

Recent Activities of the AOS

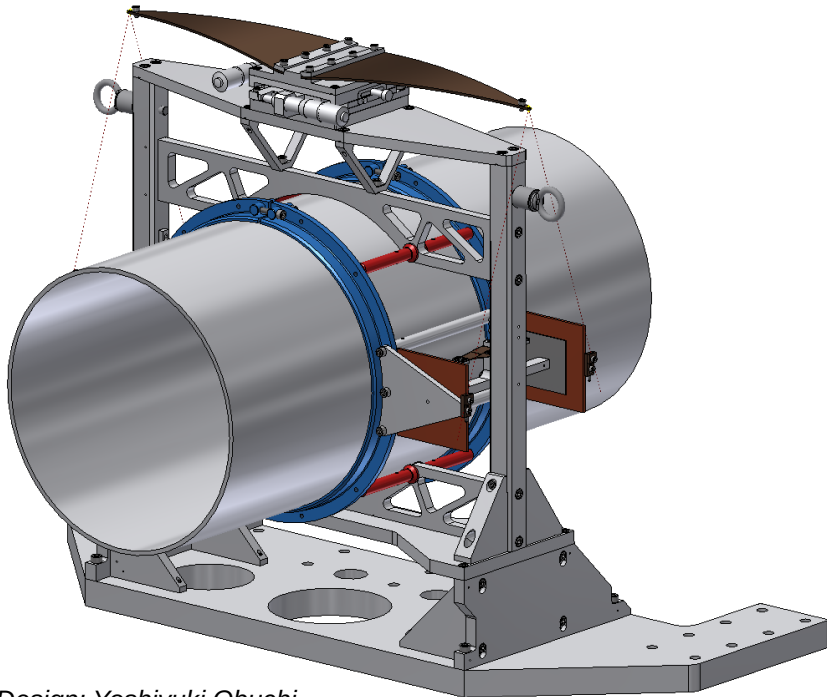
Wide-Angle-Baffle and Narrow-Angle-Baffle Installation

Simon ZEIDLER*, Tomotada AKUTSU, Masatoshi
YANO, Kenta TANAKA

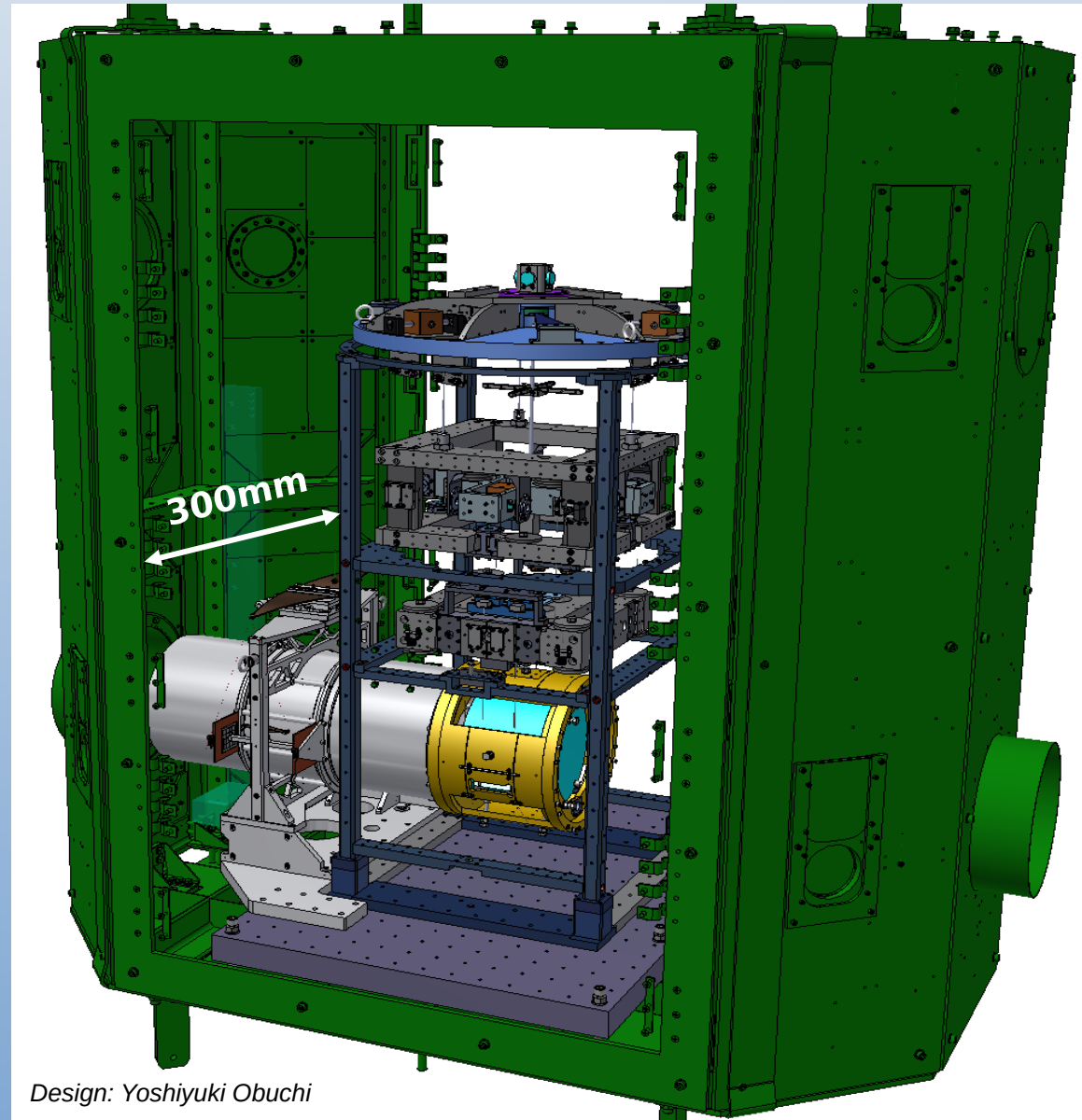
Wide-Angle-Baffle

Wide-Angle-Baffle

- Block scattering coming from the Sapphire test masses on the arm-side
- Scattering may harm goal sensitivity without WAB!



