

Frequency Comb

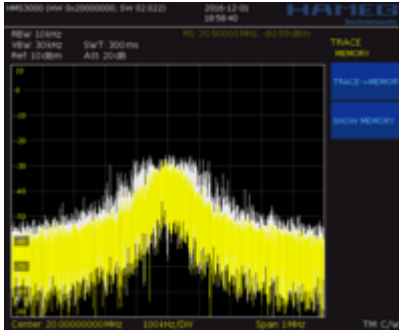
Setup

Typical Values



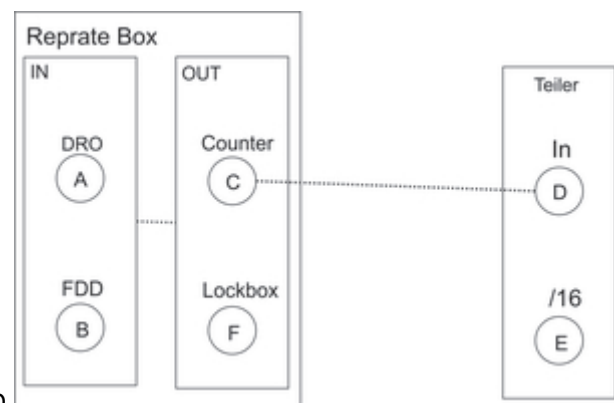
Achtung: Gemessene Werte enthalten auch andere Wellenlängen!!! Es wurde nur mit dem Thorlabs-Power-Meter die Wellenlängen verändert, dieses aber nicht selektieren kann! Daher wird gleichzeitig >600nm Licht gemessen.
Gemessene Werte im Januar 2017

- 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 μ W @ 1550 nm without filter
- Clock Laser / DUT ~ 5 mW; FWHM $\ll$ 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



- Die Reprate kommt vom Synthesizer: $10 \cdot f_{\text{rep}}$
- $10 \cdot f_{\text{rep}}$ 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] gemixt 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 $10 \cdot f_{\text{rep}}$ 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].

