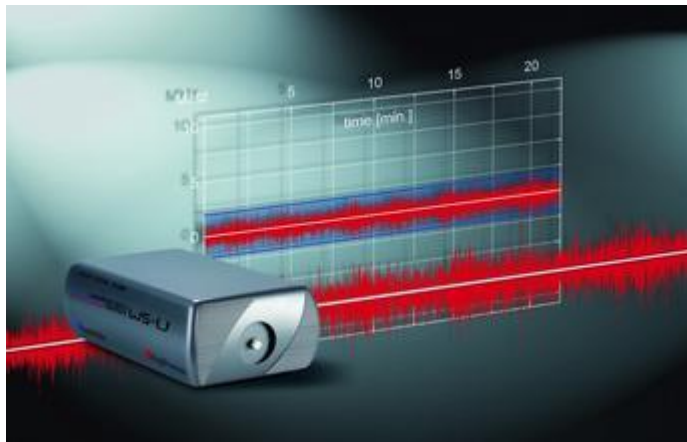


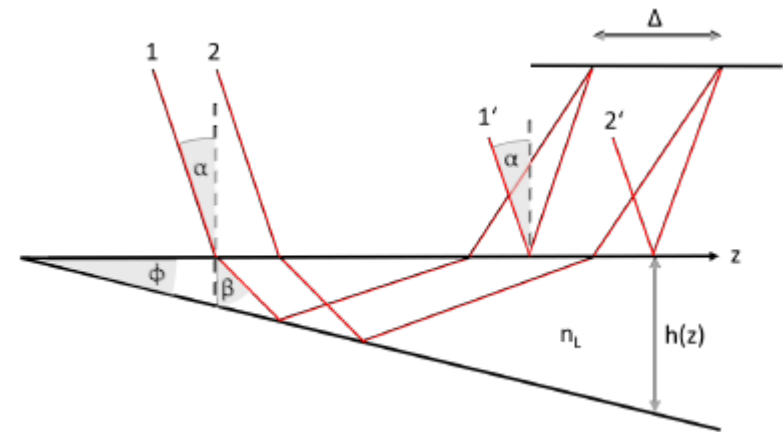
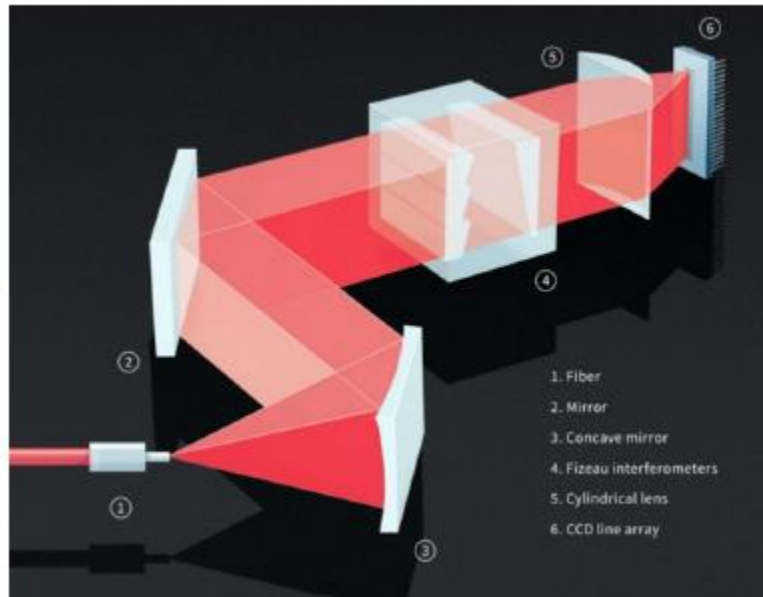
# Frequency-comb based wavemeter calibration



