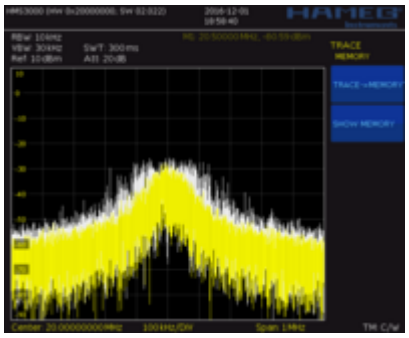
Frequency Comb

Setup

Typical Values

Achtung: Gemessene Werte enthalten auch andere Wellenlängen!!! Es wurde nur mit dem Thorlabs-Power-Meter die Wellenlängen verändert, dieses aber nicht selektieren kann! Daher wird gleichzeitig >600nm Licht gemessen.
Gemessene Werte im Januar 2017

- Laser diode current: 9.0
- AC: 950, DC: 850 (in Fiber laser software)
- Powers:
  - after fiber laser: ~ 200 mW @ 1560 nm
  - after SHG:
    - ~ 35-40 mW @ 780 nm
    - ~ 95 mW @ 1550 nm
  - direct after filter:
    - ~ 32 mW @ 780 nm
  - direct infront PCF:
    - ~ 300 mW @ 780 nm without filter
    - ~ 20 mW @ 780 nm with filter
    - ~ 8 mW @ 1550 nm without filter
  - after PCF:
    - ~ 8.5 mW @ 780 nm without filter (red light should be visible)
    - ~ 1.8 mW @ 780 nm with filter
    - ~ 250 µW @ 1550 nm without filter
- Clock Laser / DUT ~ 5 mW; FWHM « 100 MHz
- (right picture is an old measurement and we don´t know where in the comb)
- CEO frequency has a linewidth of ~500kHz
  - yellow = good lock
  - white = bad lock, because the platform and width



Electronic part

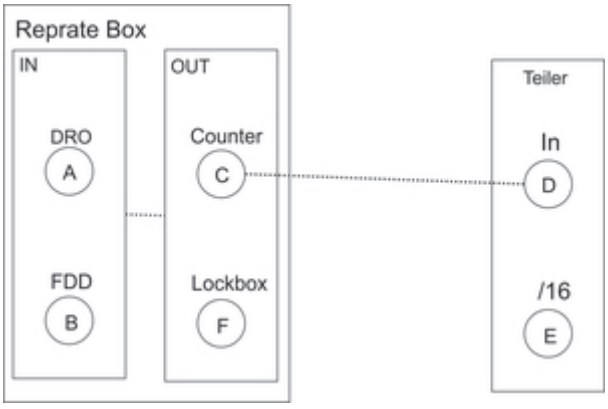
Reprate

Repraten Aufbau ab Oktober 2018

<fc #ff00ff>Siehe Foto</fc>

- DXD200 Phase Detector:
    - Lock on
- PIC201 Lockbox
    - Offset on
    - Invert on

Repraten Aufbau bis Oktober 2018



- Die Reprate kommt vom Synthesizer: 10*f_rep
- 10*f_rep geht in die Reprate-Box [A] IN
- Photodioden Signal des Frequenzkammes von “RF OUT” in die Reprate-Box [B] IN
- Dort wird [A] und [B] gemixxt und intern zum “OUT” geschickt
- Der Beat [C] zwischen [A] und[B] wird zum Teiler [D] geschickt und /16 geteilt [E]
- [E] wird zum Counter geschickt
- [F] wird zum Reprate-PID geschickt

- Der Beat zwischen der 10. Harmonischen von der Photodiode mit 10*f_rep ist 0 und wird als Fehlersignal benutzt
- Rapraten PID steuert Piezo im Resonator (Länge: 1.5m ~ FSR= 100MHz)
- Reprate ist fouriertransformiert der zeitliche Abstand zwischen zwei Pulsen

Regular problems

- Comb has to be optimized almost every day: Most of the times just tuning potis @ SHG & PCF is enough (see picture)

