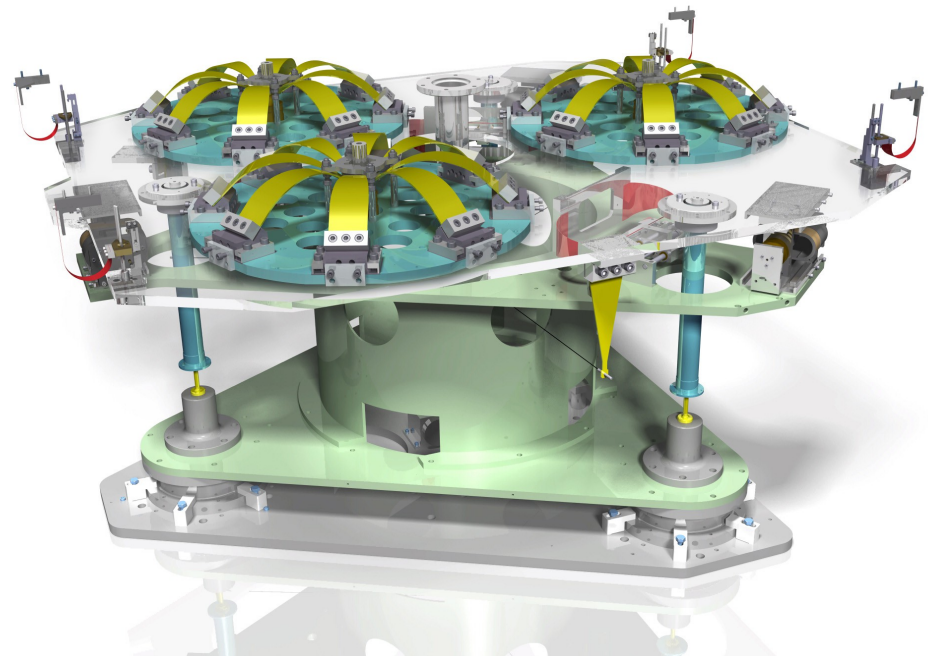
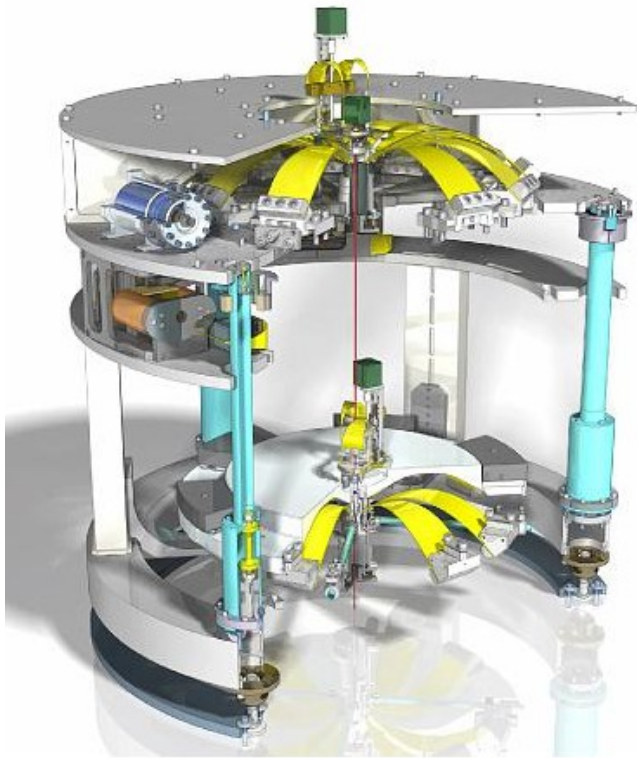

SBE status

A. Bertolini (Nikhef)
on behalf of SBE subsystem



SBE status – Planning and budget

	A	B	C
1	SBE: First two minitowers order placed	03/2012	100%
2	SBE: First two minitowers delivered	01/2013	100%
3	SBE: MultiSAS production drawings ready	03/2013	100%
4	SBE: Other minitowers design ready	04/2013	70%
5	SBE: Other minitowers order placed	07/2013	0%
6	SBE: MultiSAS for SPRB, SDB2, SIB2 construction finished	10/2013	0%
7	SBE: EIB-SAS installed	09/2013	0%
8	SBE: MultiSAS for end benches construction finished	11/2013	0%
9	SBE: Minitowers for Central building installed	05/2014	0%
10	SBE: SIB2 MultiSAS installed on site (pre-tuning done at Nikhef)	06/2014	0%
11	SBE: Minitowers for end benches installed	06/2014	0%
12	SBE: SPRB MultiSAS installed on site (pre-tuning done at Nikhef)	07/2014	0%
13	SBE: SWEB MultiSAS installed on site (pre-tuning done at Nikhef)	10/2014	0%
14	SBE: SDB2 MultiSAS installed on site (pre-tuning done at Nikhef)	08/2014	0%
15	SBE: SNEB MultiSAS installed on site (pre-tuning done at Nikhef)	10/2014	0%
16			

Minitowers

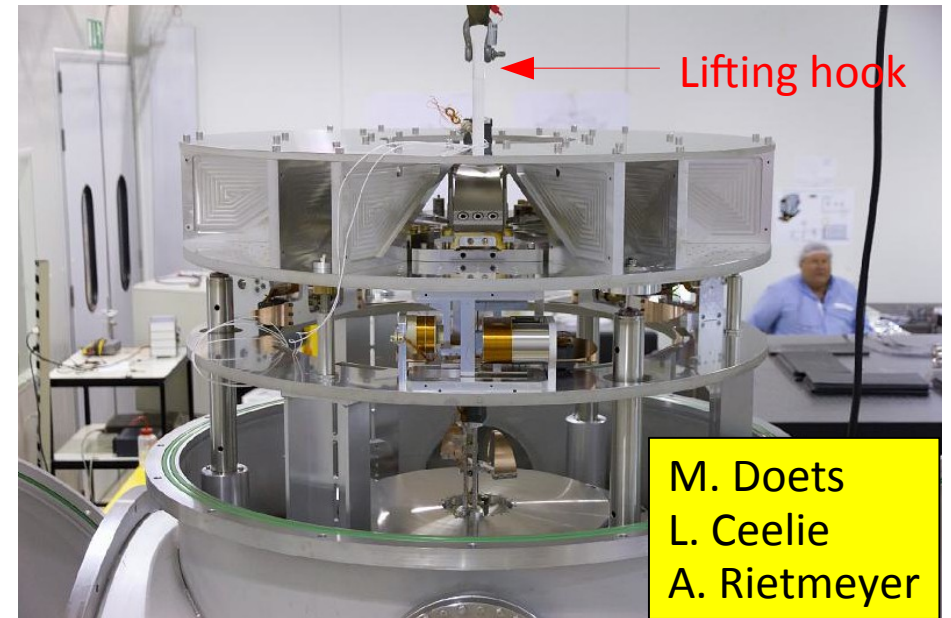
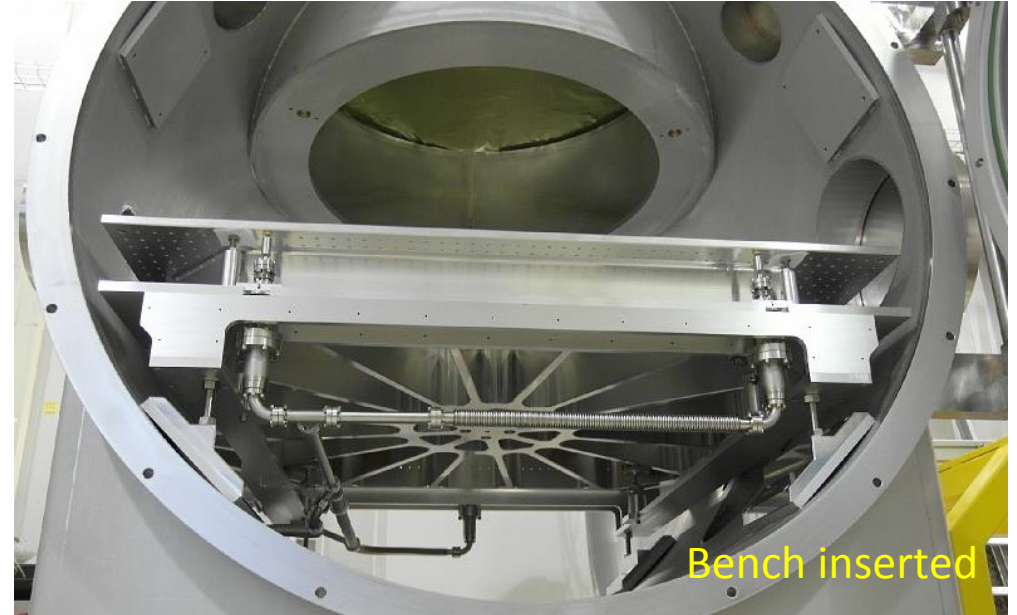
- IPRB review of SIB2 and SDB2 minitowers last May 9th
- Call for the tender deadline June 3rd, orders to be placed soon right after the mechanical integration test at Nikhef
- PR minitower design in prep, PUMA procedure start soon