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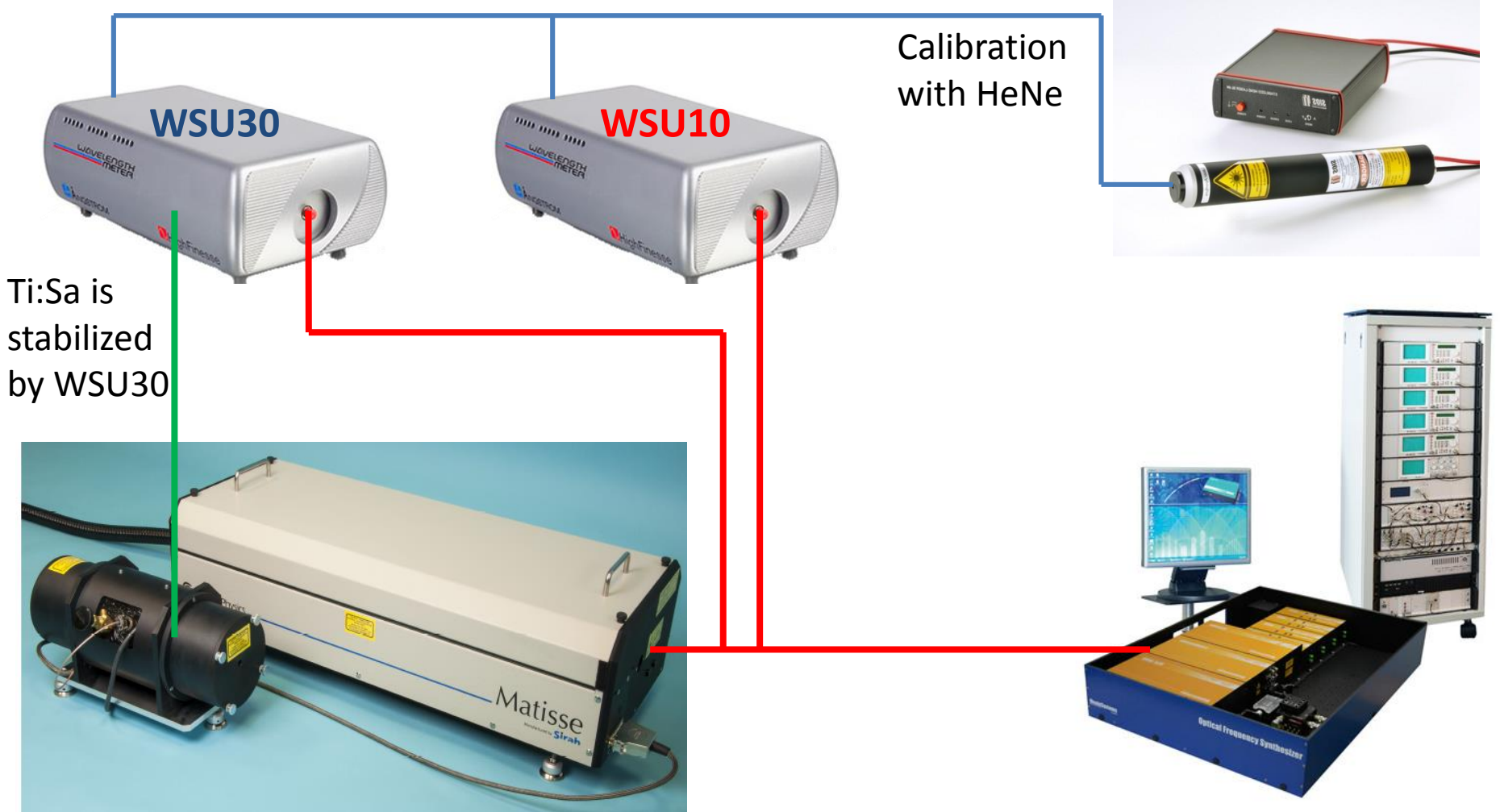


# Wavemeter = Fizeau interferometer



	Specified absolute accuracy	If calibrated within
WSU 30	30 MHz	+ - 200 nm
WSU 10	10 MHz	+ - 200 nm
WSU 2	2 MHz	+ - 2 nm

