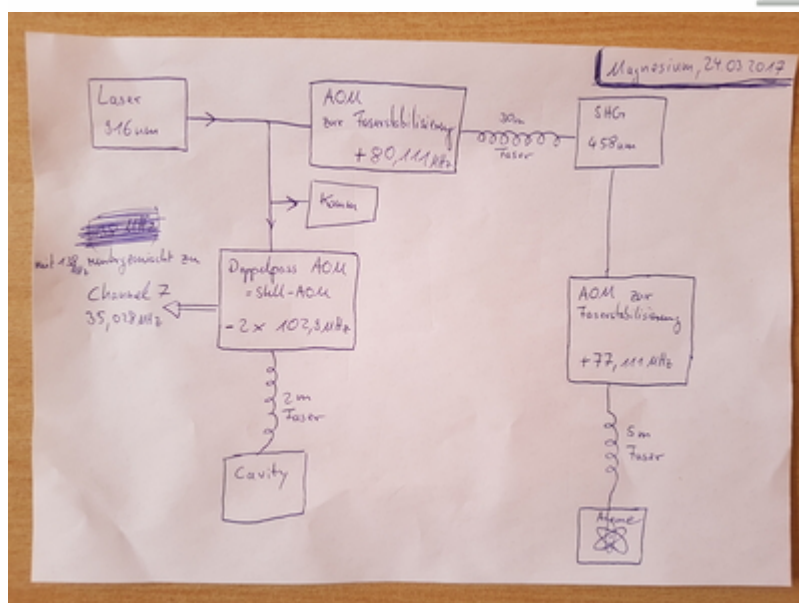
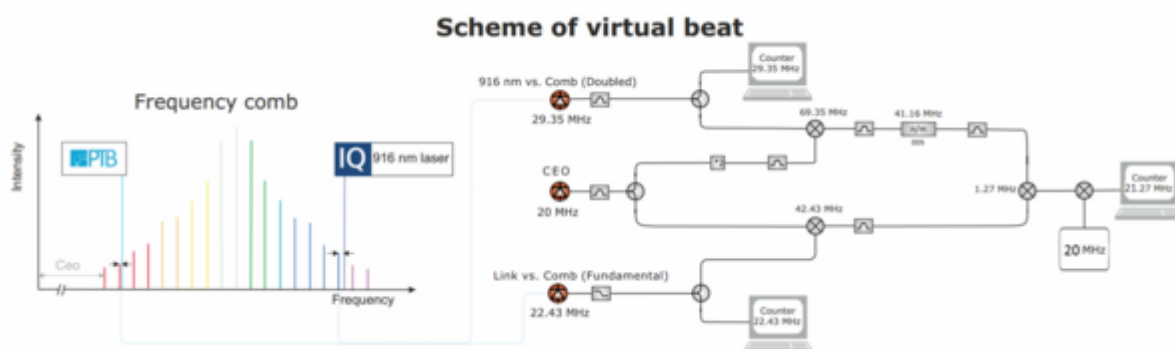


Notes/Informations

Frequency-Comb Hannover

Channel	Measured	Frequency	Sign	Interval (axis)	Max outliers (Alarmschwelle)	F(x)
CH1	IQ-Resonator (R1) vs. Comb	29.347 MHz	-	± 900 Hz	500 Hz	-fx
CH2	CEO	20 MHz	-	± 0.24 Hz	0.15 Hz	-fceo
CH3	Reprate/16	6.250001 MHz		± 0.0018 Hz	0.001 Hz	frep/16
CH4	Link vs. Comb	22.432 MHz	-	± 900 Hz	500 Hz	-fy
CH5	Virtualer Beat (Link vs. IQ-Laser)	21,27173 MHz		± 18 Hz	10 Hz	fv
CH6	Manypoint-AOM	36 MHz		± 18 Hz	10 Hz	
CH7	Stell-AOM vom IQ-Laser	35.0X MHz		± 4000 Hz	2000 Hz (+ correction of Offset)	f_Stell
CH8	Rubidiumuhr referenziert auf GPS	10 MHz		± 0.0018 Hz	0.001 Hz	

- Modenverhältnis: Ratio: $N=n_{916}/n_{\text{Link}} = 3275292/1944000 = 1.684820987654321...$
- Repetitionsrate: 100,0000226 MHz



- AOM (+77.111 MHz) used for atom-lock + fiber stabilization(5m)
- AOM (+80.111 MHz) used for fiber stabilization(30m)
- Double-pass AOM (-2*102,XX MHz) used for spectroscopy (frequency shift), feedback-loop!!!
- Channel 7 = 138 MHz (Synthesizer, referenced by 10 MHz GPS) - Double-pass AOM
- Atom frequency: $\nu_{\text{opt}}(\text{Mg}) = (3275292 \cdot \text{col}(\text{e}) \cdot 16 - 2 \cdot \text{col}(\text{d}) - \text{col}(\text{c}) + 80,111\text{e}6) \cdot 2 + 77,111\text{e}6$
- Laserfrequency: $f_{\text{laser}} = 3275292 \cdot \text{frep} \cdot 16 - 2 \cdot \text{fceo} - f_x$
- Resonator 1 frequency: $f_{\text{R1}} = 3275292 \cdot \text{frep} \cdot 16 - 2 \cdot \text{fceo} - f_x + (-2 \cdot f_{\text{AOM_R1}})$
- Double-pass AOM: $f_{\text{AOM_R1}} = 138 \text{ MHz} - f_{\text{Stell}}$

Virtual-Beat

- $f_v = (f_y + f_{\text{ceo}}) - ((f_x + 2 \cdot f_{\text{ceo}}) / (3275292/1944000)) + (2 \cdot 10 \text{ MHz})$

Evaluation (PTB)

- $f_x = \text{col}(\text{c})$ (#1, negatives f_x)
- $f_{\text{ceo}} = \text{col}(\text{d})$ (#2) (negatives f_{ceo})
- $\text{frep} = \text{col}(\text{e})$ (#3, $\text{frep}/16$)

Test analysis

- $\nu_{\text{opt}}(\text{Mg}) - \nu_{\text{Mg2015}}[\text{Hz}] = \nu_{\text{opt}}(\text{Mg}) - 655058646691000$

$$\rightarrow \nu_{\text{opt}}(\text{Mg}) - \nu_{\text{Mg2015}}[\text{Hz}] = (f_{\text{laser}} + 80,111\text{e}6) \cdot 2 + 77,111\text{e}6 - 655058646691000$$

Frequency-Comb Braunschweig

Clocks high in respect to the geoid

In front of the university are studs which are used as a reference. In the PDF everything is explained and is given by Dr. Heiner Denker (Institut für Erdvermessung (IFE)), he will also estimate the experiments height with higher precision soon.



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