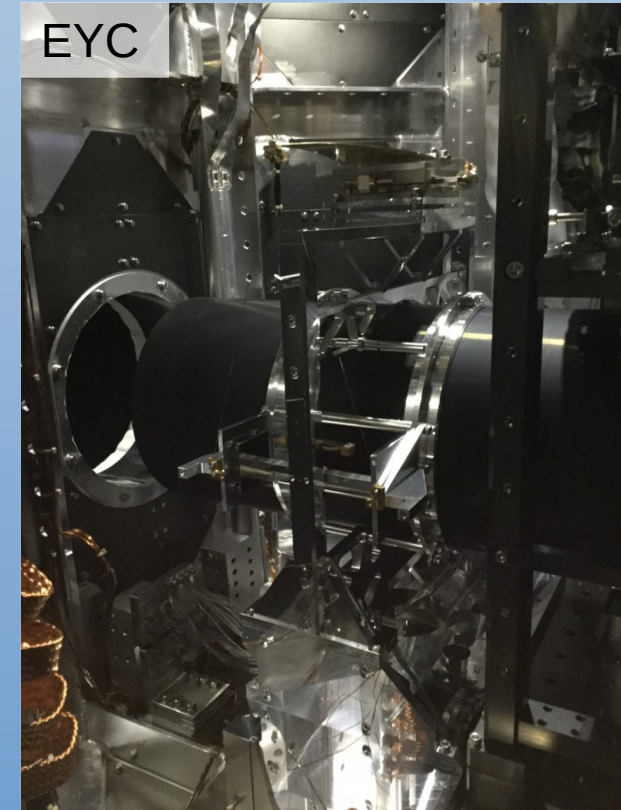
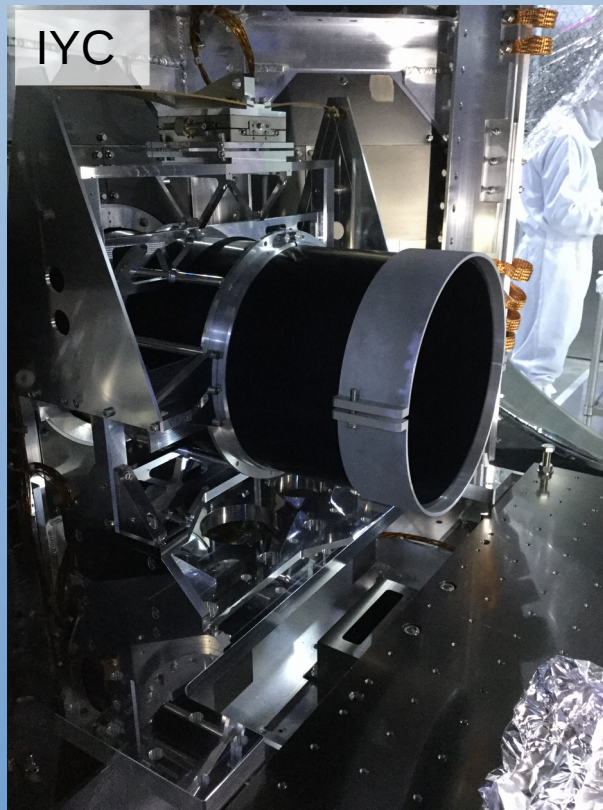
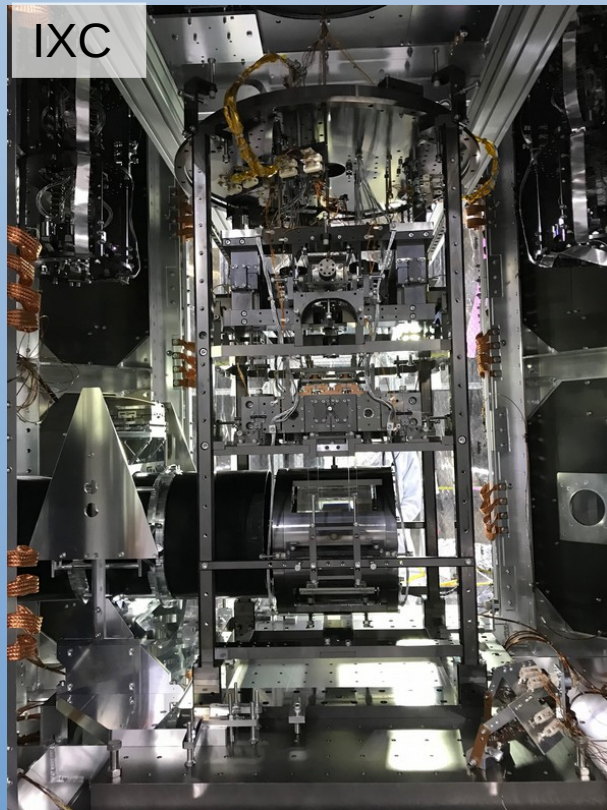
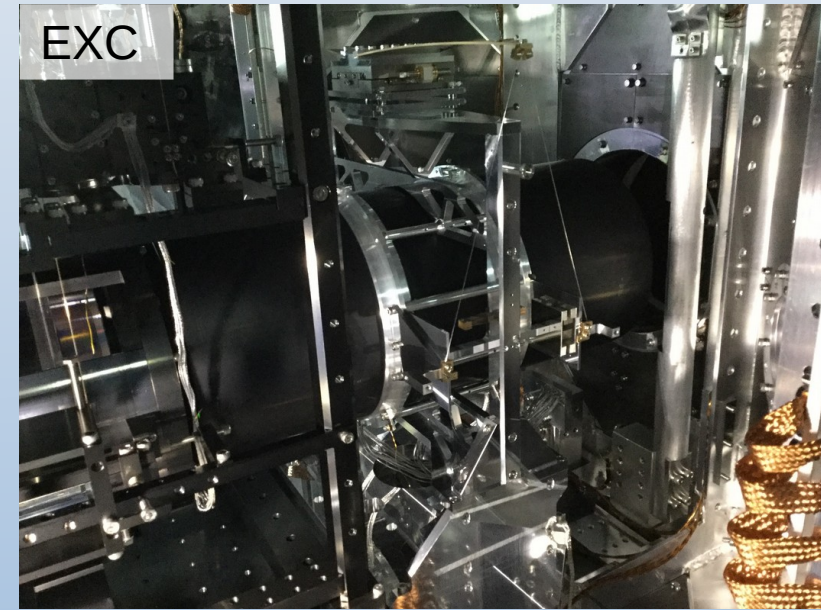
Design: Yoshiyuki Obuchi