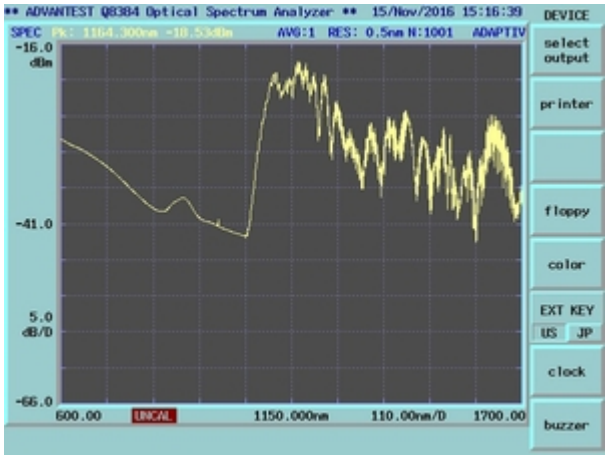
- Low power in general: Maybe pump diodes should be exchanged (15.09.2016: 145 mW Output @ 9.5)
- Fiberlaser software does not start: Maybe wrong COM Port: Change @ Windows Device Manager
- FiberLaser software starts, but Fiber Comb does not: Maybe NI card not attached properly
- You can´t lock CEO and Reprate, than restart the hole lasersysteme [probable all ~1-2 months].

Turn off and on

- Turn off the frequency comb:
    1. Push Amplifier button (LED off)
    2. Push Laser button (LED off)
    3. turning the upper key (position 0)
    4. turning the lower key (position 0)
- Turn on:
    1. exactly the other way arround

1064 Port

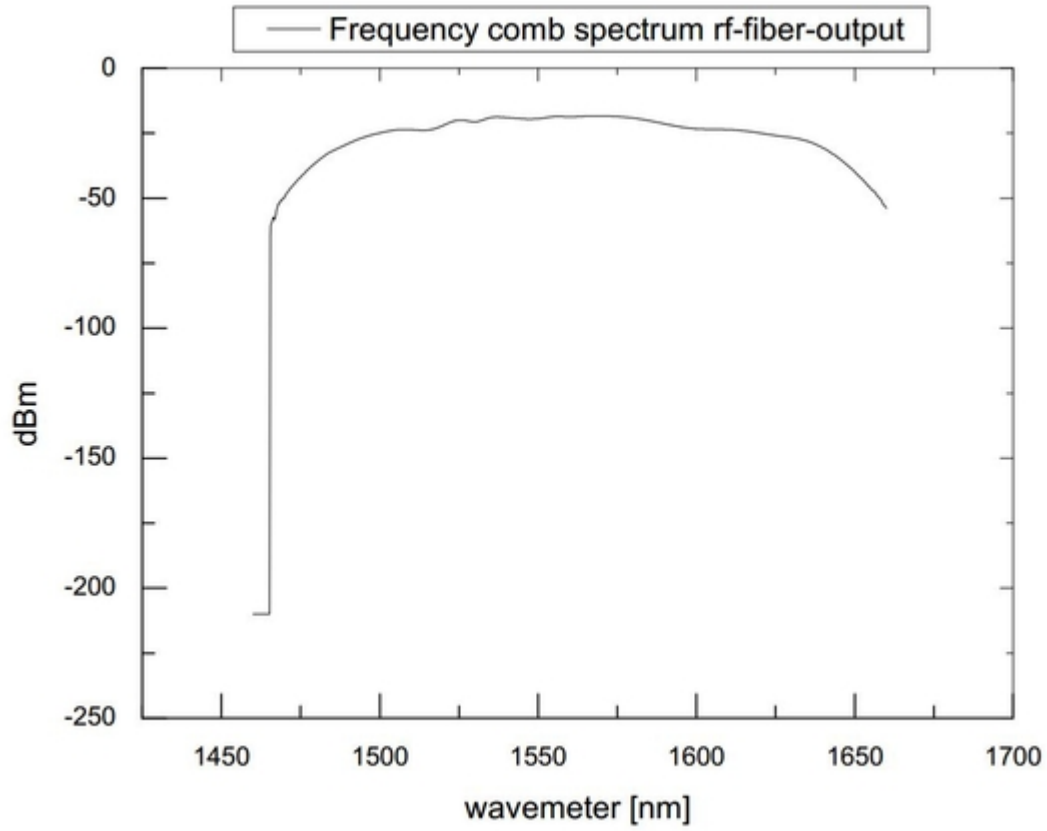
Data under ResLab: D:\Dokumente\Daten\Frequenzkamm\Spektren 161115 1064 nm Port.