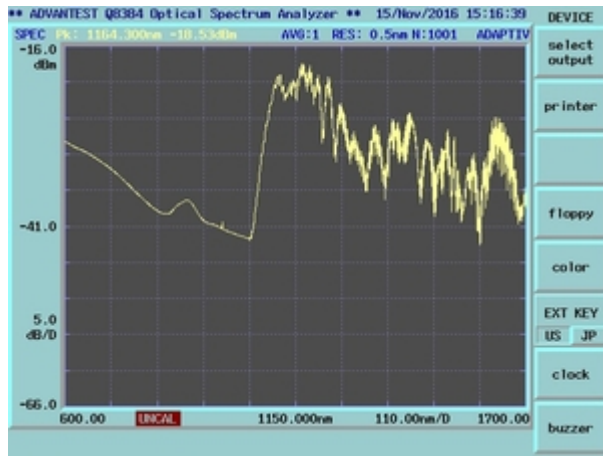
Turn off and on



- 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 around

1064 Port

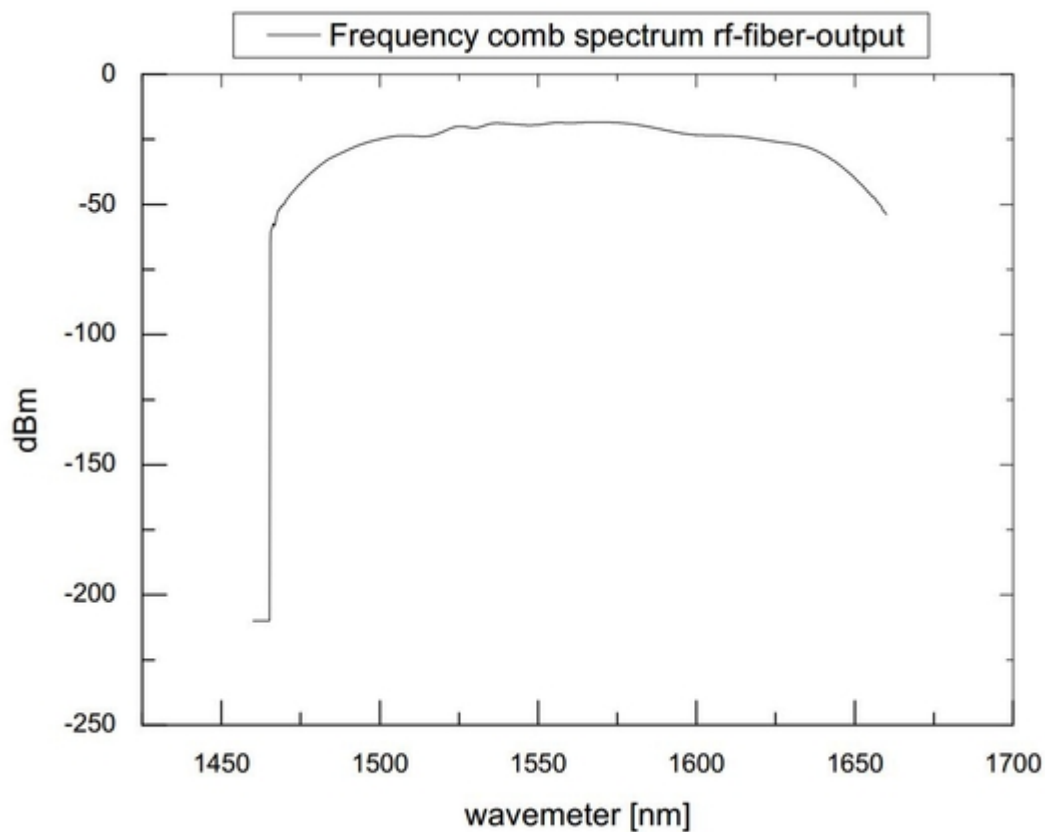
Data under ResLab: D:\Dokumente\Daten\Frequenzkamm\Spektren 161115 1064 nm Port.

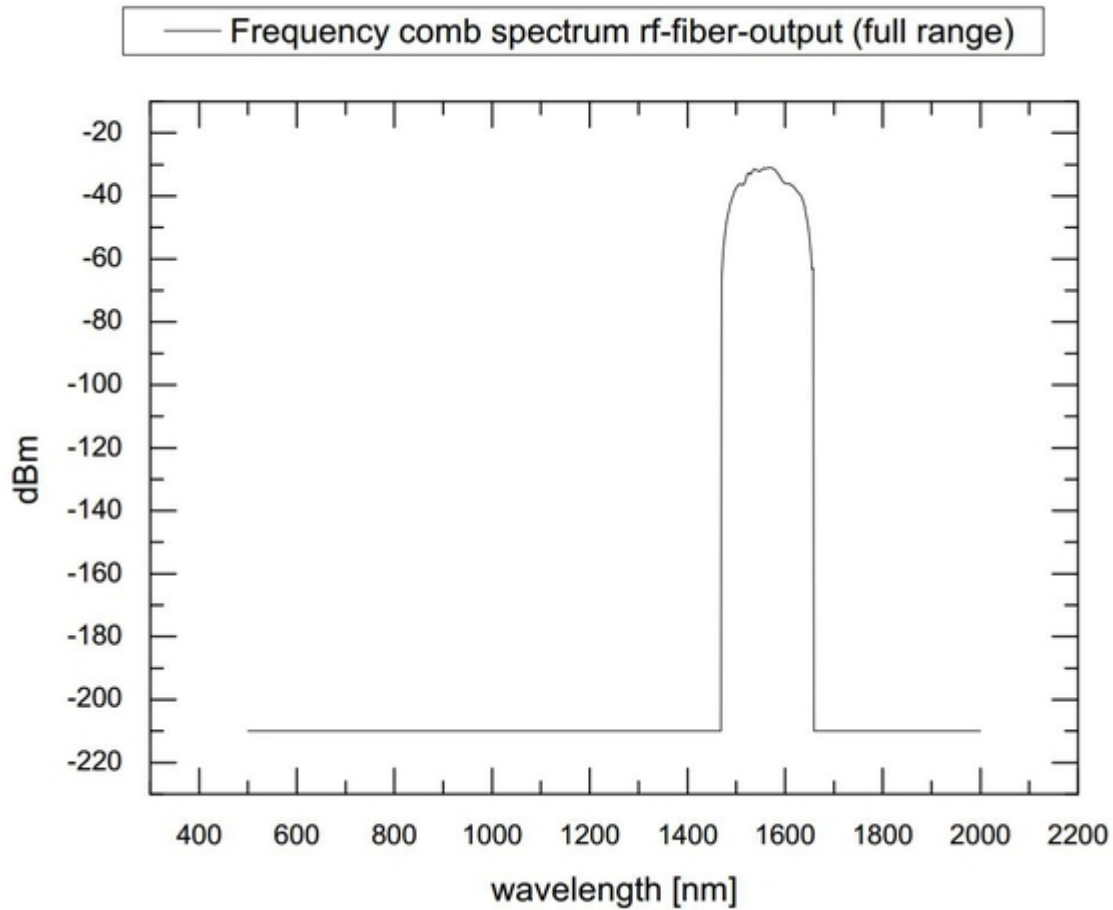


Rf-output-fiber

- measured with optical spectrum analyzer 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