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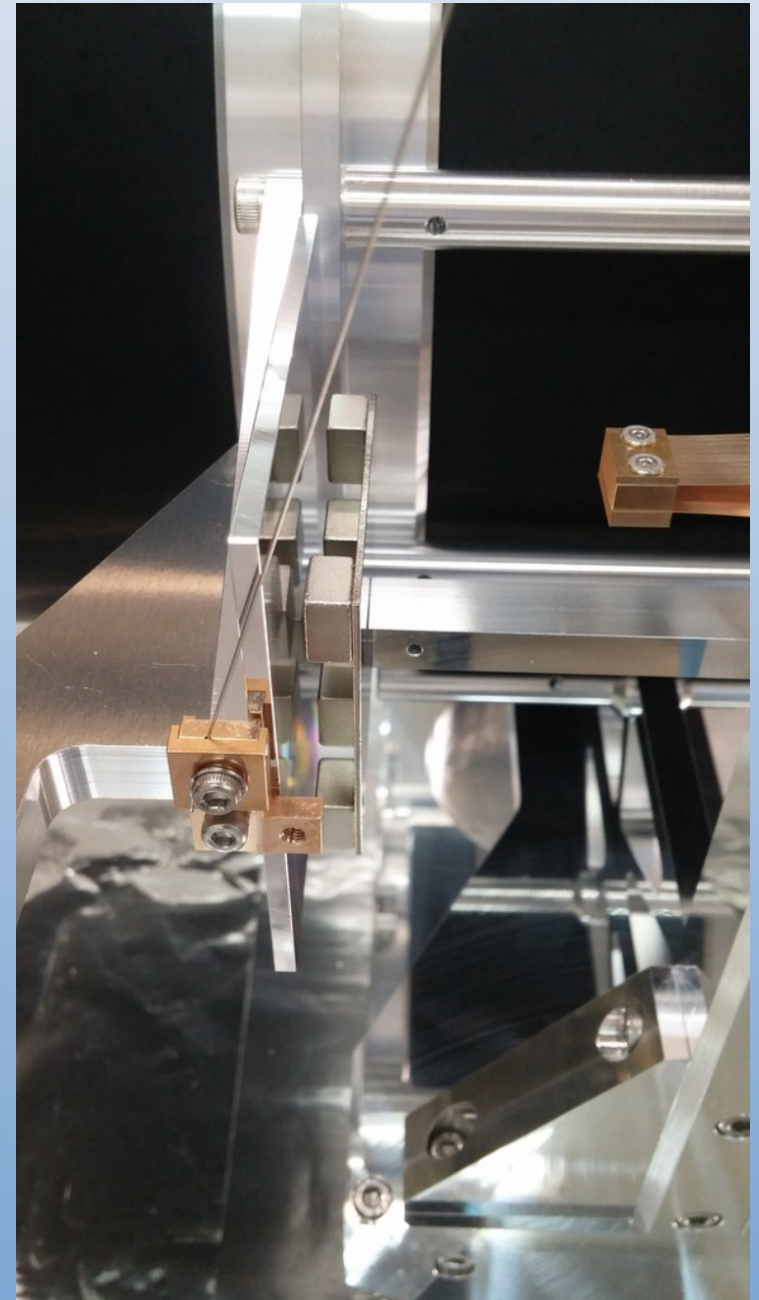
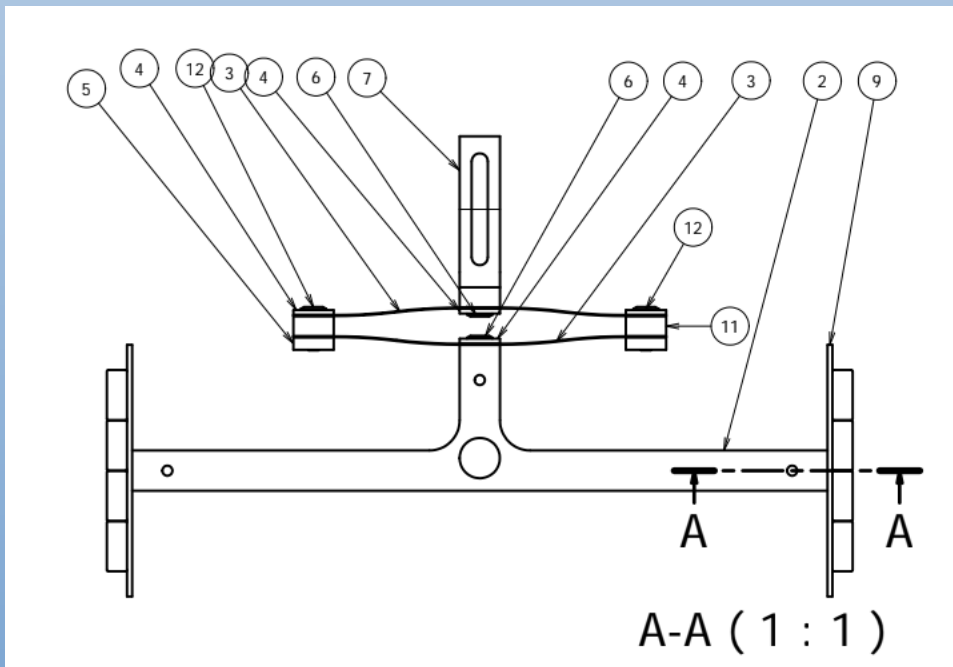
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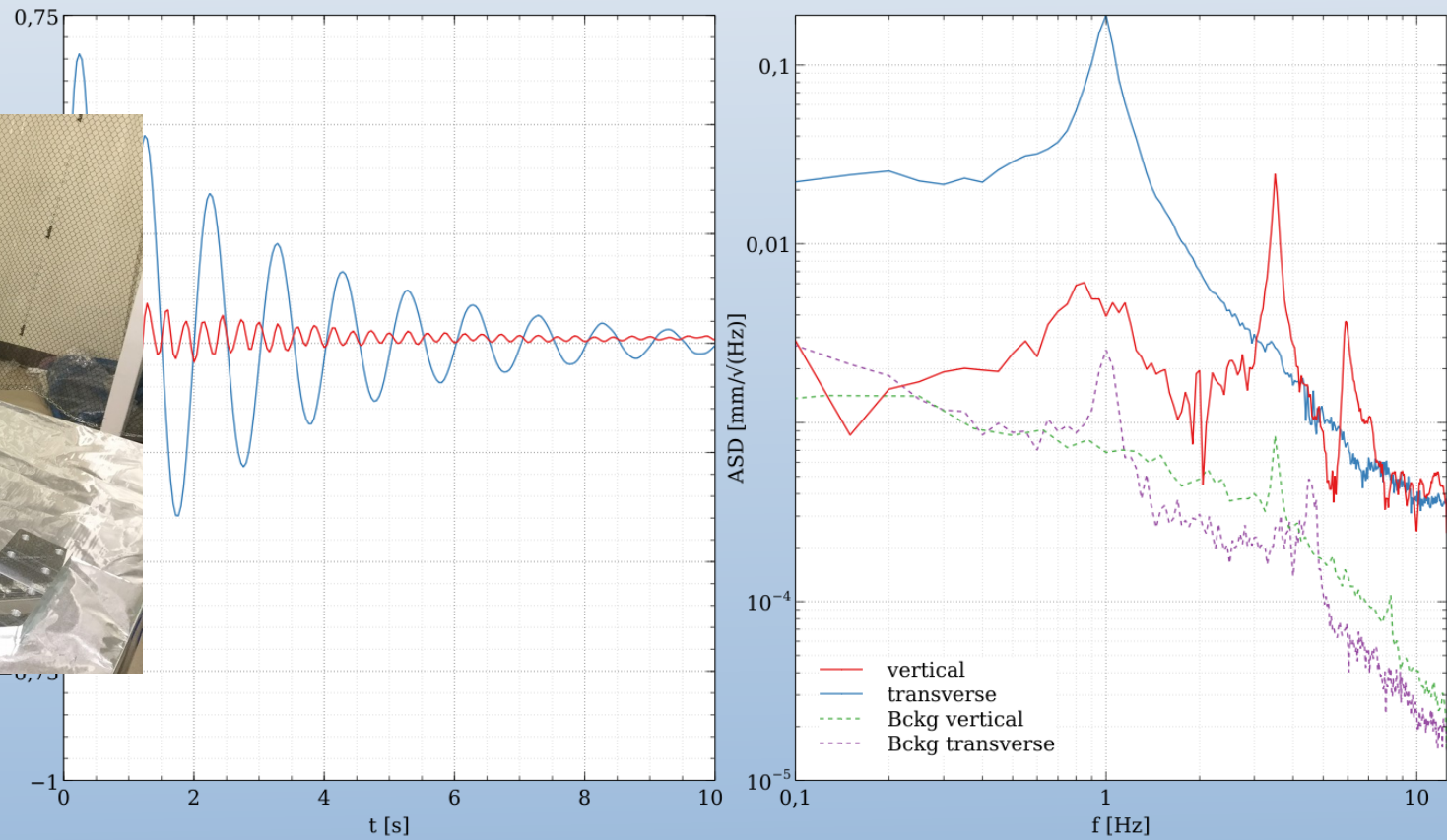
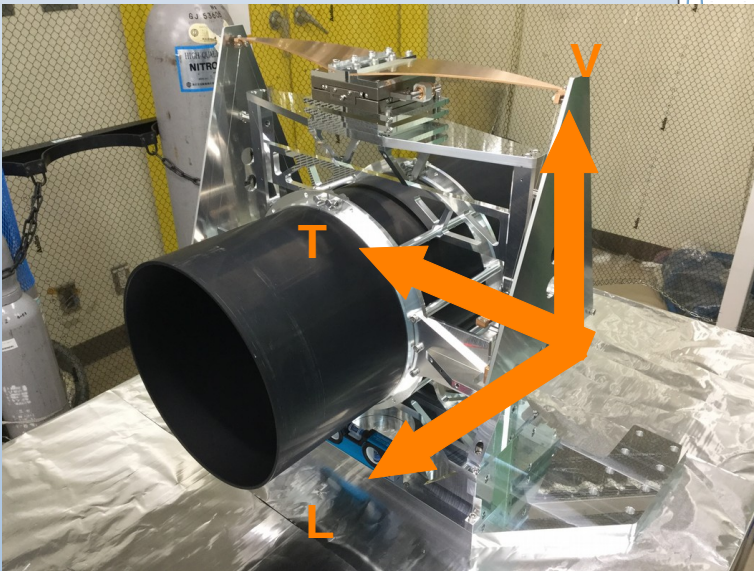
- **All 4 baffles are installed and finalized!!!**
- A document on the characteristics of each WAB is currently being prepared



Dampers

- On 4 spots: **Al (6061)** plate facing 8 SmCo magnets (nominal distance: ~2mm)
- Al shows much less increase of electric conductivity during cool-down compared to Cu