MultiSAS

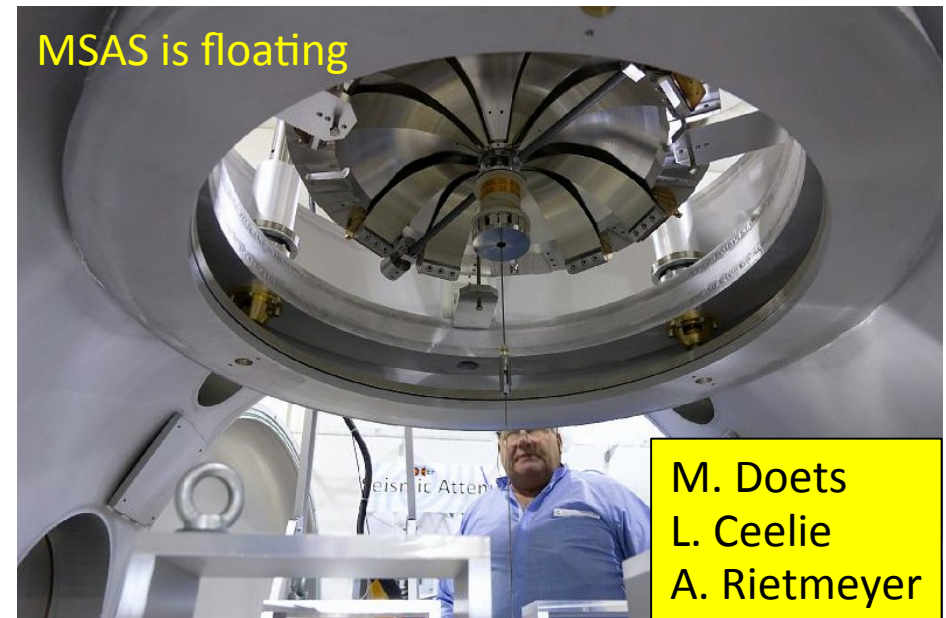
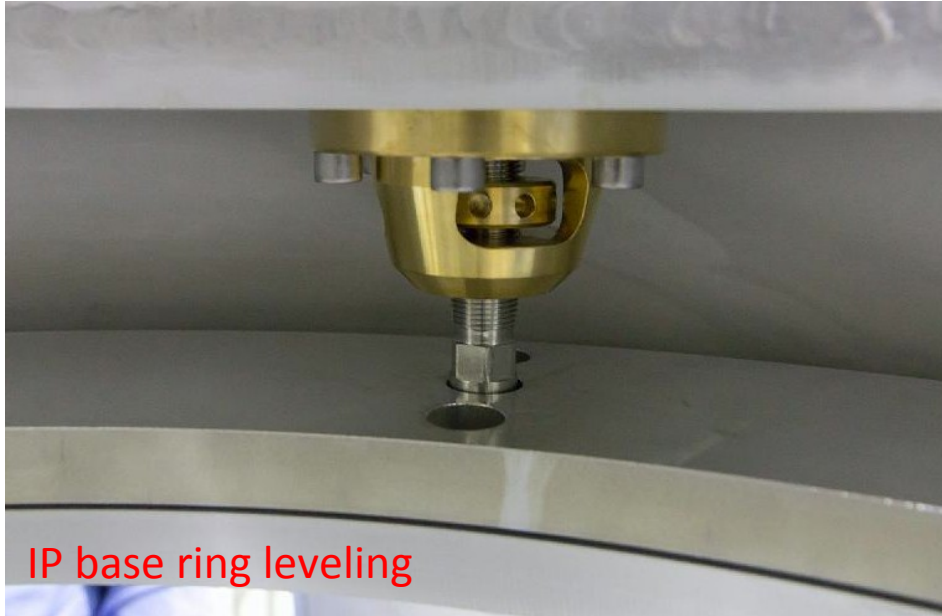
- IPRB review of MSAS on April 17th
- Procurement of off-the-shelf parts (sensors, motors, etc) done
- LVDT and actuator coils windings being done right now
- The mechanics for all the 5 systems is in production: lead time 4-6 weeks from today
- Cost change on the mechanics (mostly outsourced):

MultiSAS subsystems	Actual cost	October 2012 estimate
LVDT/actuators OVERALL	14520	15000
Filters OVERALL	118780	125000
IP OVERALL	88080	65000
Total:	221380	205000