# Experimental setup

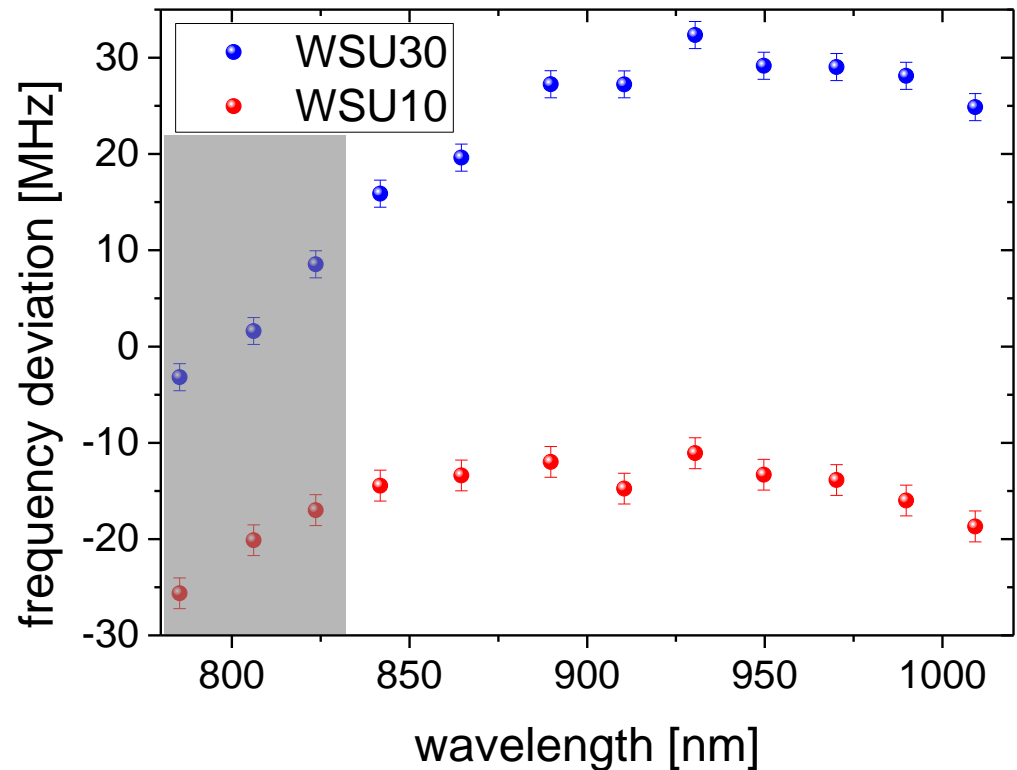


# The big picture – 20 nm steps

Only first 3 data points in calibration range ( $\pm 200\text{nm}$ ) specified by High Finesse  
-> WSU10 shows deviation

Statistical uncertainty of comb measurement 100kHz

Error bars due to a further wavemeter trend (next slide)

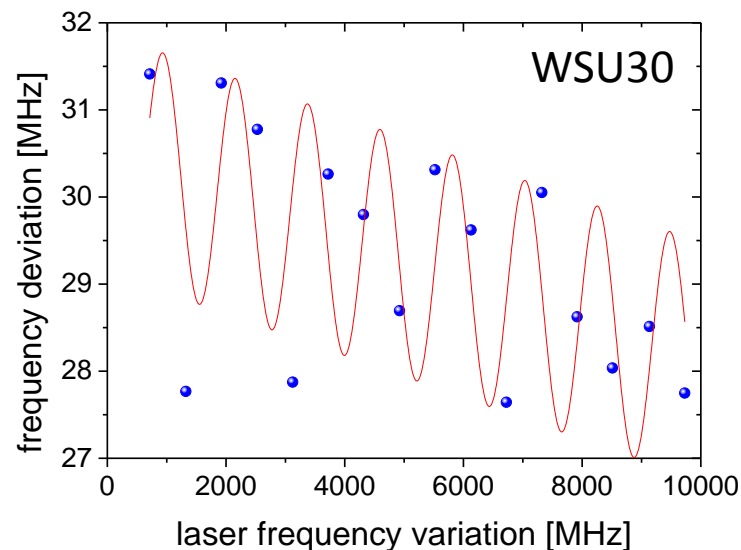
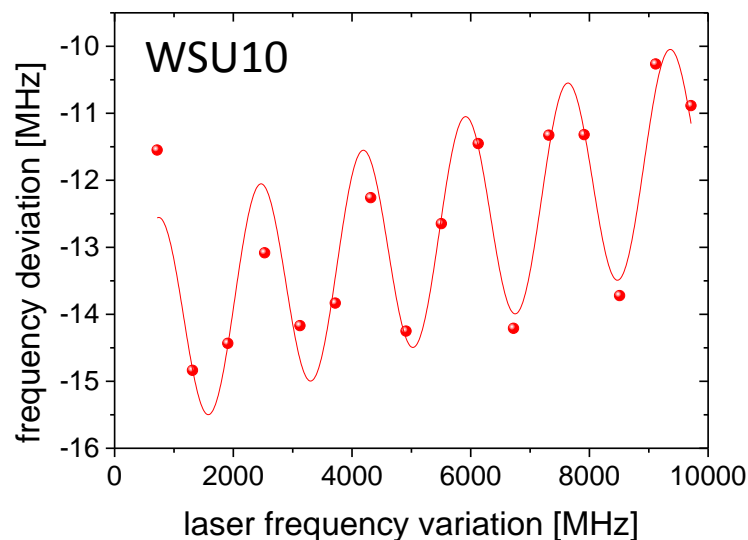