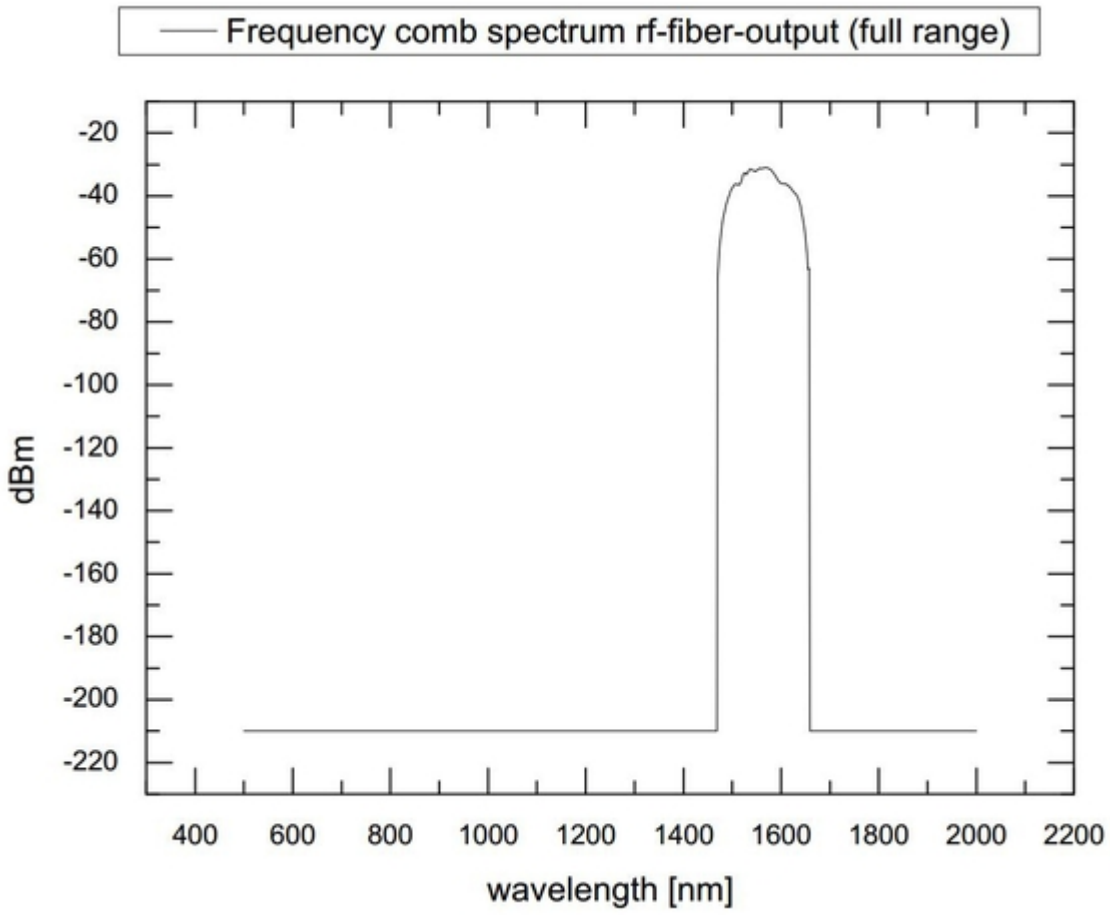


Rf-output-fiber

- measured with optical spectrumanalysizer from AG-Morgner
- Resolution: for peak 0.2nm and full range measurement 1.5nm
- pdf-files:

frequency_comb_spectrum_rf-fiber-output.pdf
frequency_comb_spectrum_rf-fiber-output_full_range_.pdf