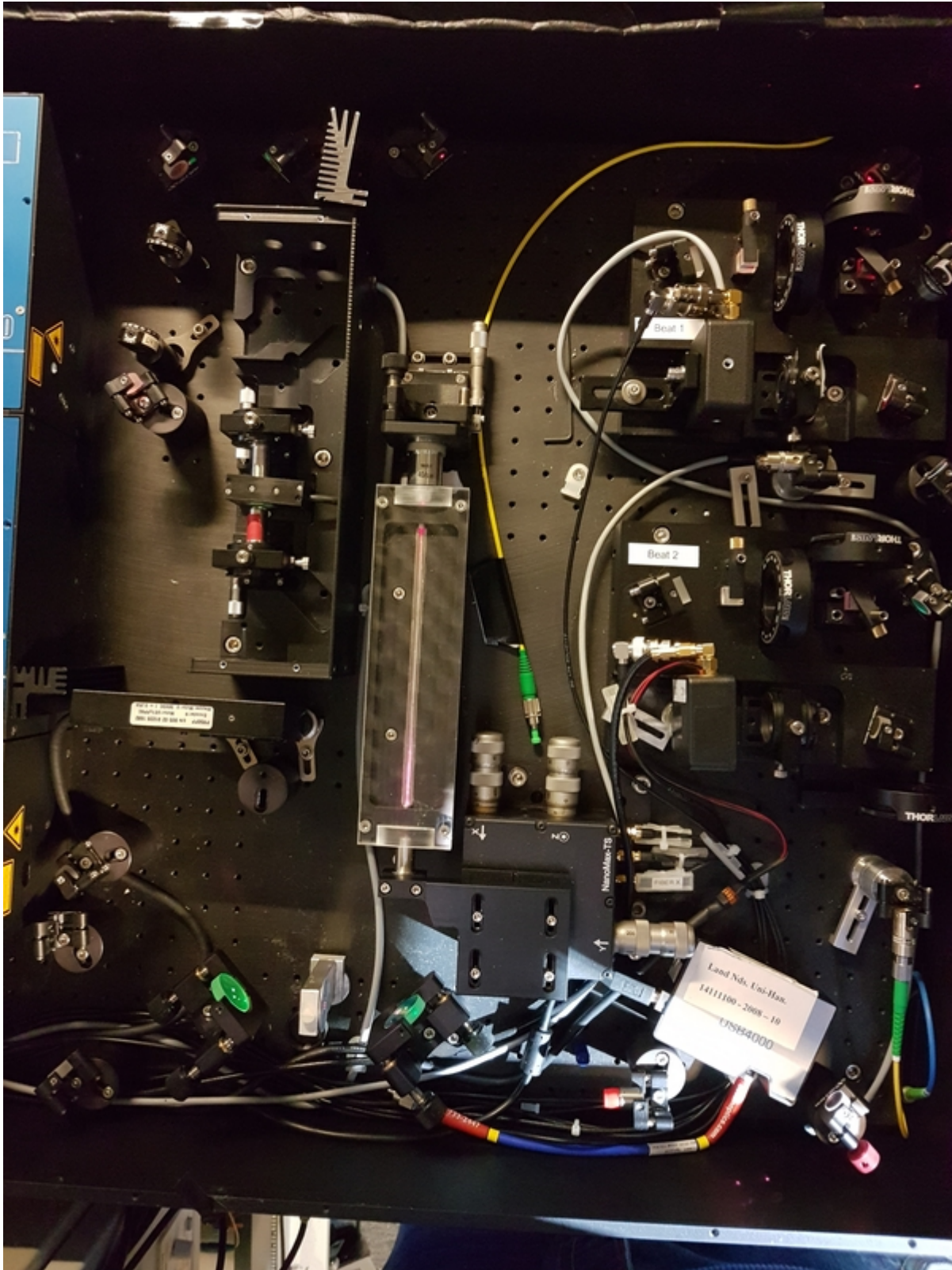


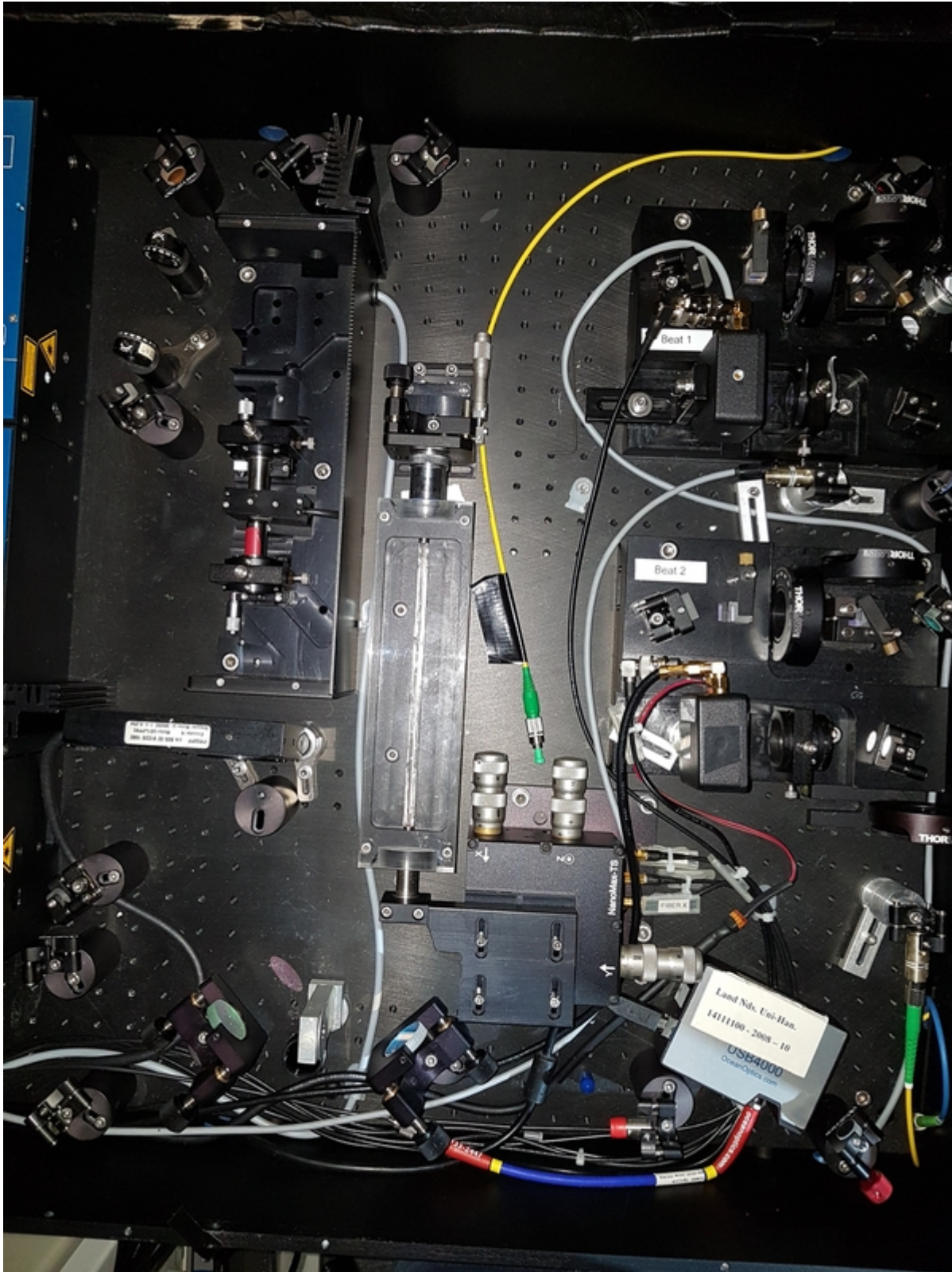


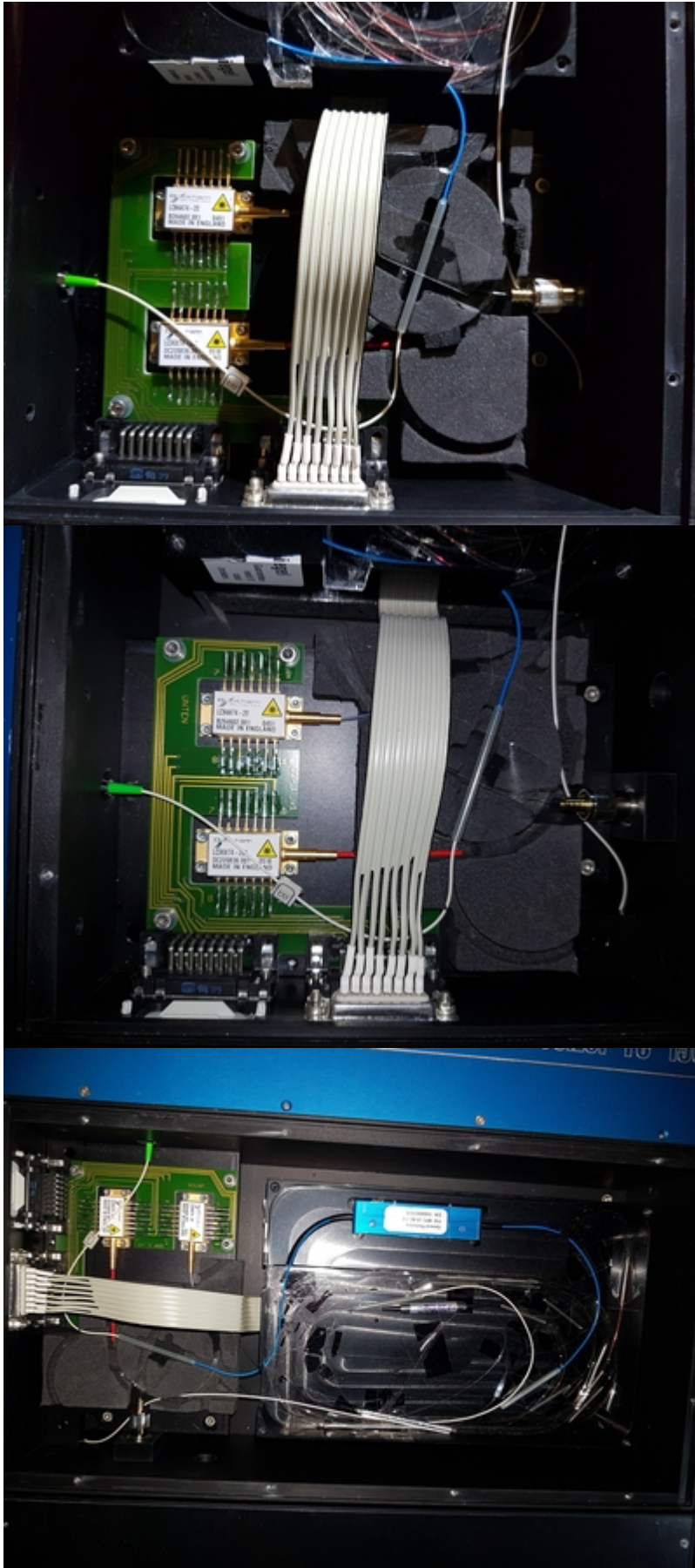
Manuals and Datasheets

- Software for [FiberLaser](#)
- Software for [Fiber Comb Control](#)