Wavemeter were calibrated before the measurement

# Laser variation in 0.6 GHz steps at 910 nm



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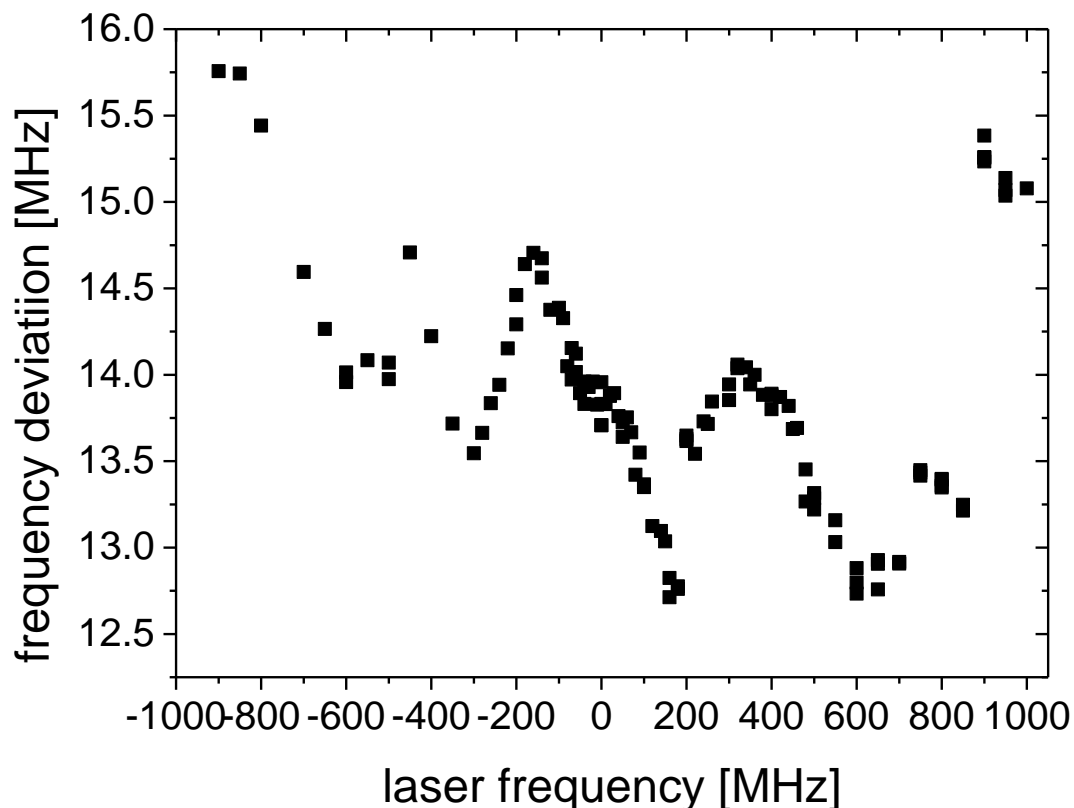


	WSU 10	WSU 30
Amplitude	1.6 MHz	1.4 MHz
Period	1.7 GHz	1.2 GHz
Linear regression	0.29 MHz/GHz	-0.24 MHz/GHz

