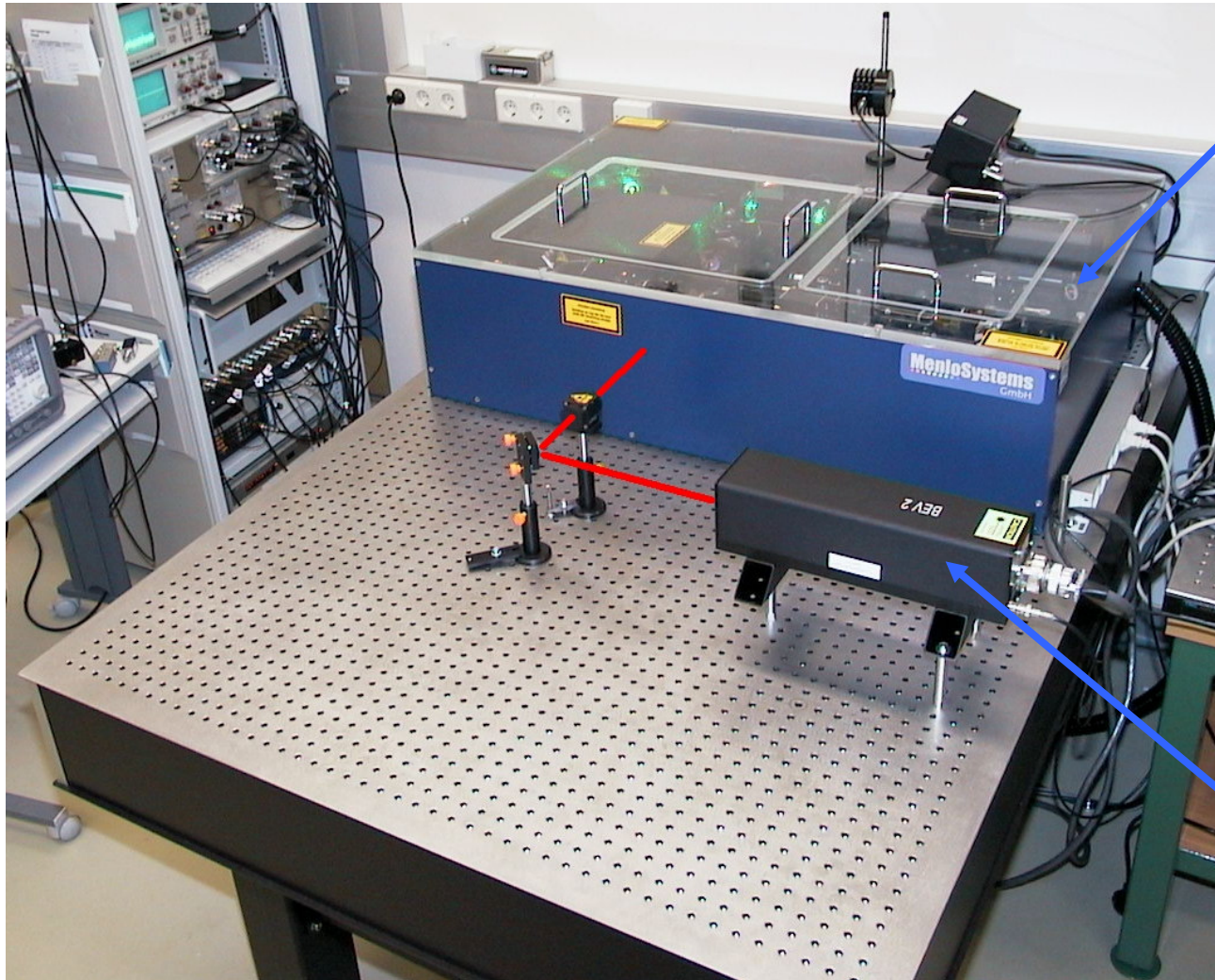


Present setup

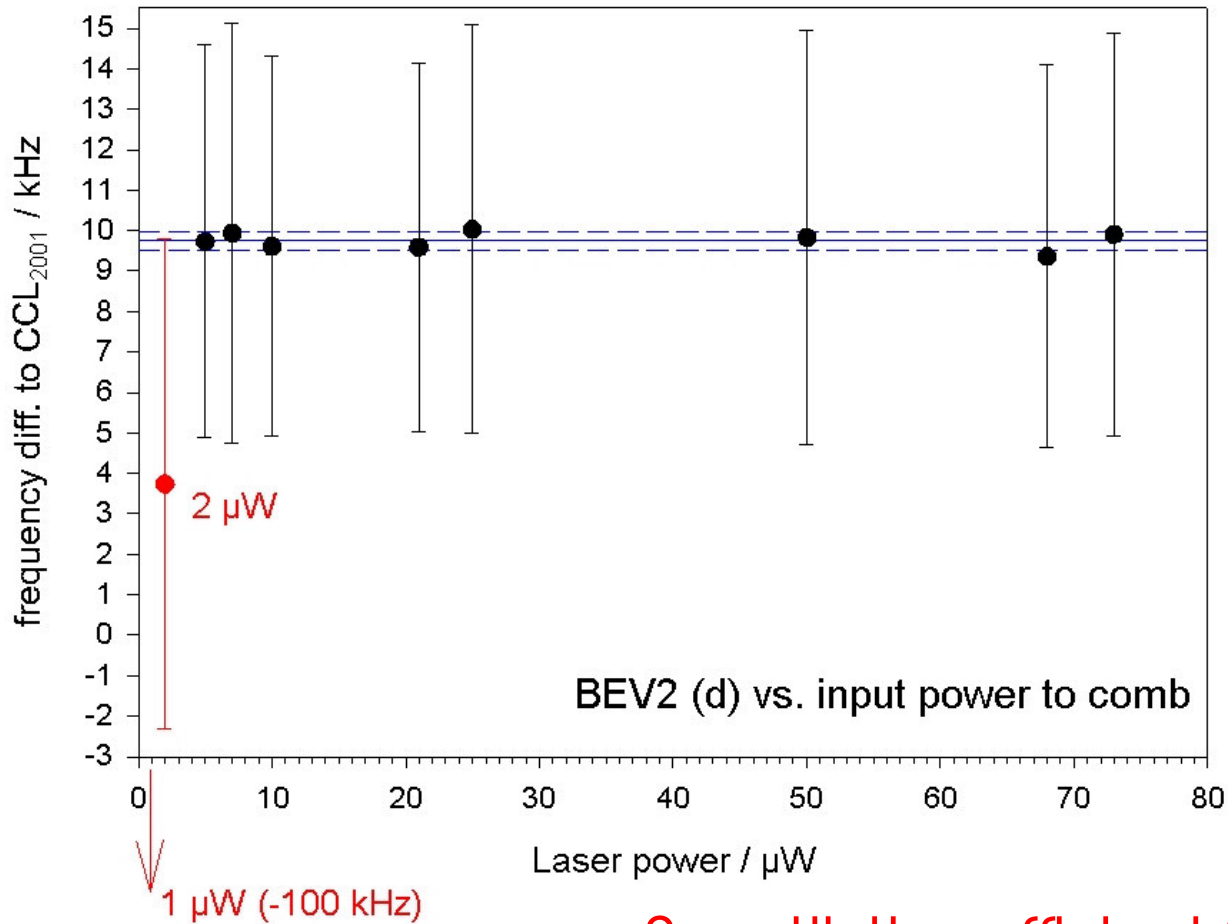


Replaced
mirror

Dichroic mirror, high
transmittance at 45°