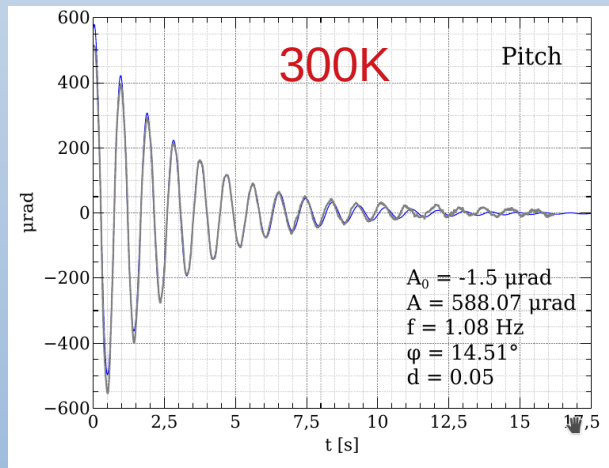
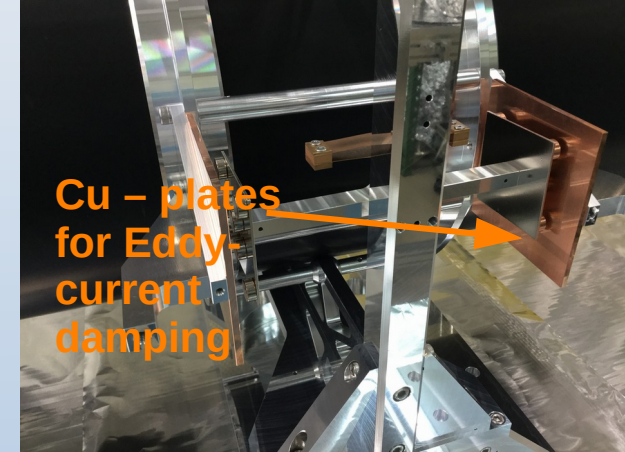


	IXC		EYC		IYC		EXC	
Mode (@ 300K)	f [Hz]	Q	f [Hz]	Q	f [Hz]	Q	f [Hz]	Q
longitudinal	0.84	6.33	0.83	7.18	0.86	6.1	0.84	4.67
transverse	1	11.17	1	15.75	1	9.09	1	9.3
vertical	3.47	42.15	3.47	50	3.51	31.25	3.52	29.4
roll	5.79	37.6	5.76	44.49	5.89	27.78	5.91	26.8

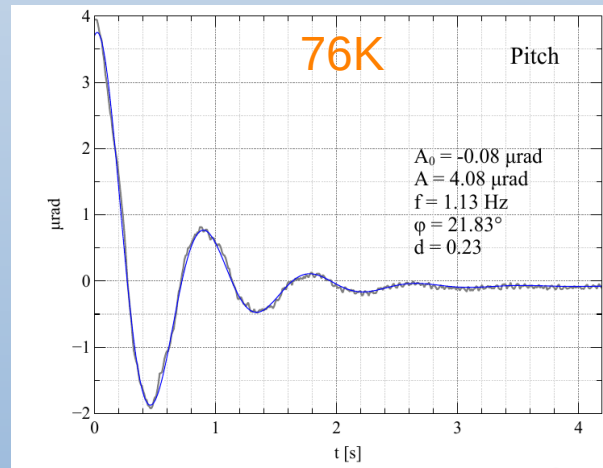
Cooling test performed (02/2018 – 04/2019)

With Cu-plates!

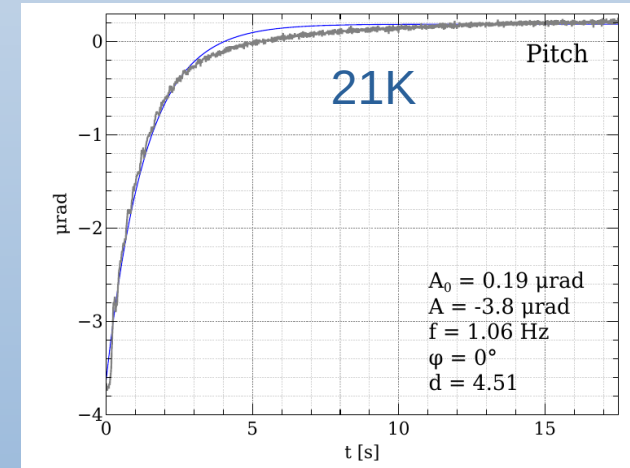
- Checking the damping behavior by cooling down a dummy-WAB in IYC



$Q = 20$



$Q = 4.3$

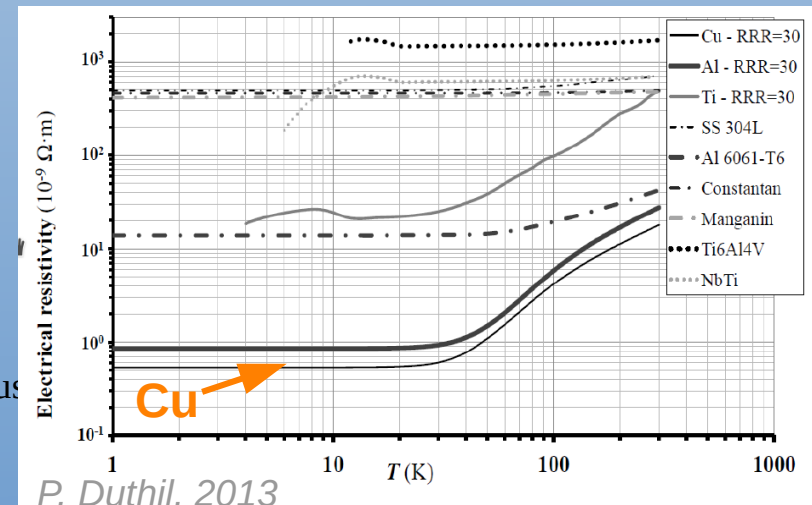


$Q = 0.2$

- Electrical resistivity decreases in Cu during cooling-down a lot
→ Eddy-current works much more efficient
- → Overdamping