MultiSAS-Minitower integration test



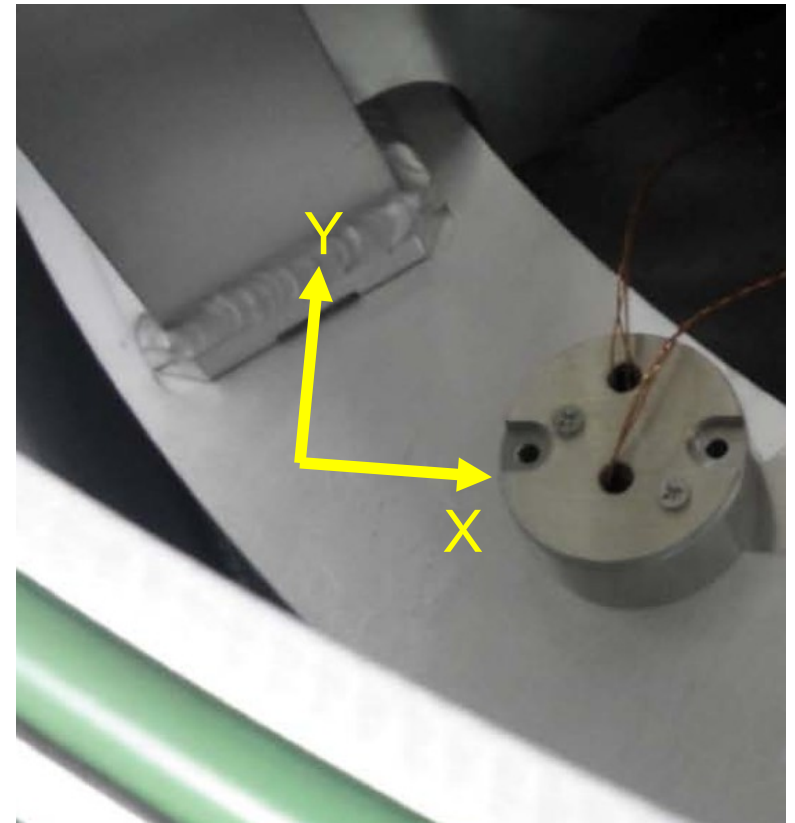
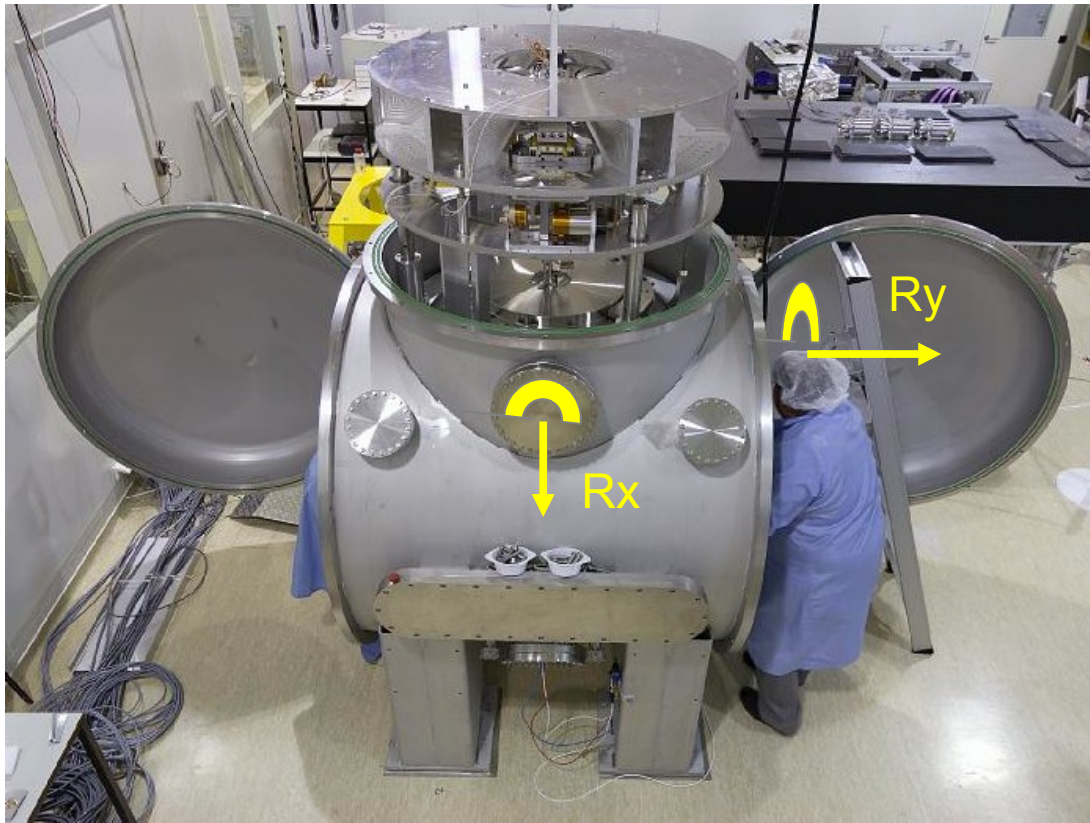
MultiSAS-Minitower integration test



MultiSAS-Minitower integration test: recap so far

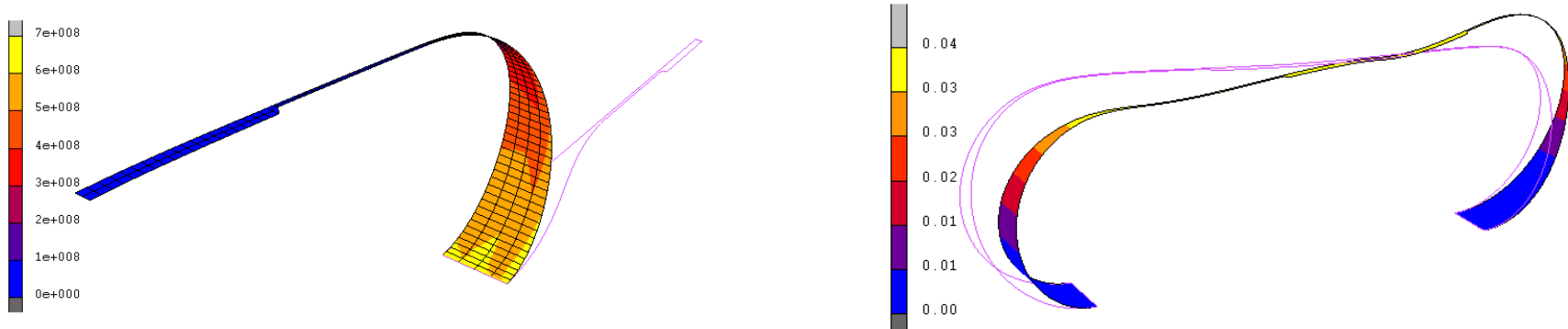
- Check for installation issues: → OK
- Check for effects of the vacuum forces on the chamber: the vertical sagging of the central cylinder has been measured with mechanical gauges both at LAPP and Nikhef: ~0.2mm uniform (same as predicted by FEM models) then OK (actually at Nikhef found a slight 0.05 mm asymmetry)
- Test with in-vacuum tilt sensor ongoing at Nikhef to confirm the compliance with the specs given in the TDR: ± 0.1 mrad maximum acceptable tilt of the IP inner support platform (right now we are characterizing the sensor for stability in the air pressure to vacuum transition)
- green light for the order placement asap