from 600 - 900 nm

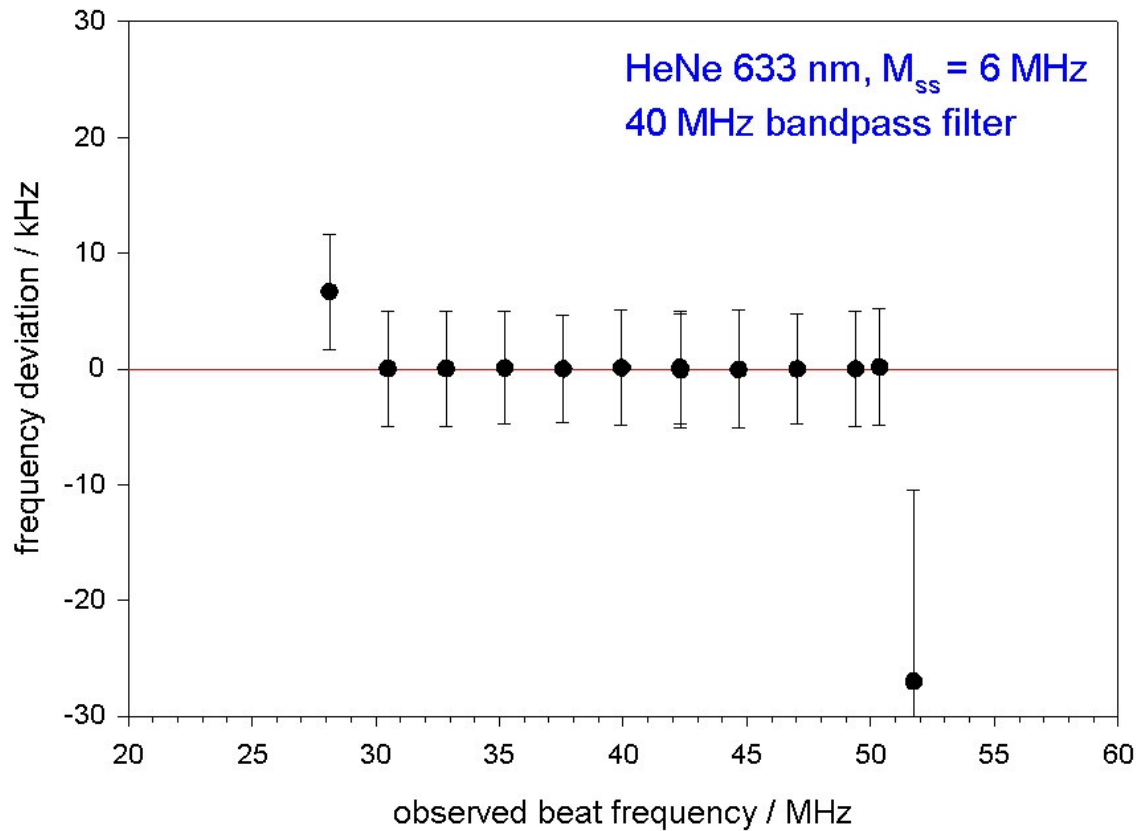
Laser to be
calibrated

Minimal laser power



Laser power at APD even lower by approx. 40 %

Sensitivity sufficient for most lasers!

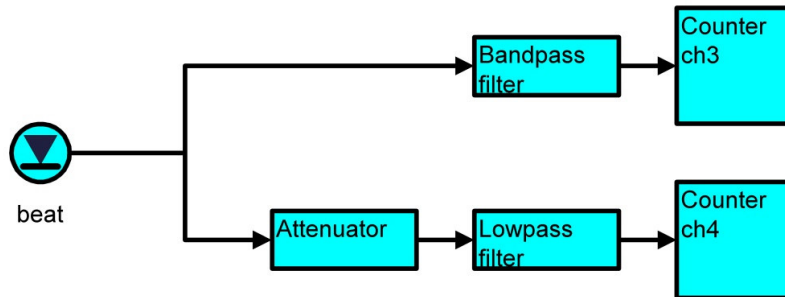


Using narrow band filters together with frequency modulated signals can cause big errors.