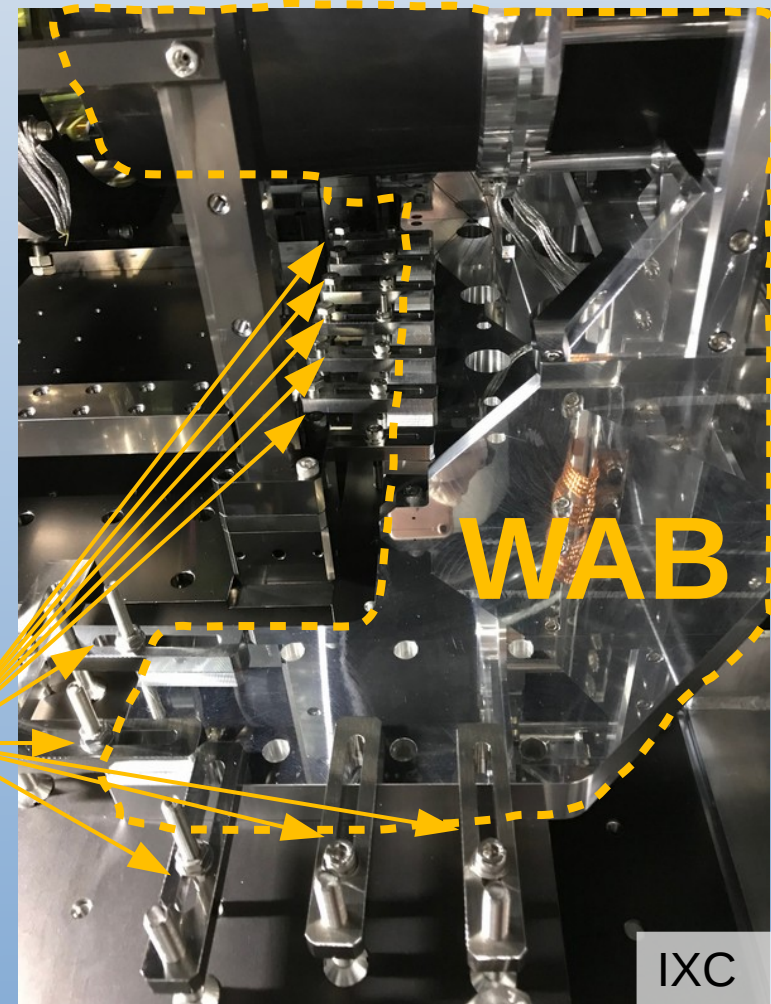
04/20/19

KAGRA f2f Kashiwa Campus

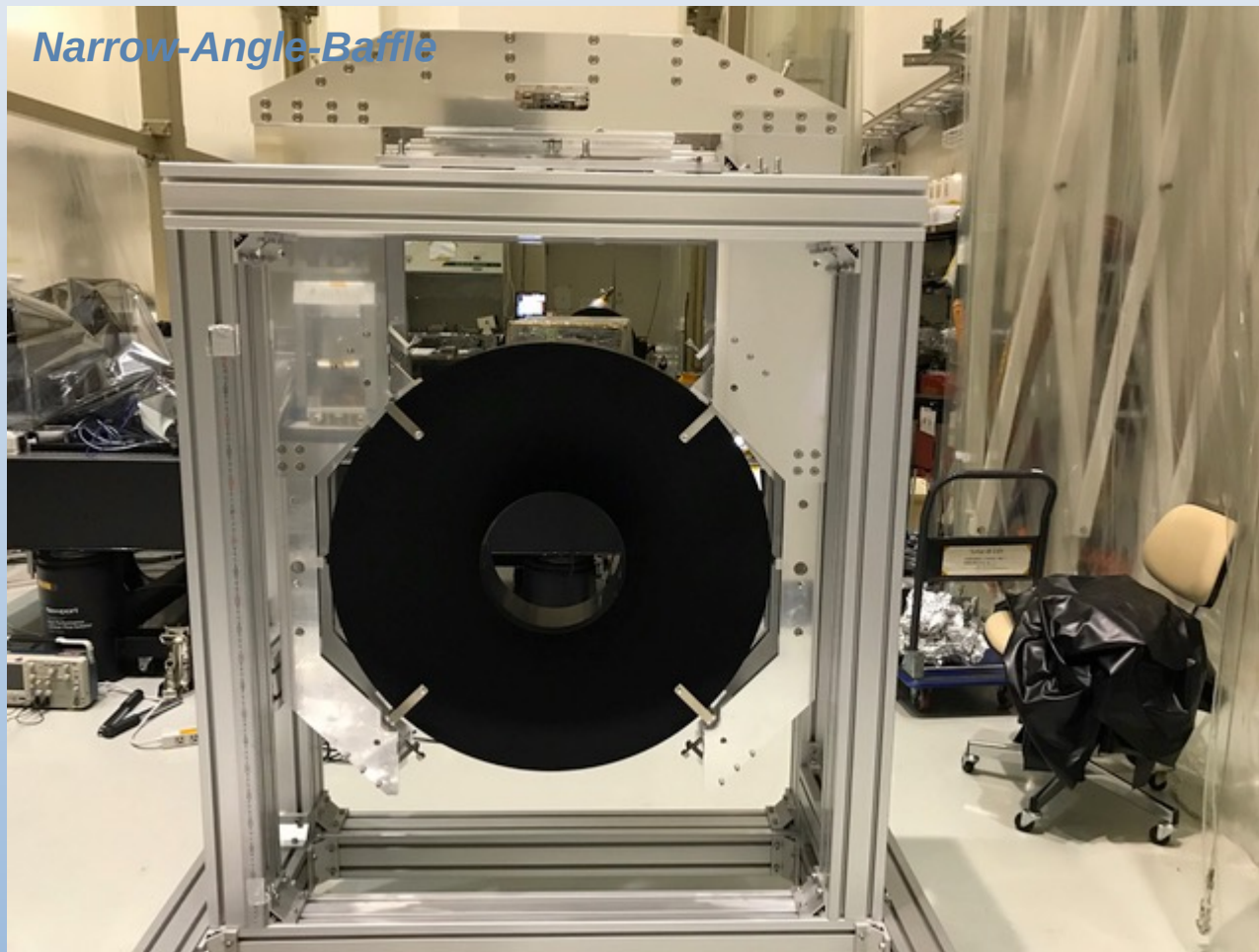


Issues during installation/finalization:

- **Payload-shift in IXC & EXC**
 - Payload structure installed too much shifted +X/-X by 8~10mm
 - WAB needed to adopt
 - But: WAB is supposed to be fixed on the optical table by screws → screw holes do not match!
 - → shifted WAB more further away from the recoil-mass (7mm → 22mm) using both remaining screw-holes and clamps
- **Heat-link bracket hard to access**
- **Thermometer, Burndy-Connectors,...**



Narrow-Angle-Baffle

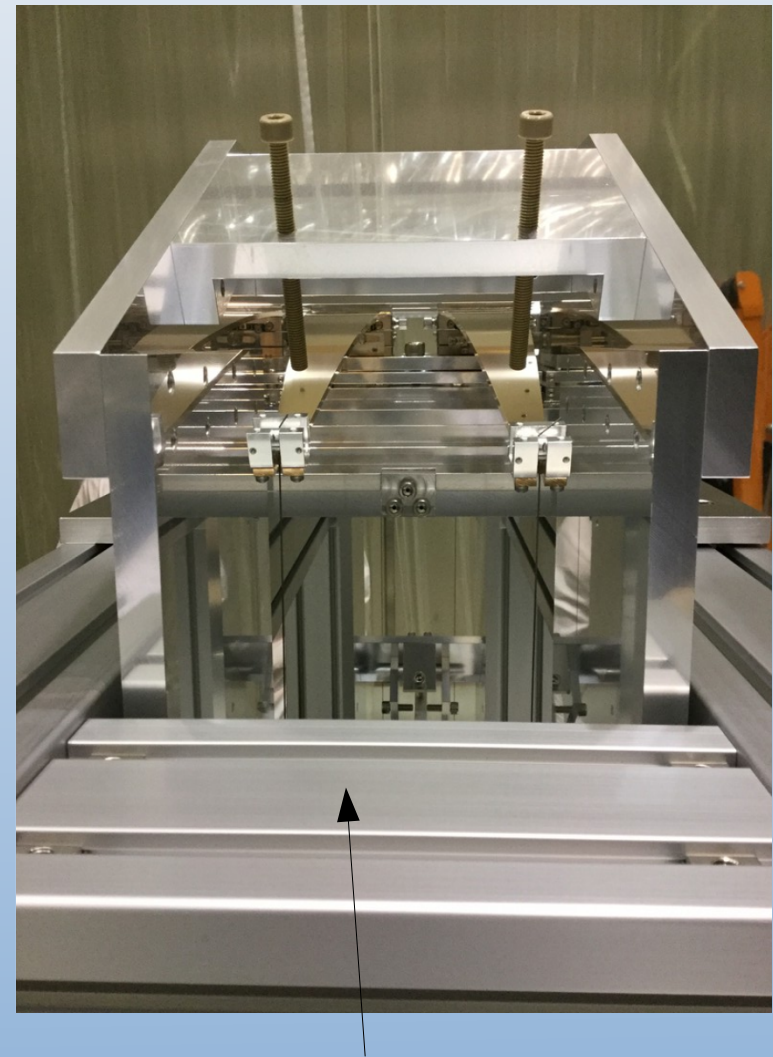


Status:

- **4 baffles installed and finalized!!!**
- Located in A-chambers
- Documentation:

<https://gwdoc.icrr.u-tokyo.ac.jp/cgi-bin/private/DocDB/ShowDocument?docid=10027>

