setpoint: 40 mW
  - Power Range: 12-40 mW
  - Wavelength tuning: -499.9 ... +570 pm
  - Power stability 0.01 dB

## Laser at IQ



- [Todo List](#)
- Wavelength: 1560.47 nm
- ITU channel number 21, 192.10 THz, 1560.61 nm
- [Laserdiode](#)
- [Laserdiode Mount](#)
- [Laser driver](#)
- [Pin assignment/Cables](#)
- [Temperature Controller](#)
- [Laser Housing](#)
- [Characterisation](#)
- [SHG \(1560nm -> 780nm\)](#)

## Fiber setup

- Fiber-components
  - Fiber-Photodiode (IQ Version)
  - EOM and AOM Box
- Electronic-Components
- Fiber-connections

## Vibration isolation

- **Vibration isolation**

## Monitoring

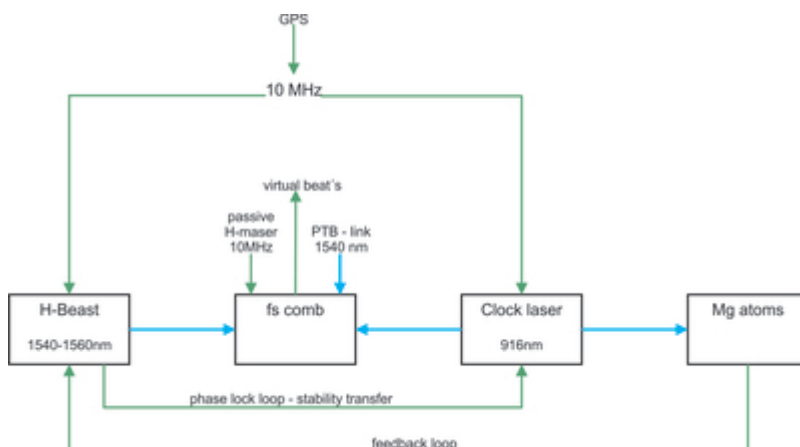
- Temperature and vacuum pressure monitoring

## Performance / Measurements

- Thermal noise limit
- Pound-Drever-Hall (PDH)
- Residuelle Amplitudenmodulation (RAM)
- Vacuum pressure

## Future Setup @ IQ

- Frequency doubling 1560 - 780 nm
- **Transfer of stability:**
  - Providing 10–16 Short-Term Stability of a 1.5- $\mu\text{m}$  Laser to Optical Clocks  
, C. Hagemann et. al., IEEE Transactions on instrumentation and measurement, VOL. 62, NO. 6 (2013)



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