Linear degression disagrees with previous trend. -> Other, unresolved structure

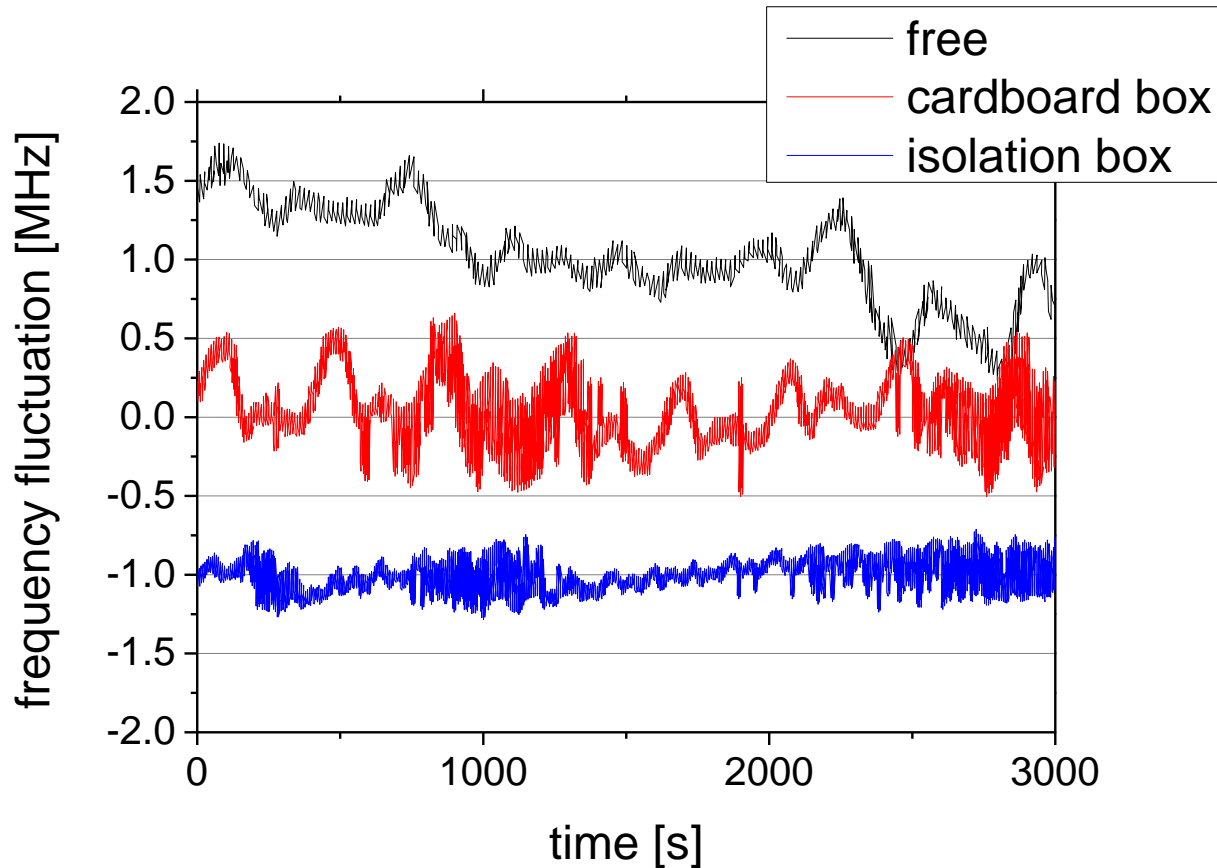
# Laser variation in 10 MHz steps at 880 nm