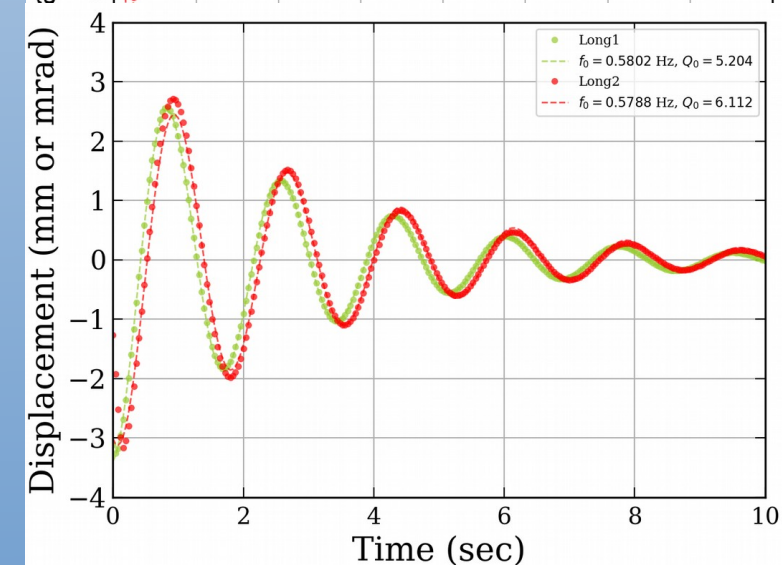
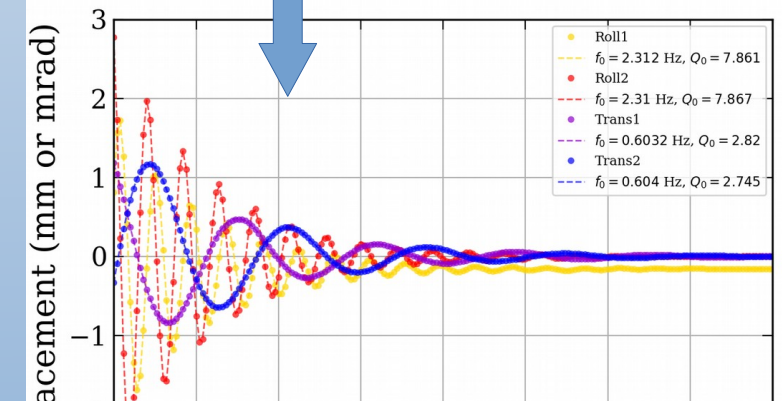
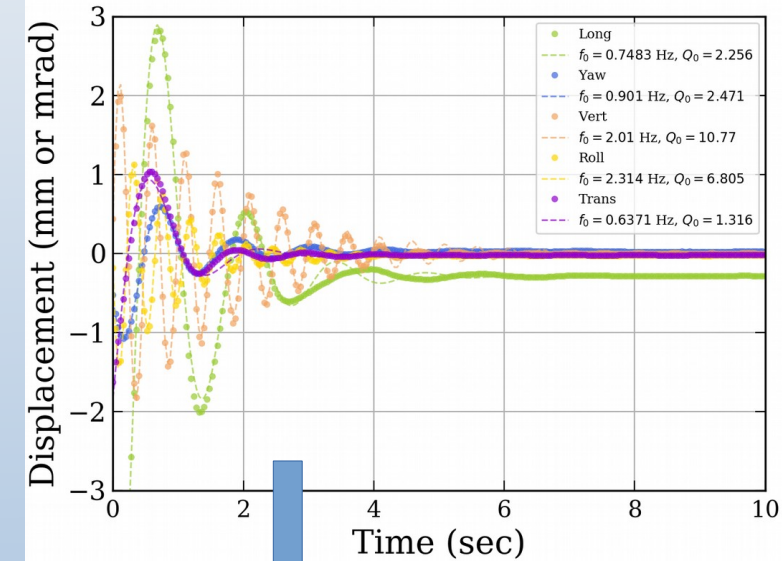
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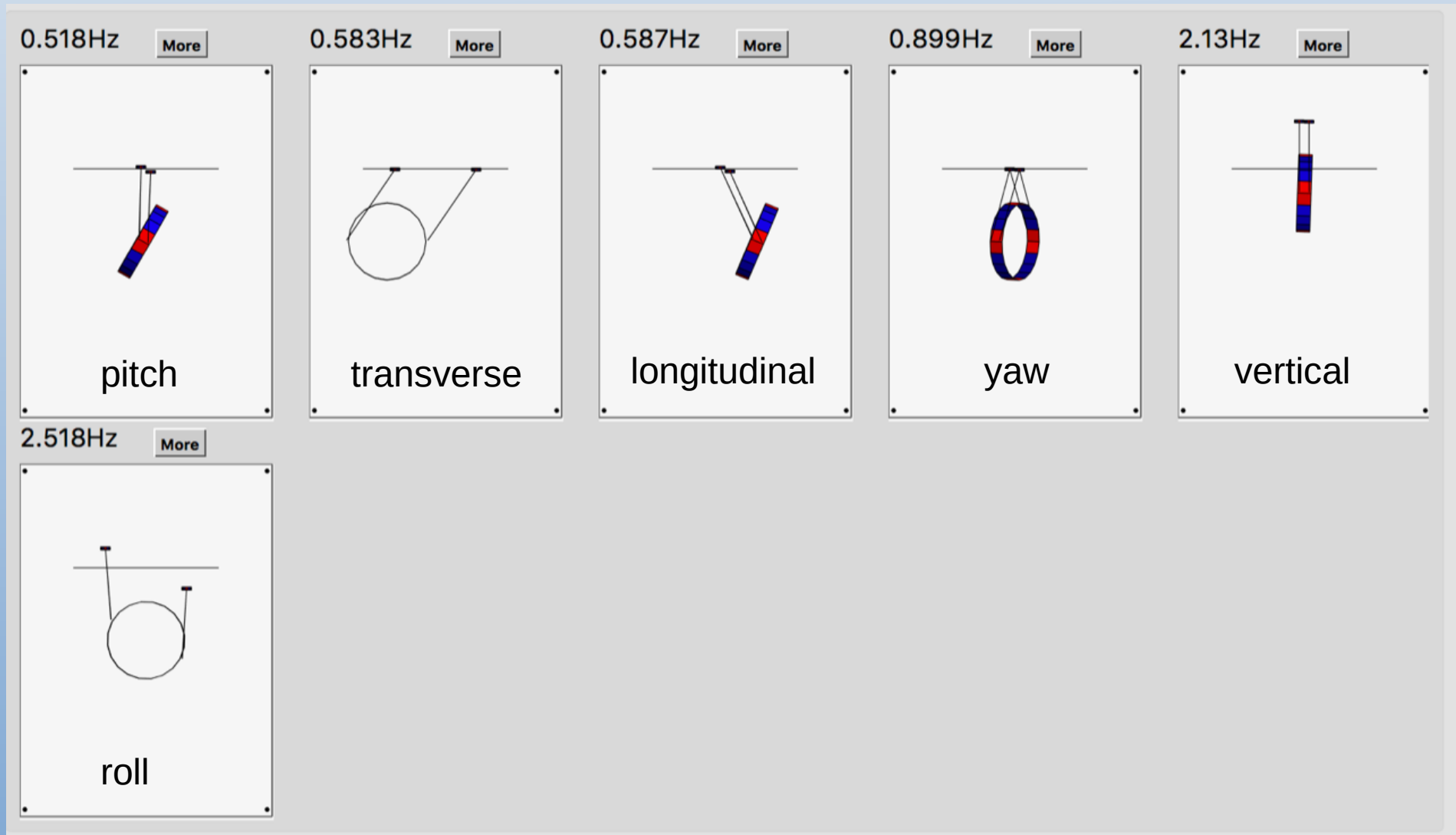
Suspension: 4 wires and 2
Spring-blades

Issues we found:

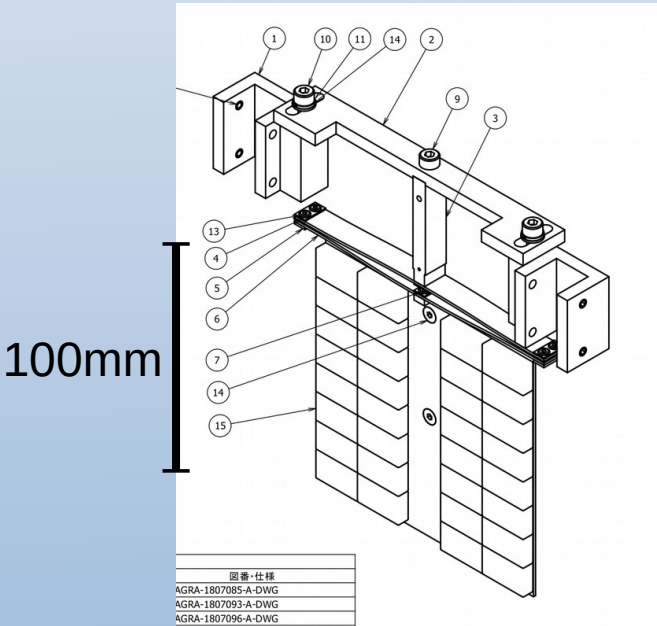
- **Spring-blades are bended**
 - **Issue:** heavy influence on alignment!
 - **Reason:** probably due to cutting process
 - **Solution:**
 - company found a solution, though very late → used for the last NAB
 - Using balance masses
- **Influence from PD-holders**
 - **Issue:**
 - Baffle gets additional pitch offset
 - Wires are easy to touch and hold the baffle
 - **Solution:**
 - Balance masses (sometimes difficult)
 - Wires need to be placed very carefully and rather loose
- **Setting and clamping NAB to chamber**
 - **Issue:** Installation-tower has uneven feet
 - **Solution:** we bought longer clamps and additional shims



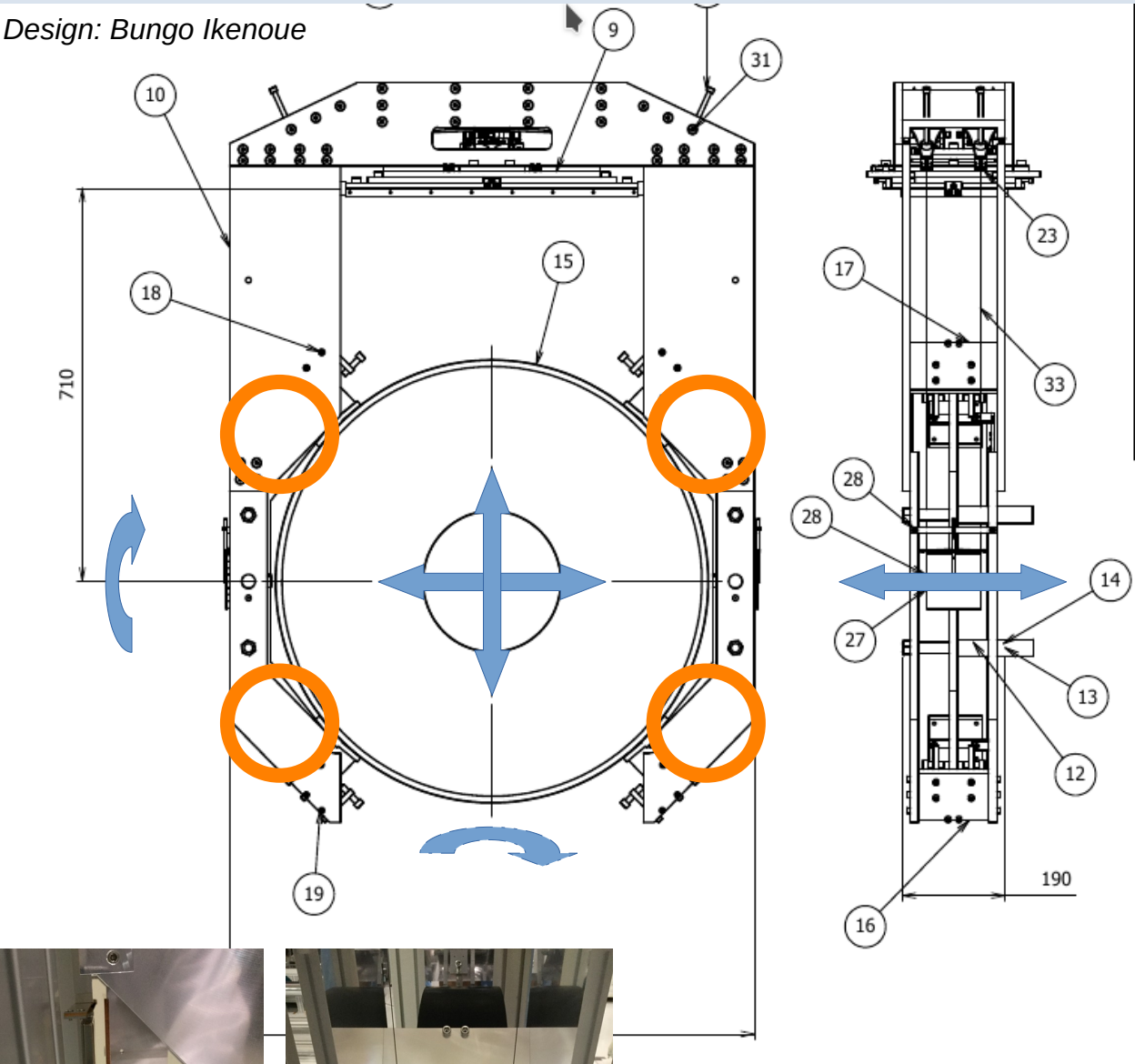
Eigenmodes:



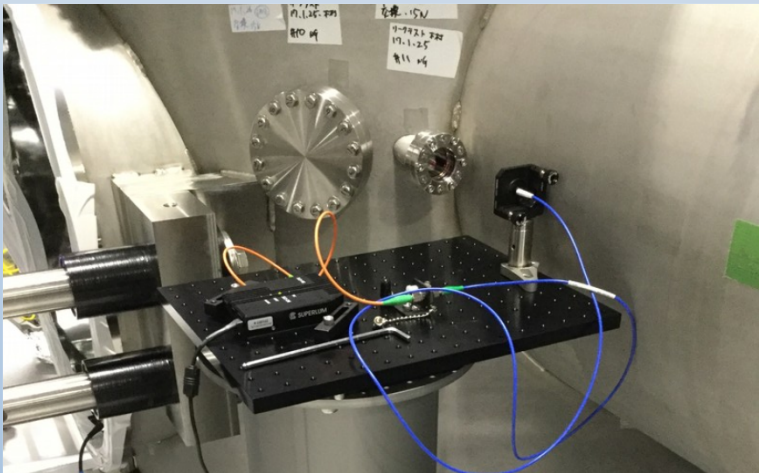
Damping NAB



Fully packed with Nd magnets



Using “Laser Displacement Sensors” and OpLevs for analyzing baffle movement



	NAB@IXA		NAB@IYA		NAB@EXA		NAB@EYA		Design
	f	Q	f	Q	f	Q	f	Q	f
longitudinal	0.59	7.2	0.58	5.2~6.1	0.56	5.3	0.59	8.3	0.587
transversal	0.65	3.2	0.6	2.8	0.59	3.1	0.59	4.6	0.583
vertical	2.02	20	2	18	2.05	22.2	2	29	2.13
yaw	0.98	1.6(?)	0.88	2.7~2.97	0.88	3.1	0.88	4.6~4.9	0.899
pitch	0.56	4.76	0.59(?)	4.26(?)	0.5	4.1	-	-	0.518
roll	-	-	2.3	7.8	2.21	6.2	2.3	11~12	2.518

Summary

WAB:

- Finalized all 4 WABs!!!
- Effect on the damping due to cryogenic temperatures not clear yet (further tests planned)
- Documentation not yet (fully) finished

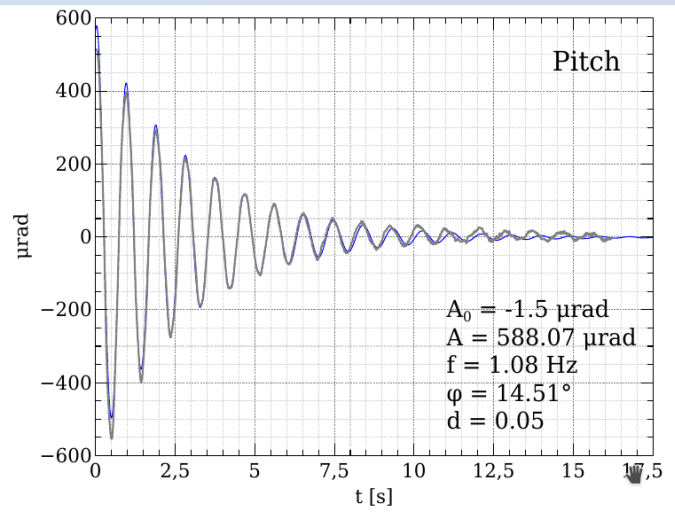
NAB:

- Finalized all 4 NABs!!!
- Had issues due to misshaped spring-blades
→ using balance-masses
- PD-holders (+ cable) alter the suspension
→ need to take care during installation
- Documentation on assembly and characterization online

Thank you for your attention!

