Ultra-stable local oscillator (H-Beast)

- Labbook

- ToDo
- List of ideas/open questions
- Wishlist

- List of orders and status
- Paper
- List of collaboration partner and companys

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

Fiber setup

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

- **Vibration isolation**

Performance / Measurements

- Thermal noise limit

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

Future Setup @ IQ

- **Transfer of stability:**
    - Providing 10−16 Short-Term Stability of a 1.5-μm Laser to Optical Clocks , C. Hagemann et. al., IEEE Transactions on instrumentation and measurement, VOL. 62, NO. 6 (2013)