MultiSAS-Minitower integration test: recap so far

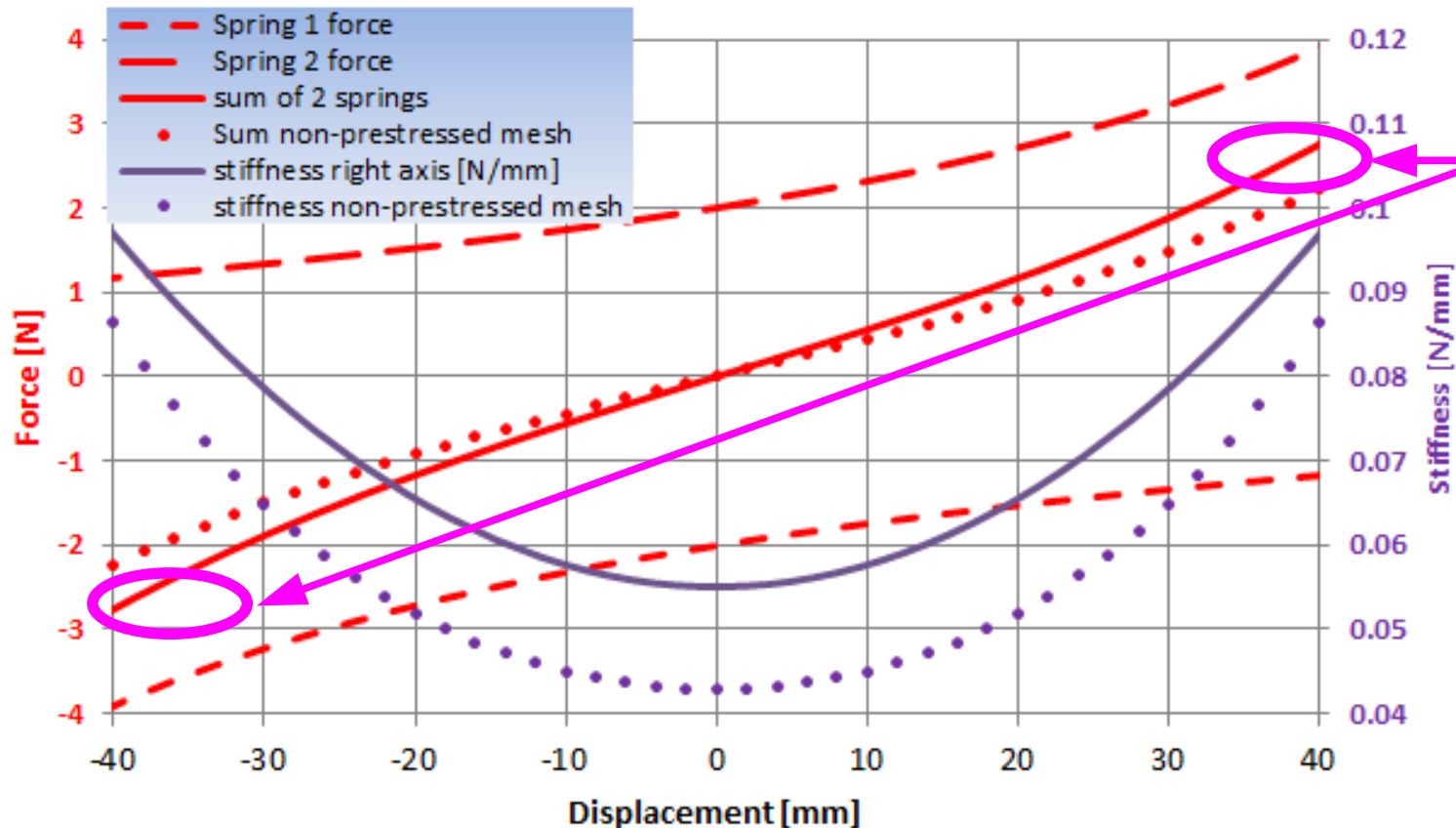


A vacuum compatible two-axes tilt sensor (Model 756 from App.Geomechanics, $\pm 5 \mu\text{rad}$ resolution) was installed on the IP base ring, to measure the effect of the Minitower deformation under vacuum forces.

MultiSAS-Minitower integration test: are the specs too tight?



MultiSAS correction springs stiffness and force (FEM)



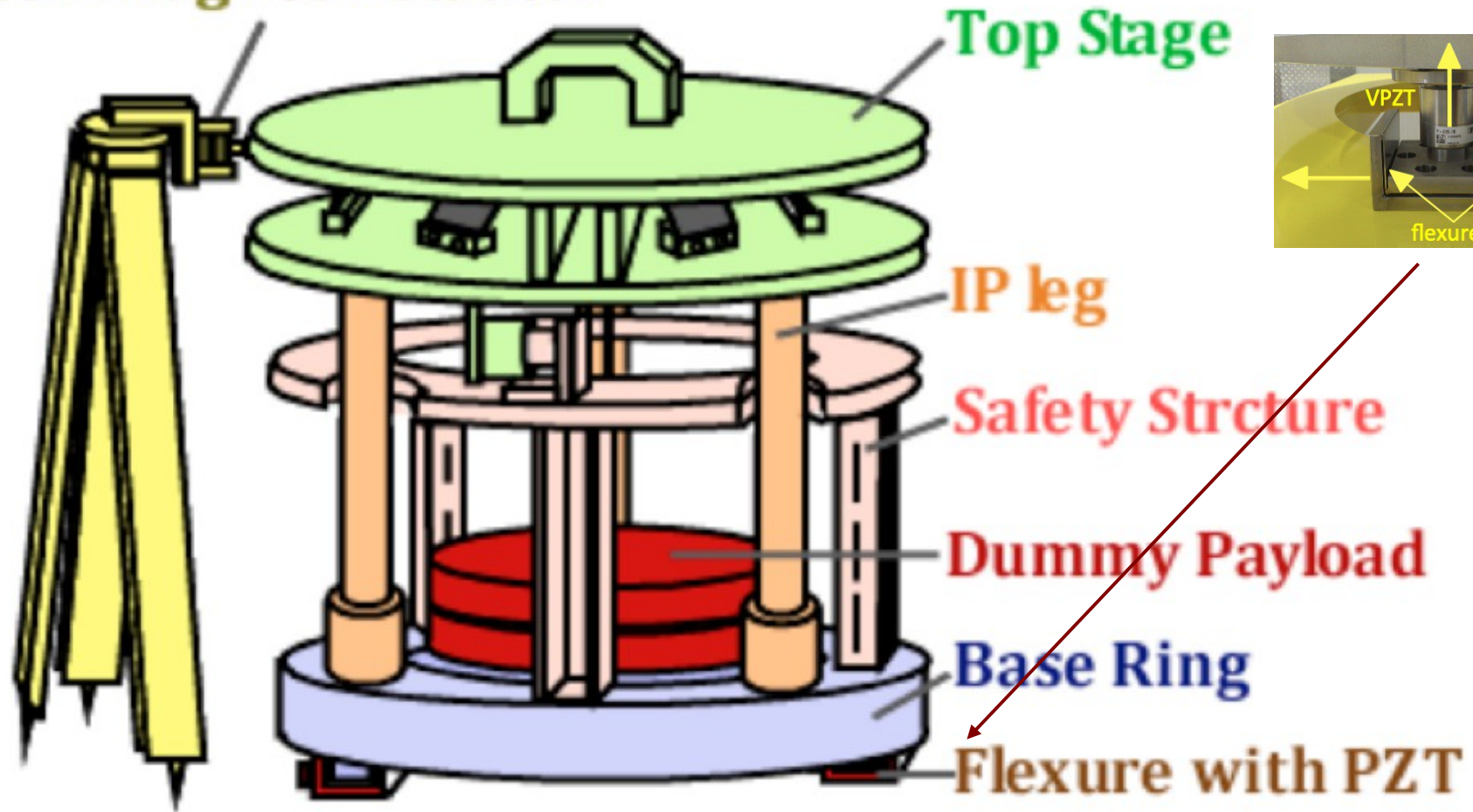
Up to $\pm 5\text{N}$ overall adjustment force available along X,Z corresponding to $\pm 0.9\text{ mrad}$ base tilt