Passband ~25 MHz

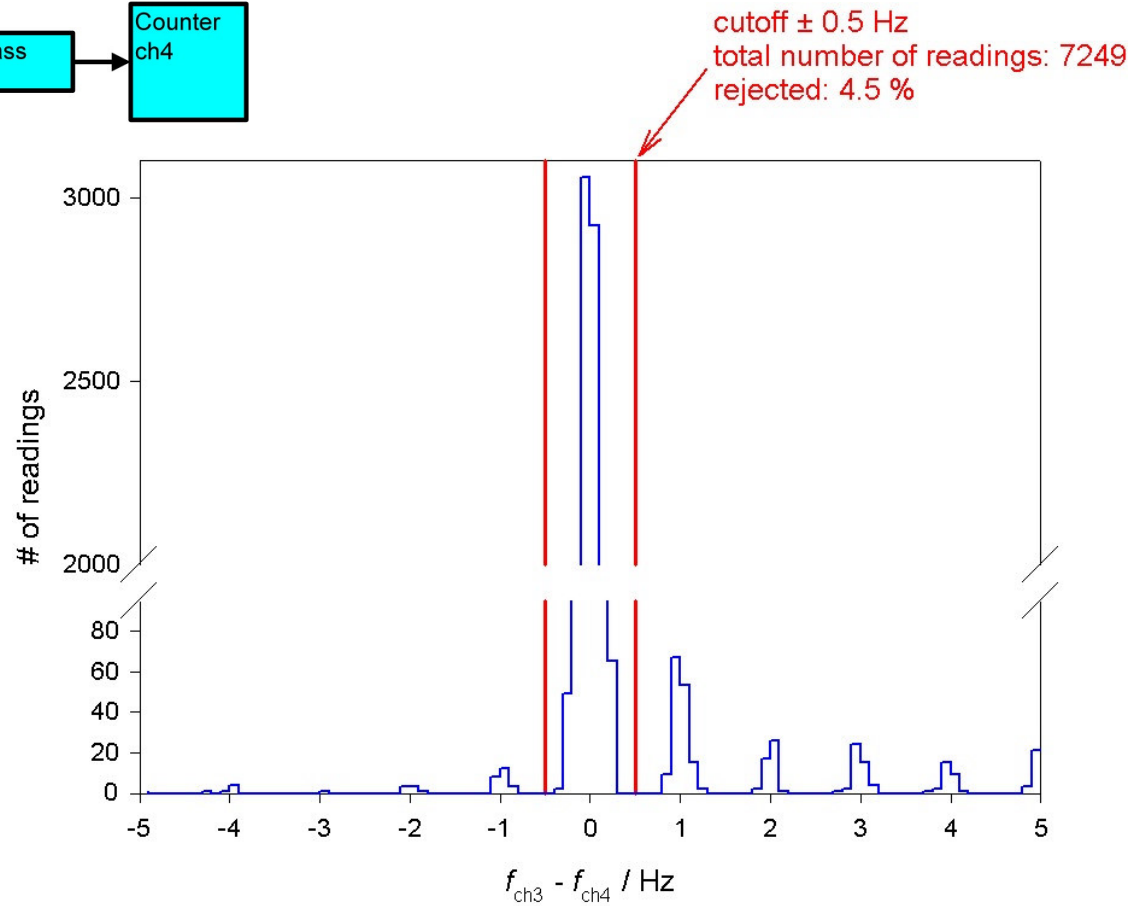
Narrow band RF-filter not necessary!