WSU2 calibrated with iodine-locked HeNe before measurement



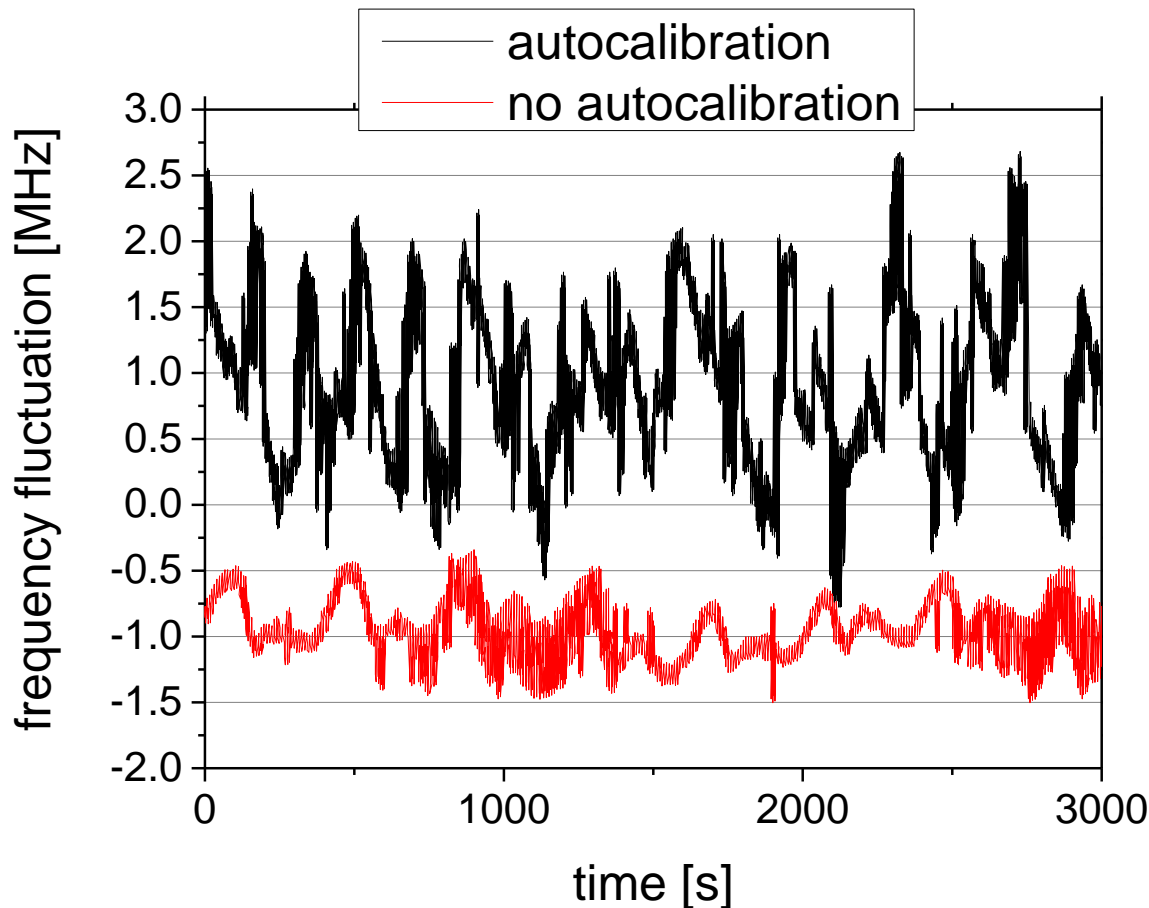
- Measurement started at 0 going to +1GHz. Going back to -1GHz and then to 0 again (3 hours)
- ⇒ Data points are well reproduced in every run
- Sudden jumps of >1 MHz (e.g. at +200, +900 MHz)
- Same measurement will be repeated soon to check long-term stability of this wavemeter calibration

# Long-term stability



without autocalibration

# Autocalibration



- In longer measurements drifts are observable without autocalibration
- No drifts with autocalibration
- Frequency jump with every calibration of the order of  $\pm 1$  MHz
- Better calibration laser (iodine-locked HeNe) jumps of  $\pm 200$  kHz
- Different calibration when using calibration or measurement port of wavemeter



# Next steps (hopefully until end of 2018)



- Repetitions of WSU2 measurement
  - ⇒ Is wavemeter + iodine-locked HeNe – system long-term stable?
  - ⇒ Are wavemeter calibrations possible?
- Clarify difference between calibration and measurement port with manufacturer
- Resolve more structures in the wavemeter behavior by using different laser variation steps
- Simultaneous measurements with comb and WSU2, WSU10, WSU30, WS7

# Improved setup