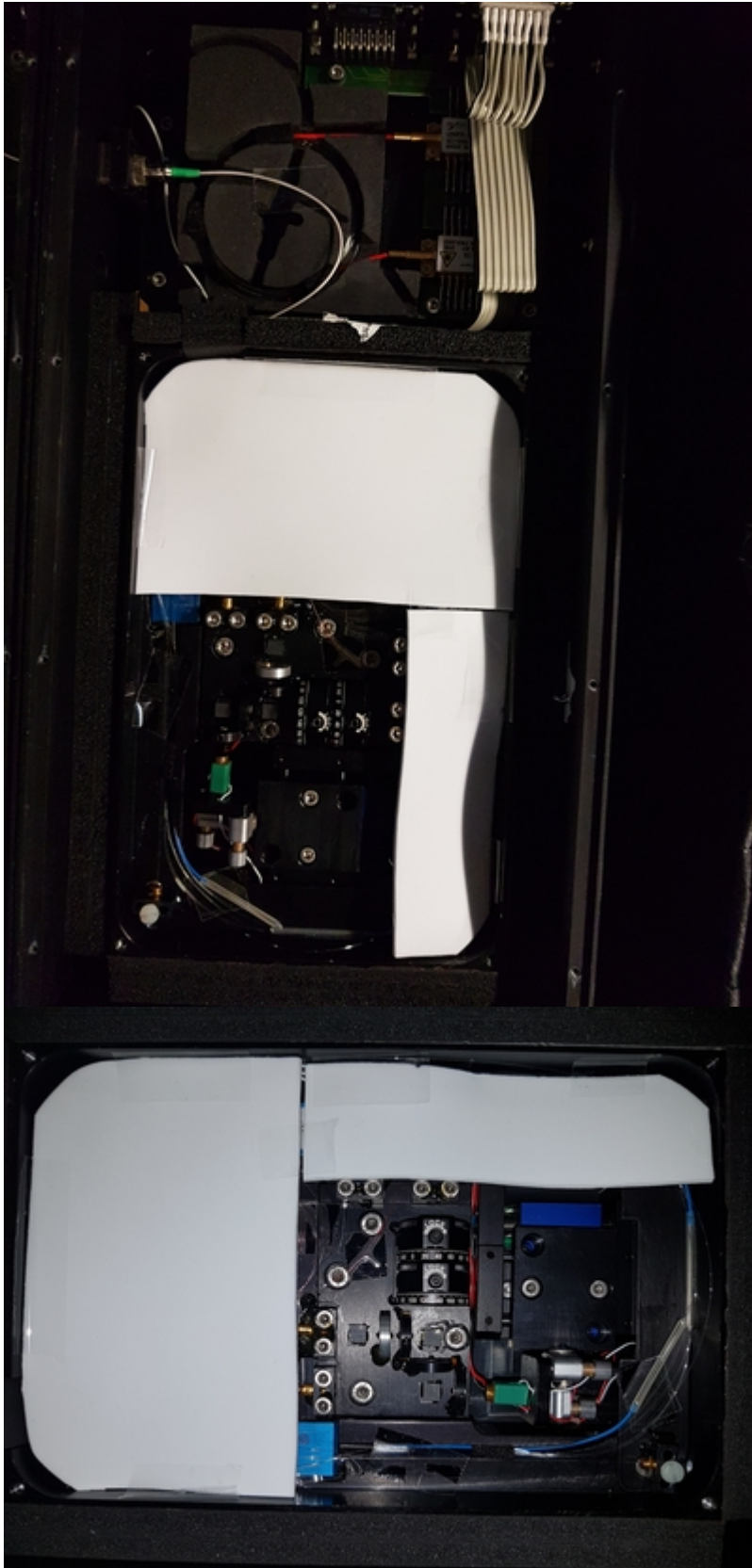
Pictures from the inside of the frequency comb