Cycle slip detection



Simple method to ensure validity of beat-frequency readings

drawback:
laser power must be slightly higher



532 nm CMI YAG1 (32-0 R(56) α_{10}) (~500 μ W)

563 260 223 514.3 kHz \pm 0.4 kHz

543 nm PLG1 (28-0 R(106) b_{10}) (~15 μ W)

551 580 162 396.6 kHz \pm 0.6 kHz

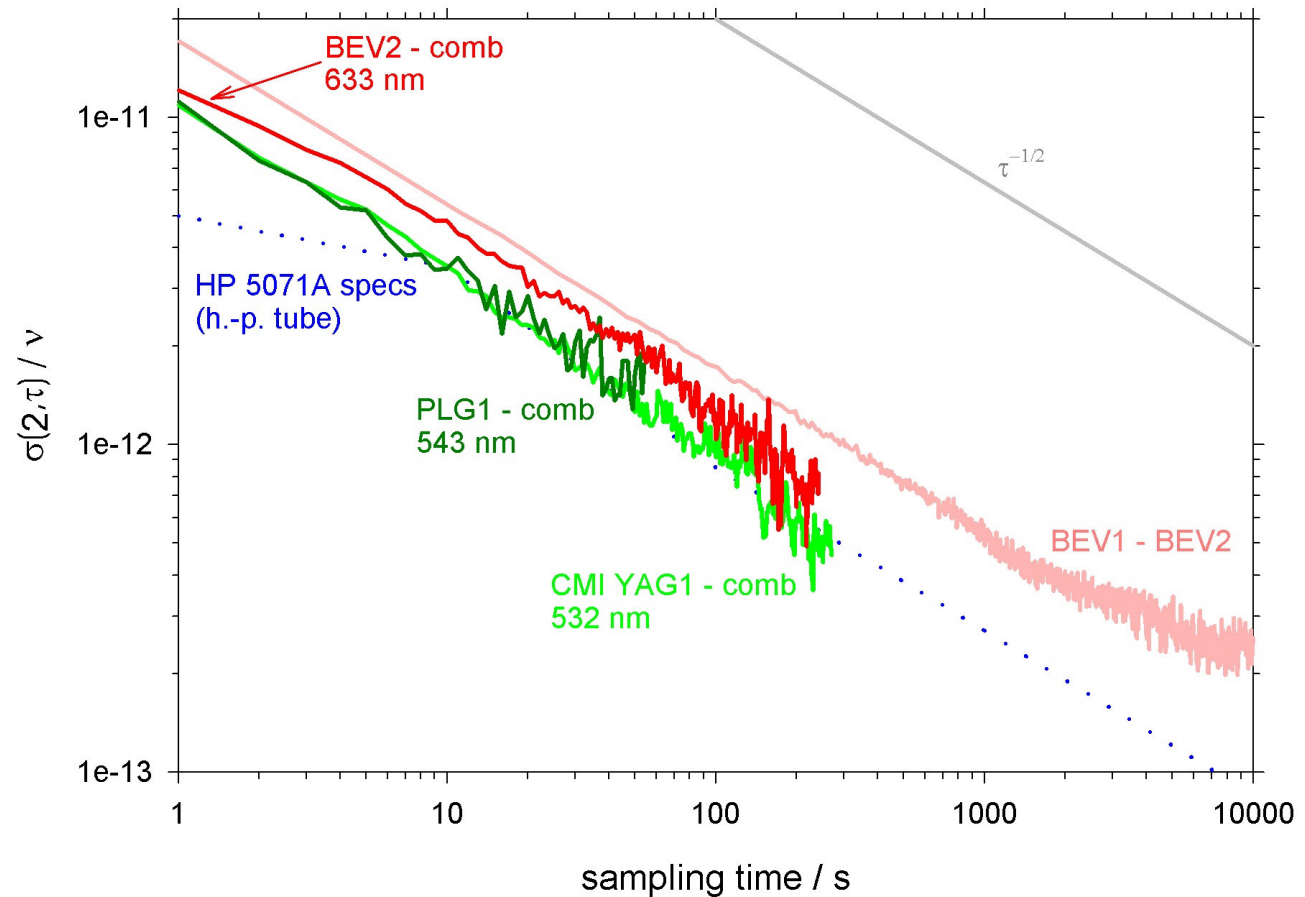
633 nm BEV2 (11-5 R(127) f) (~90 μ W)