E.Hennes

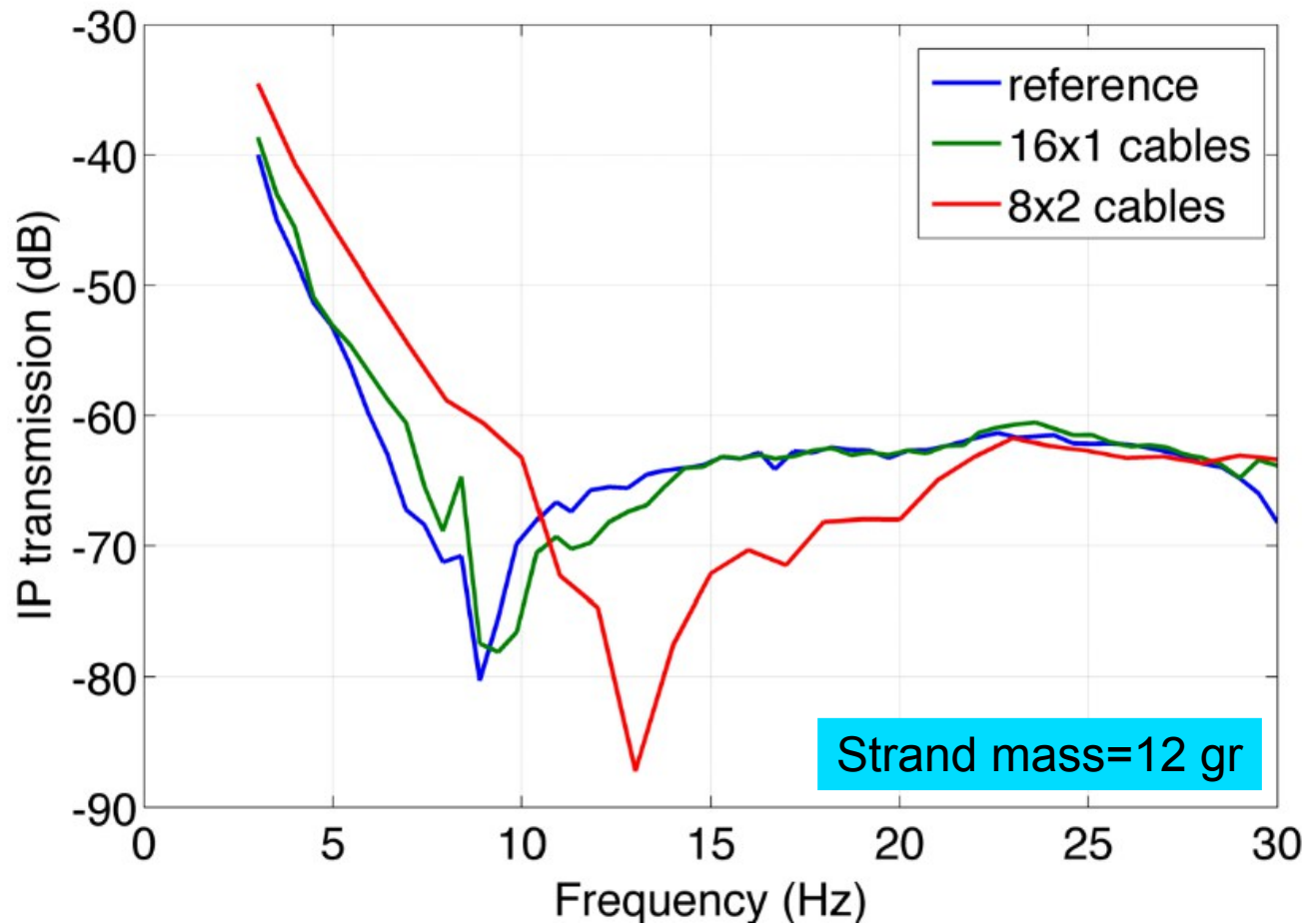
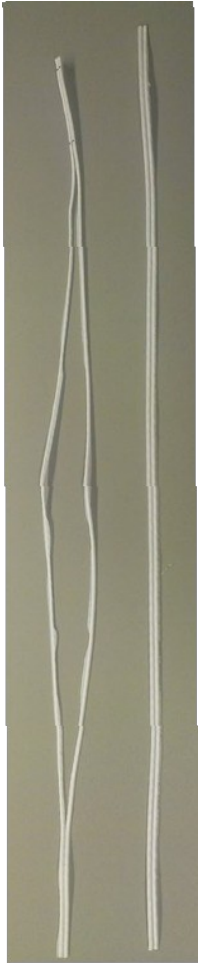
Test of SAT cable – Setup

DET needs to feed 12V, 200W (16A) to the in-vacuum benches
Is it doable without spoiling the seismic attenuation level?