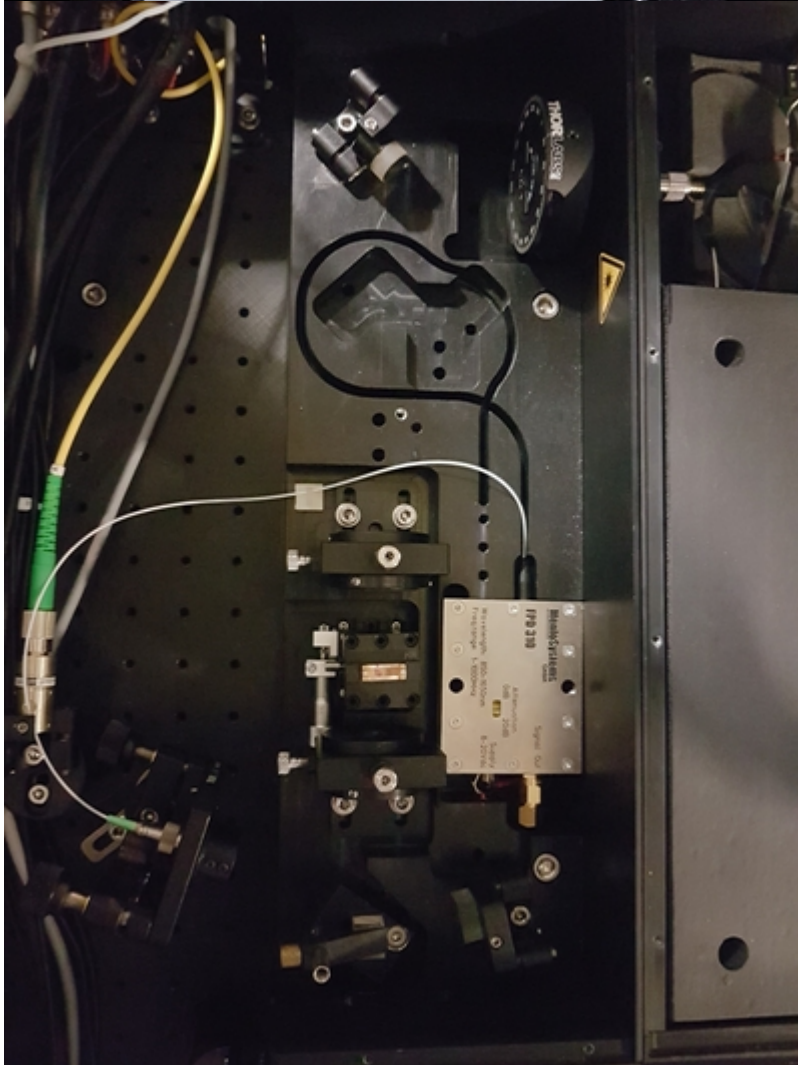
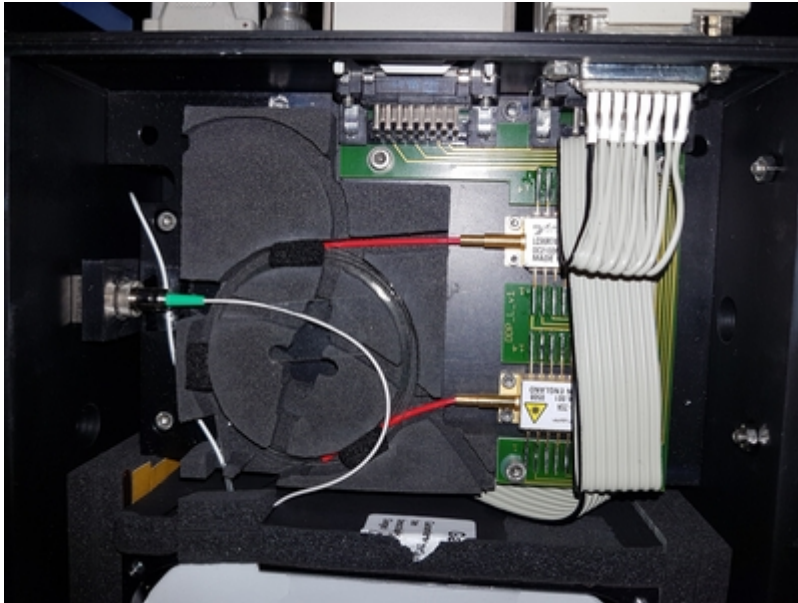