473 612 353 604.36 kHz \pm 0.14 kHz

	BEV1		BEV2	
	Δf	s	Δf	s
d	+16,4	1,7	+9,88	0,16
e	+15,1	1,0	+1,69	0,39
f	+17,0	1,6	+0,36	0,13
g	+16,7	0,3	-2,89	0,23
h	+17,2	1,4	+0,60	0,21
i	+14,4	0,0	+3,32	0,23
j	+13,9	0,1	+1,52	0,38

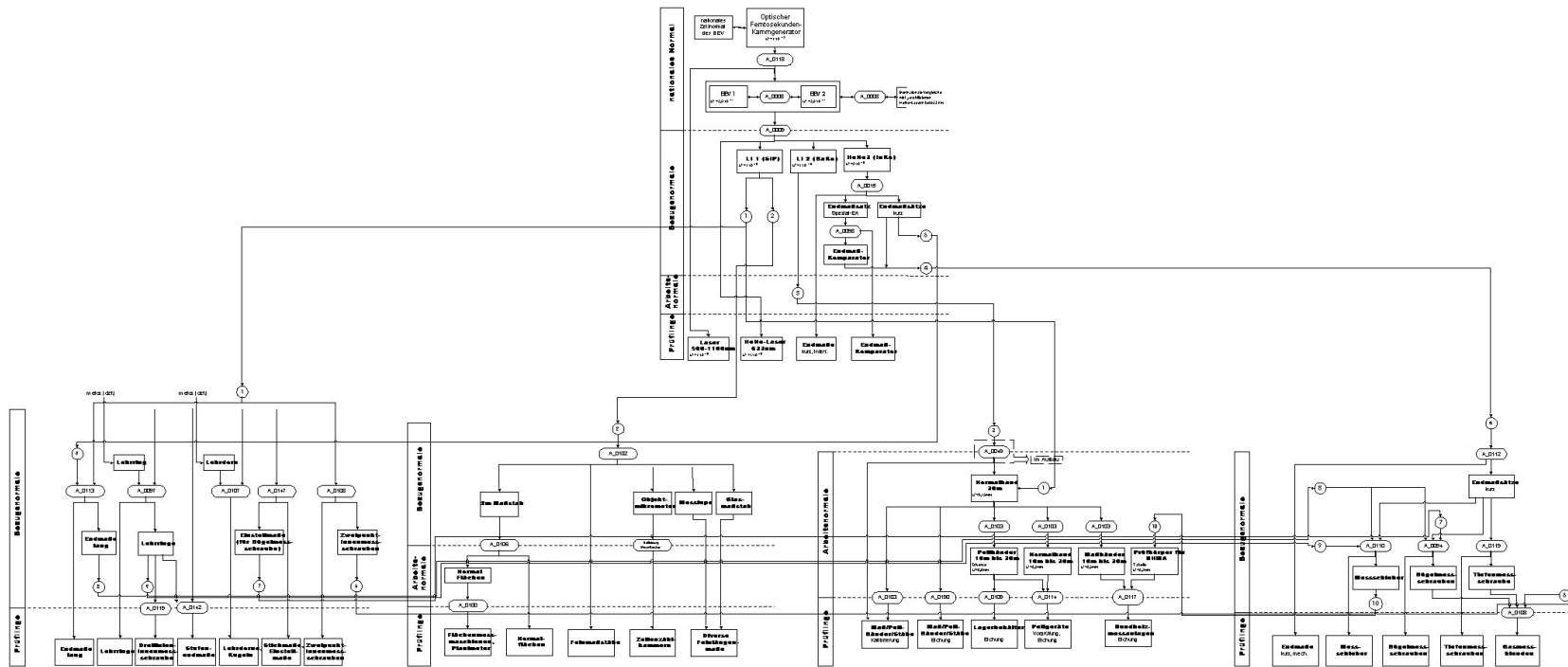
Frequency stability

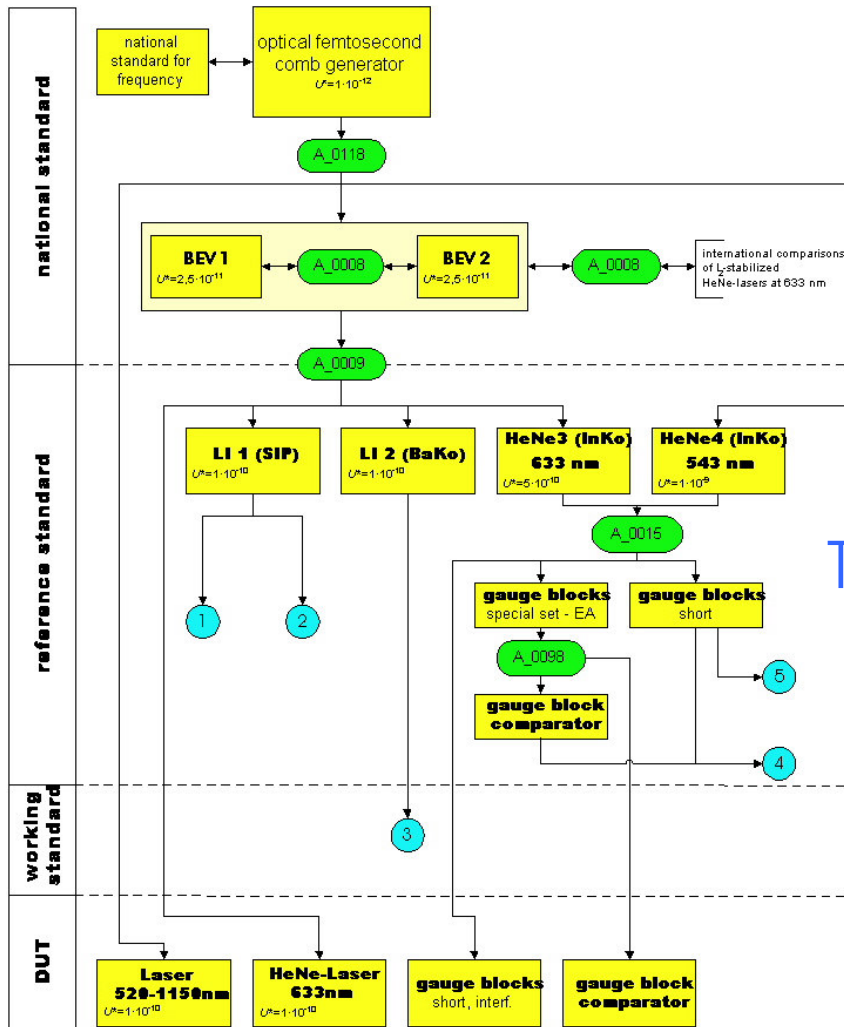
Two samples variance as measured with the comb for sample times >10 s as good as one can expect from the standard!



- Instrument is working fine and reliable. Even the fibre survived all experiments so far.
- Calibrations on 543nm and 633nm lasers are now performed as a regular service.
- Already applied for entry in the cmc tables (520 nm – 1150 nm, $U_{rel}=10^{-9}$)
- Comb generator now included (as the national standard) in the hierarchy scheme for length measurements.

Overview of traceability for dimensional calibrations (and verifications) covered by BEV's quality system.





The optical femtosecond comb generator is now the primary (national) standard for all length measurements traceable to the BEV.

The I₂-stabilized lasers BEV1 and BEV2 can still be used as primary standards but it makes more sense to employ them as transfer and travelling standards

- For institutes with the need for more than a single wavelength, the femtosecond comb generator as a length standard is an option! (as opposed to build and maintain a variety of CCL lasers).
- Calibration of secondary standards (2-mode stabilized etc.) is now not more elaborate than the traditional way. For this lasers even the beat frequency measurement using a spectrum analyzer might be adequate.
- We are confident in the reliability of this technique to offer it as a service to the public.