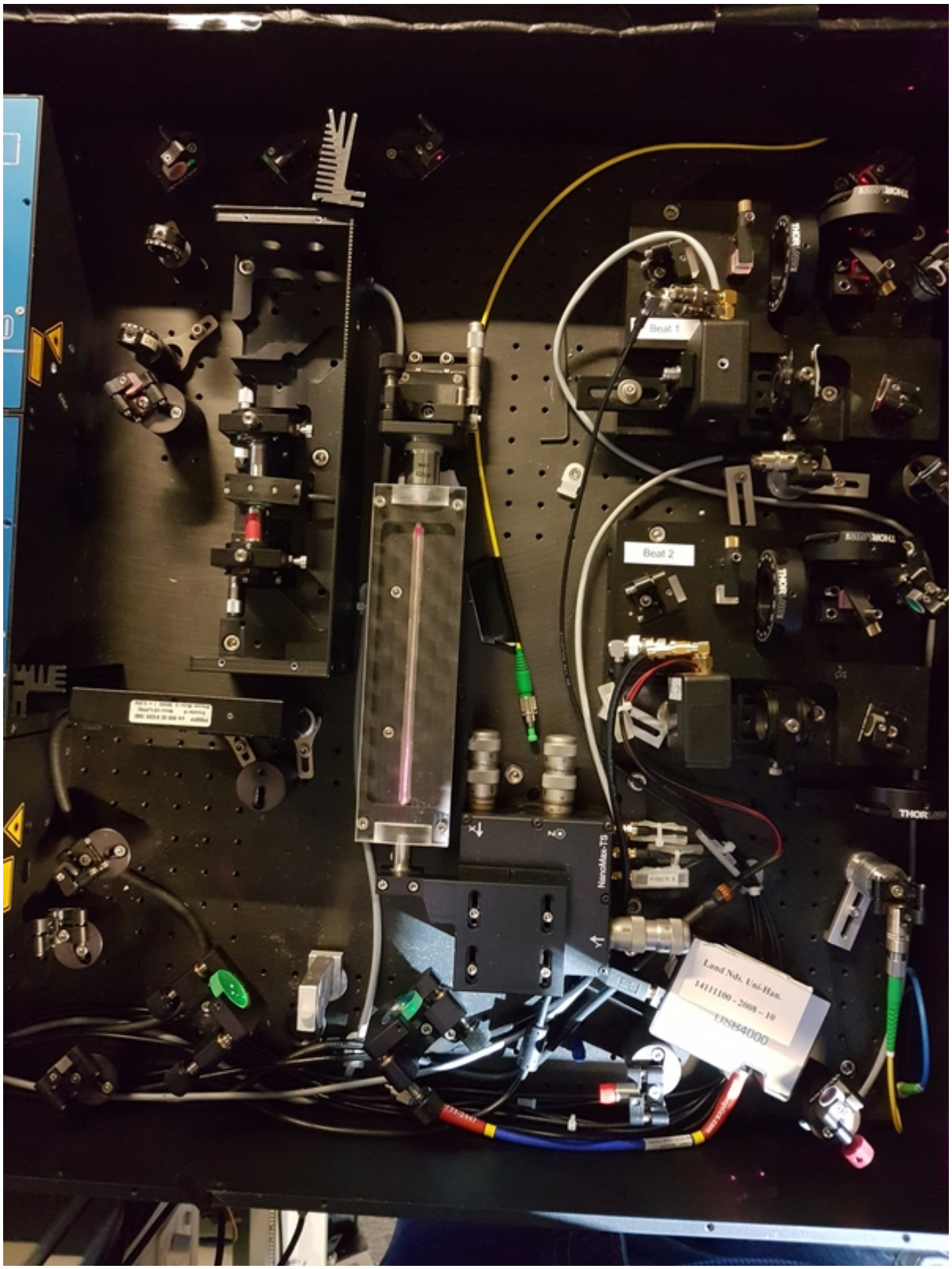


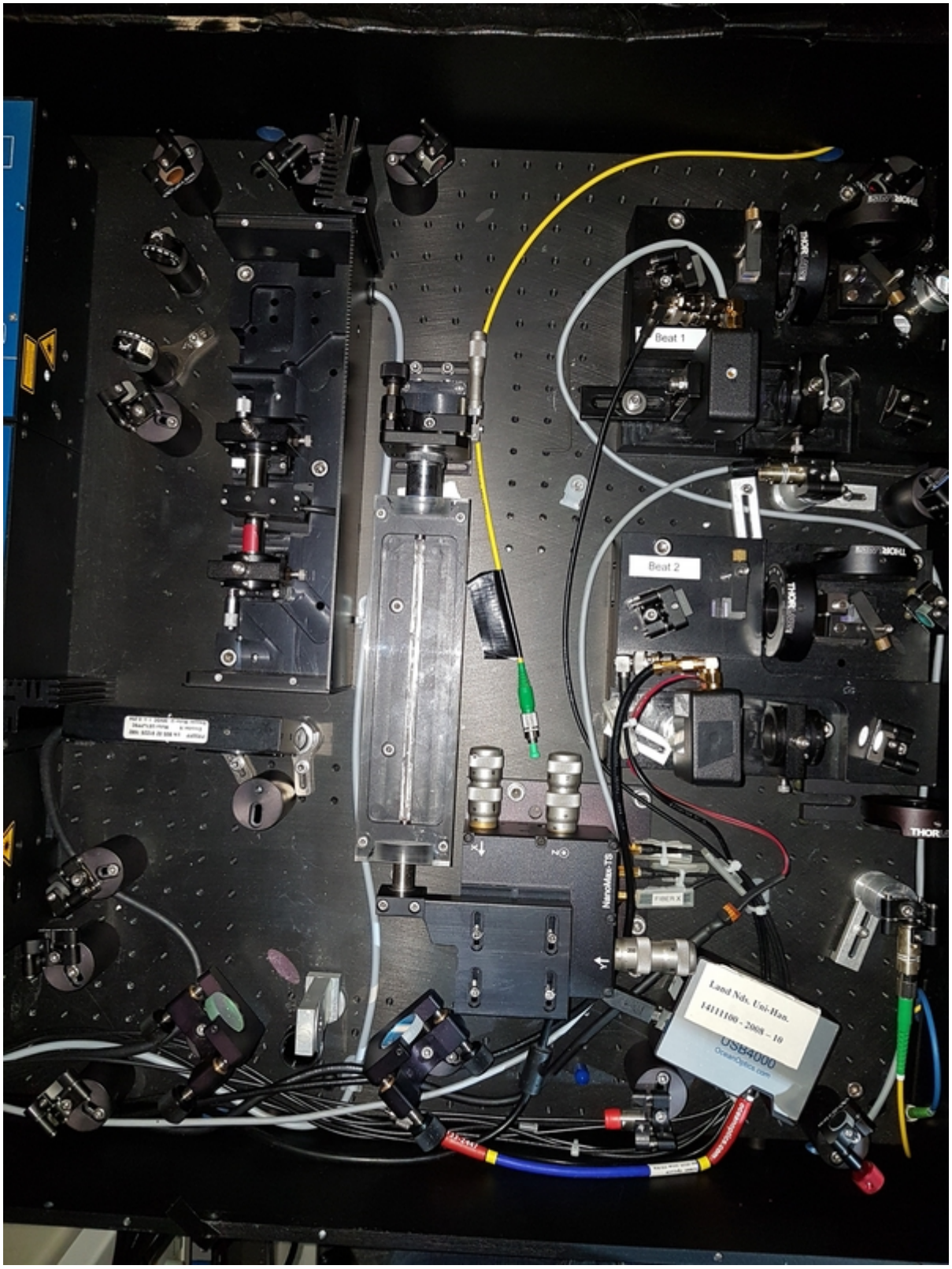


Manuals and Datasheets

- Software for FiberLaser
- Software for Fiber Comb Control

Pictures from the inside of the frequency comb


Beat 1
Beat 2
NanoMax-TS
Land Nds. Uni-Han.


Beat 1
Beat 2
Land Ndx. Uni-Han.
14111100 - 2008 - 10
USB4000
OceanOptics.com