Coil Magnet Actuator

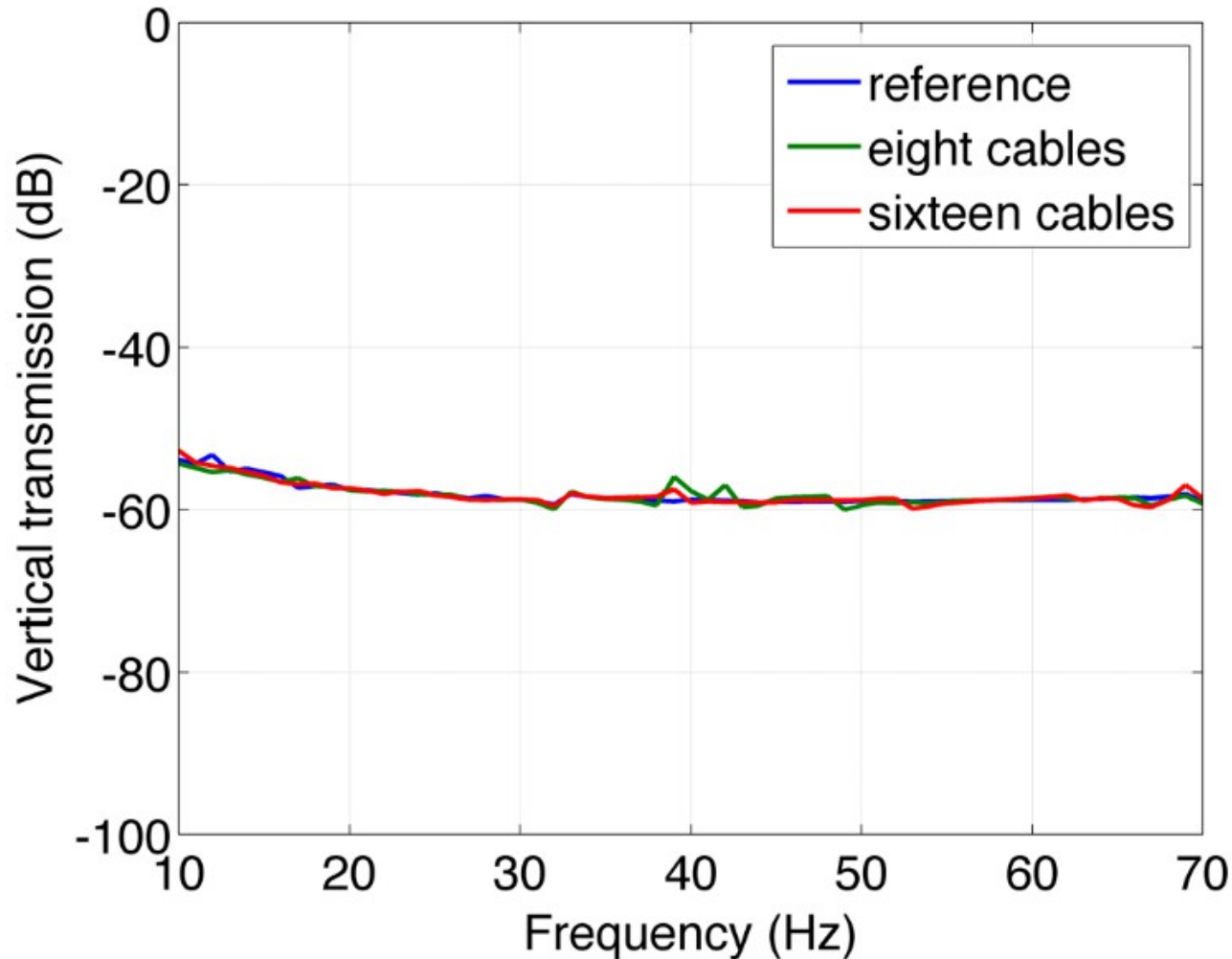


Test of SAT cable – Effect on the IP stage



- More representative: IP natural frequency 0.1 Hz, dynamic mass 150 kg
- Mass still not a problem; stiffness effect appears if we don't split

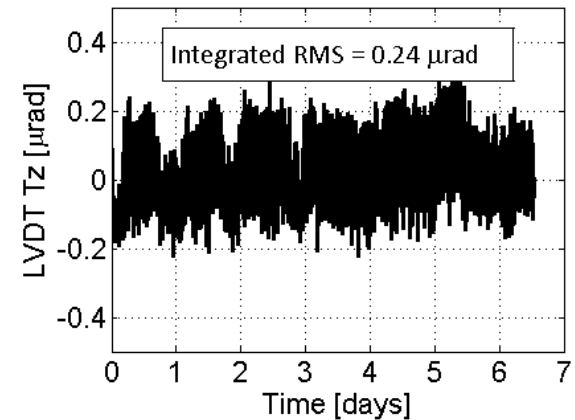
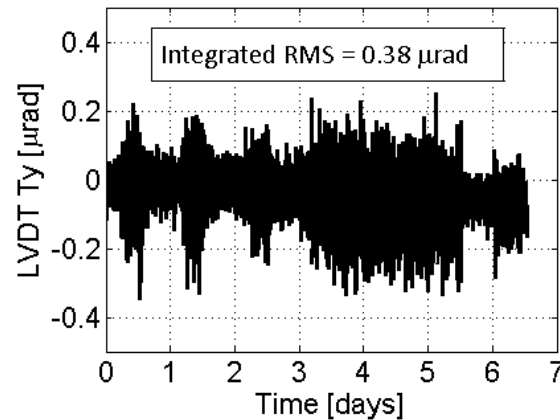
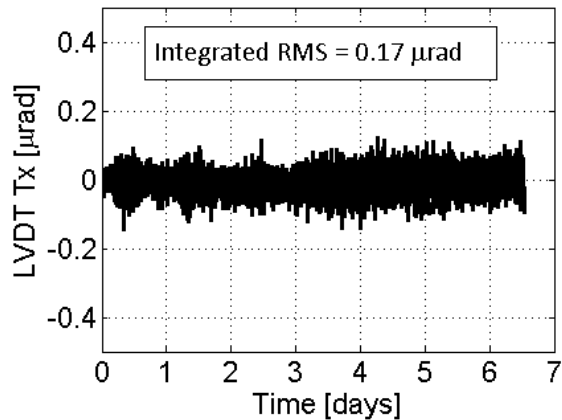
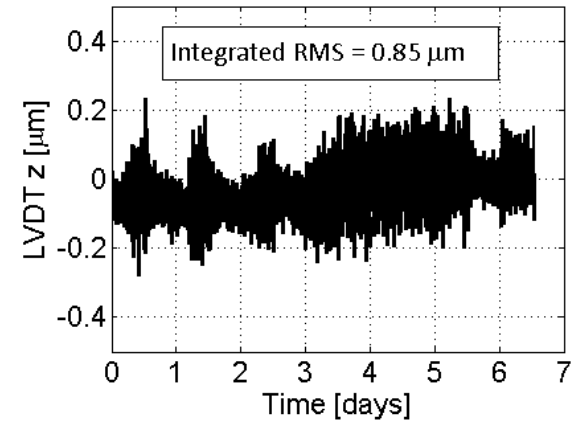
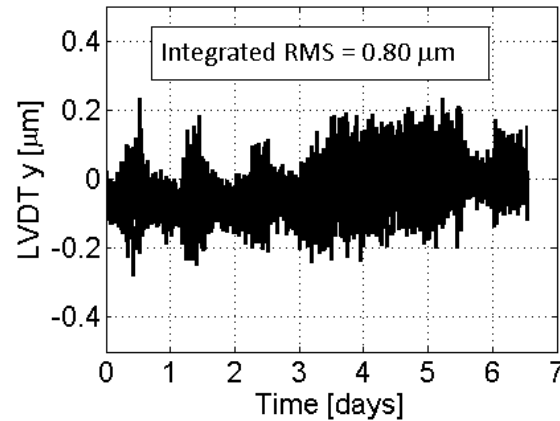
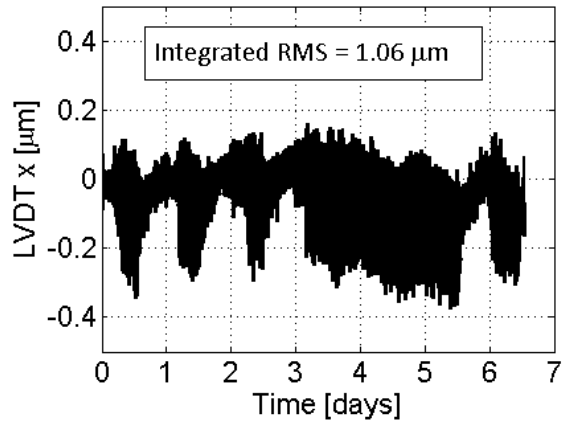
Test of SAT cable – Effect on the GAS filter



- Mass effects could be masked by the 420 kg size of the payload in this test
- Real intermediate filter mass is only 100 kg

EIB-SAS – Closed loop stability vs time (one week)