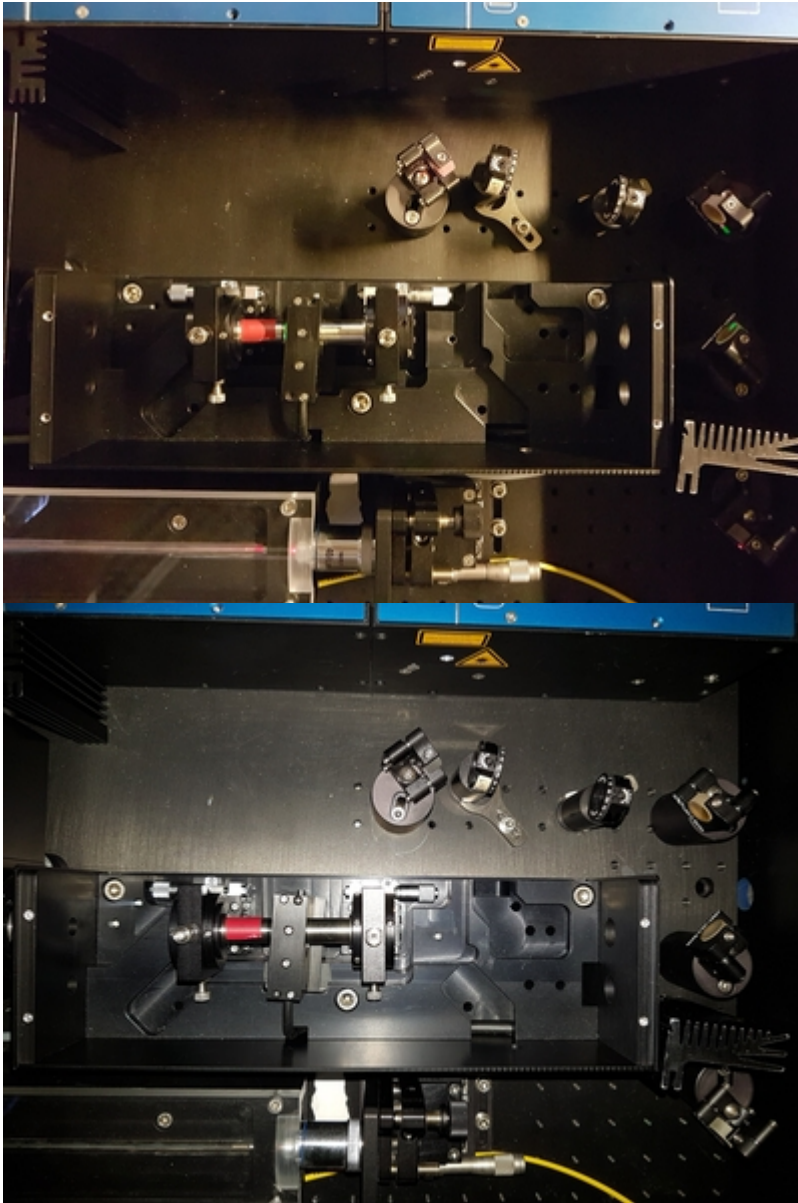


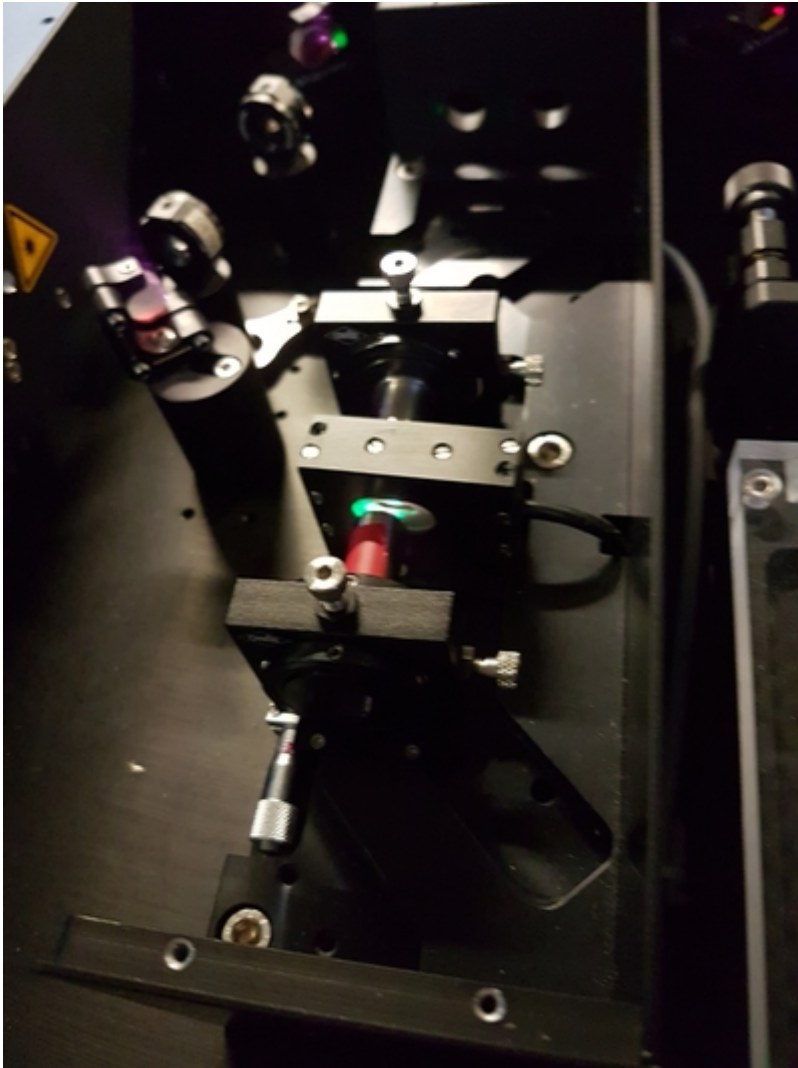












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