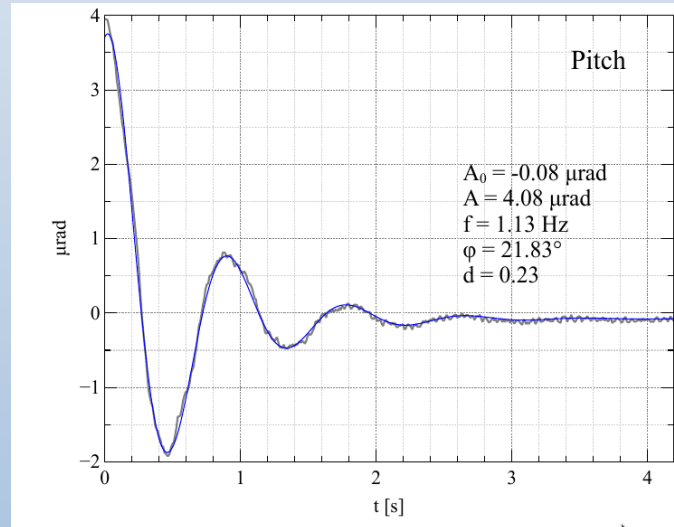
Wide-Angle-Baffle

300K



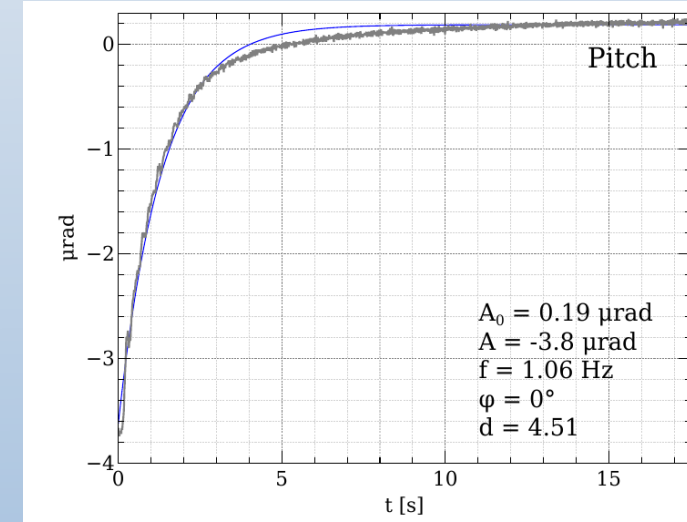
$Q = 20$

76K

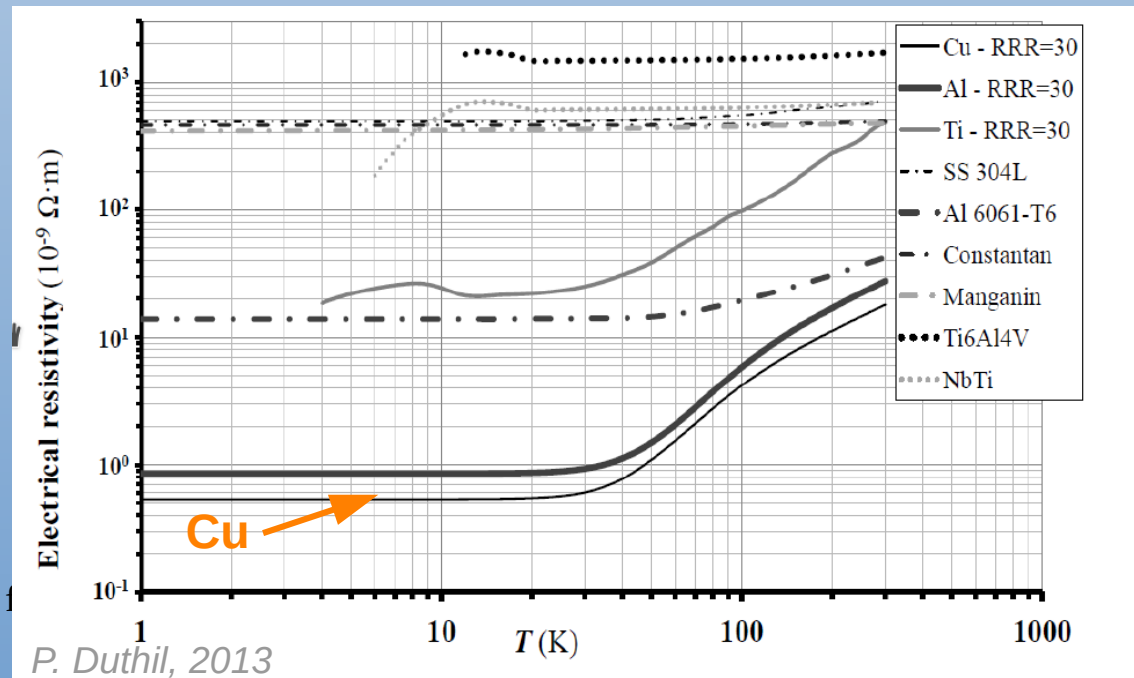
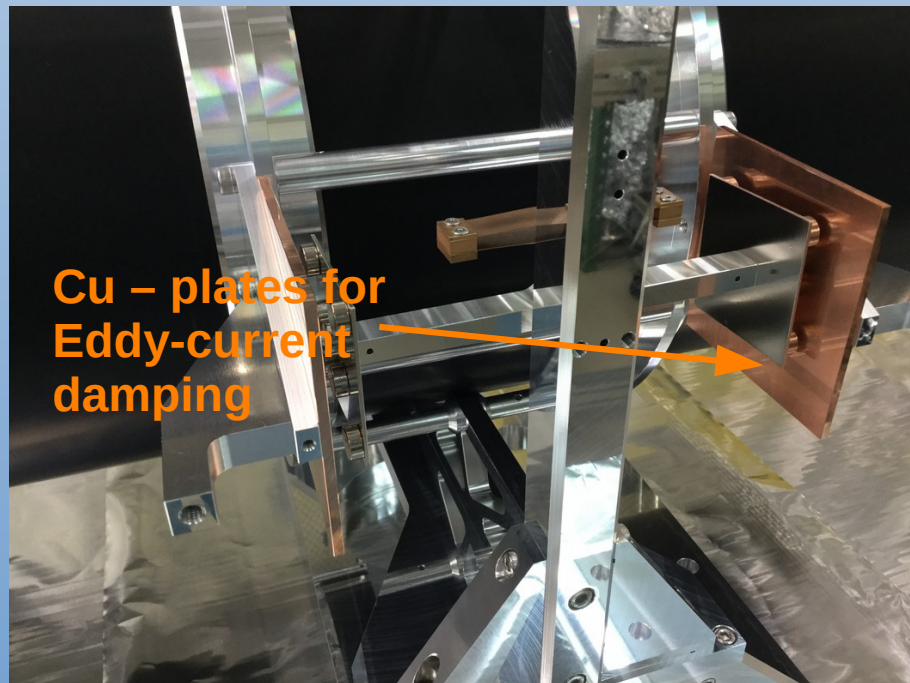


$Q = 4.3$

21K



$Q = 0.2$



Narrow-Angle-Baffle Assembly