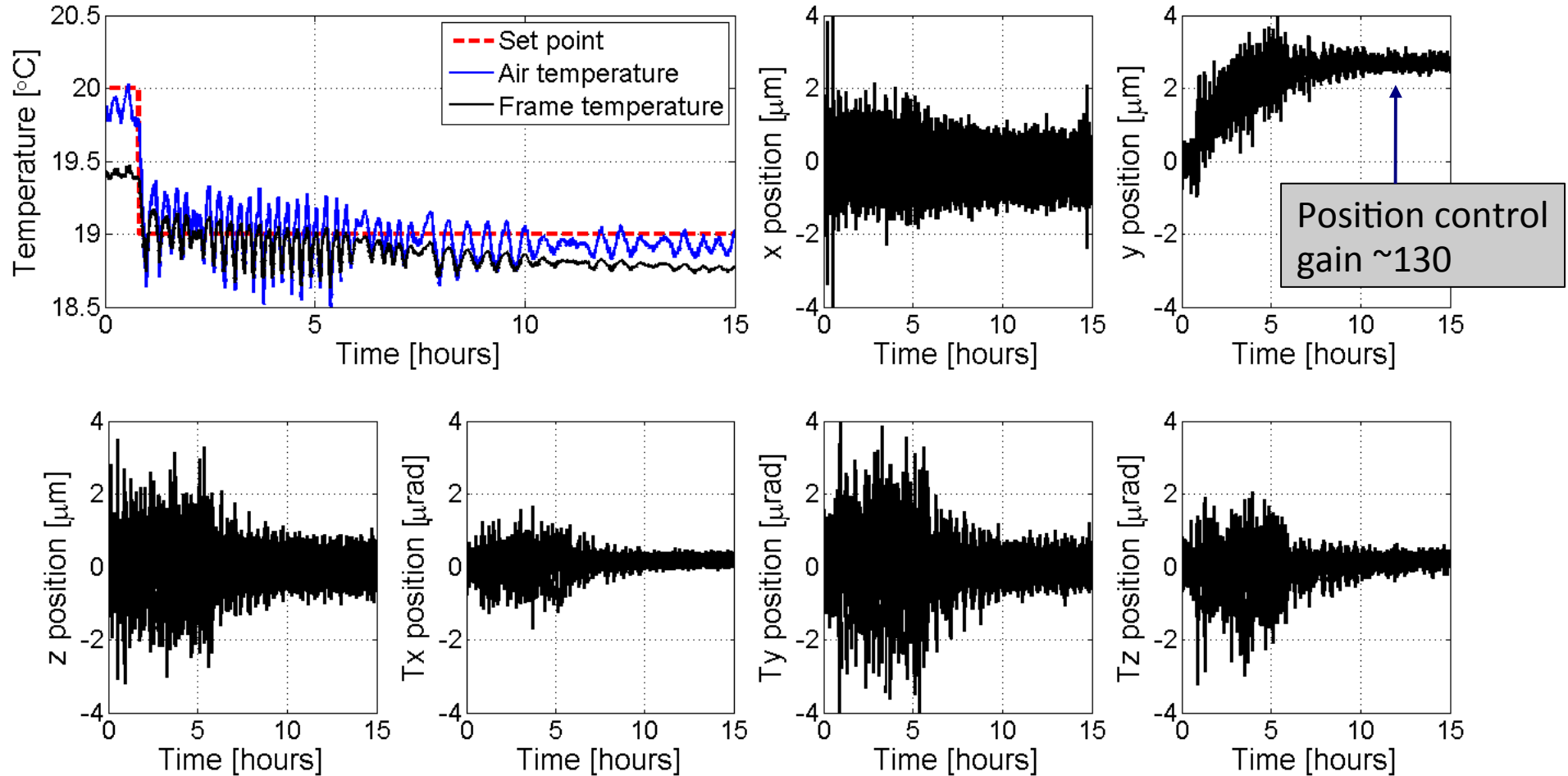
RMS deviation from set point < $1\mu\text{m}$, $0.5\mu\text{rad}$ in all 6 dof



M. Blom
H.J. Bulten

EIB-SAS – Closed loop stability vs temperature change ($\pm 1\text{K}$)

...lowering the temperature...

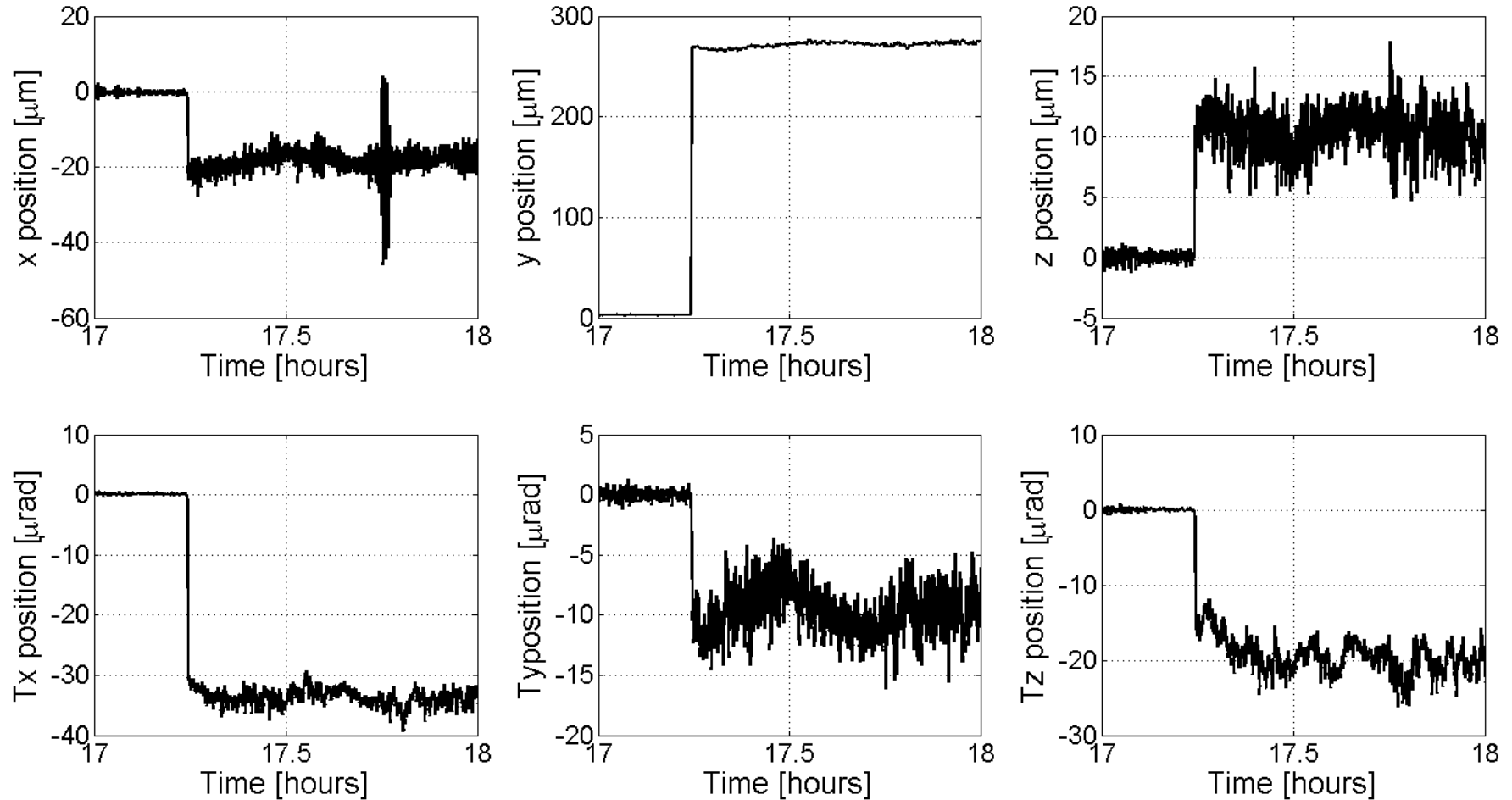


Vertical dof (y) as expected is the most affected: nearly $2 \mu\text{m}/\text{K}$

M. Blom
H.J. Bulten

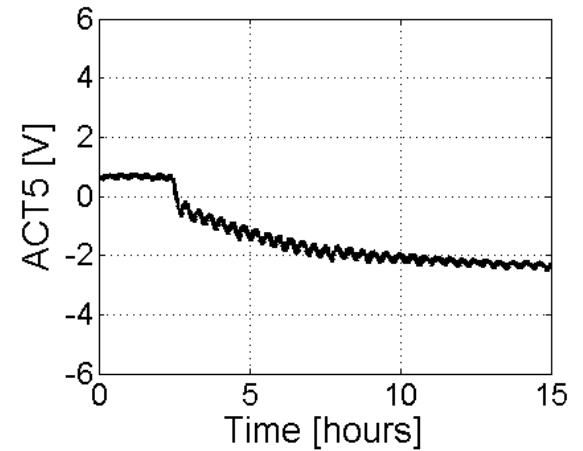
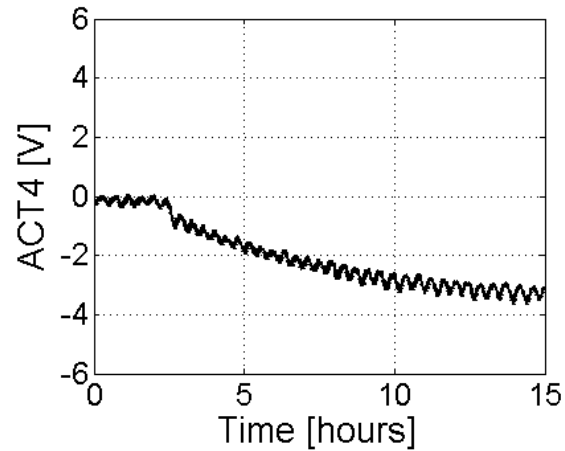
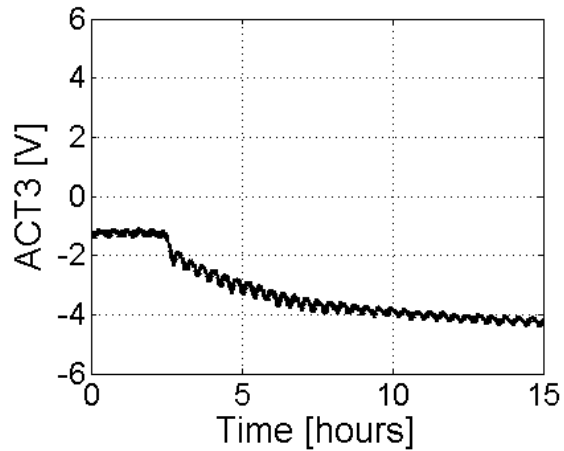
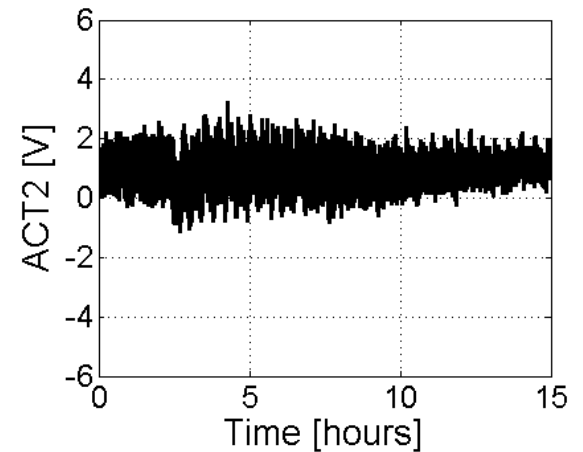
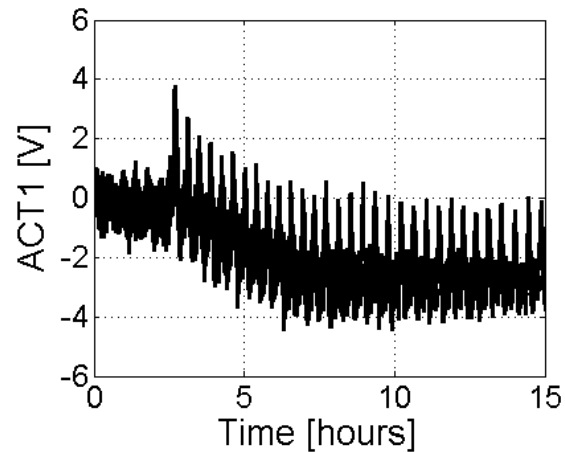
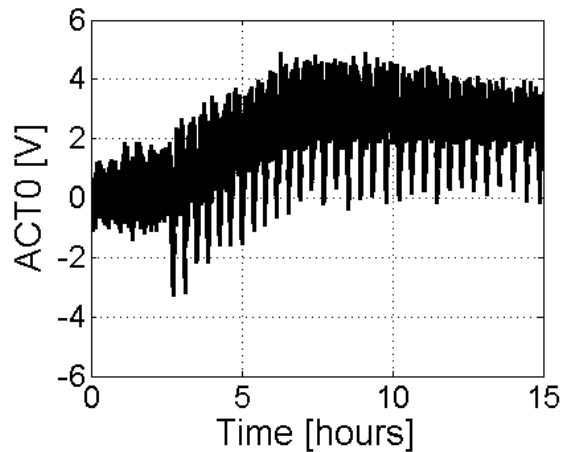
EIB-SAS – Closed loop stability vs temperature change ($\pm 1\text{K}$)

How it would be in open loop



M. Blom
H.J. Bulten

EIB-SAS – Closed loop stability vs temperature change ($\pm 1K$)



New vertical actuator coils allow $\pm 3K$ compensation before clipping

M. Blom
H.J. Bulten

Summary

- Ordering of Minitowers for CB being finalized soon
- The whole mechanics for the 5 MSAS ordered and in production delivery of parts expected by the end of July
- Control electronics (geophone preamps, LVDT/act drivers) design reviewed and finalized
- MSAS-minitower integration test ongoing to provide feedback for the design of the remaining Minitowers
- MSAS long term in vacuum test should start beginning of July
- Feeding needed power to the in-vacuum benches seems feasible