

Report of LVK meeting 2026



Tatsuya Sugioka

- LIGO-VIRGO-KAGRA Collaboration Meeting
- March 9-12, 2026
- Pala Todisco – Meeting and more, Pisa, Italy
- Parallel sessions in day1&2,
Plenary session in day3&4, Poster session in day3
- Workshop lunch everyday, one(two?) dinner(s),
VIRGO site tour in day5
- Program and slides, posters available on LIGO dcc



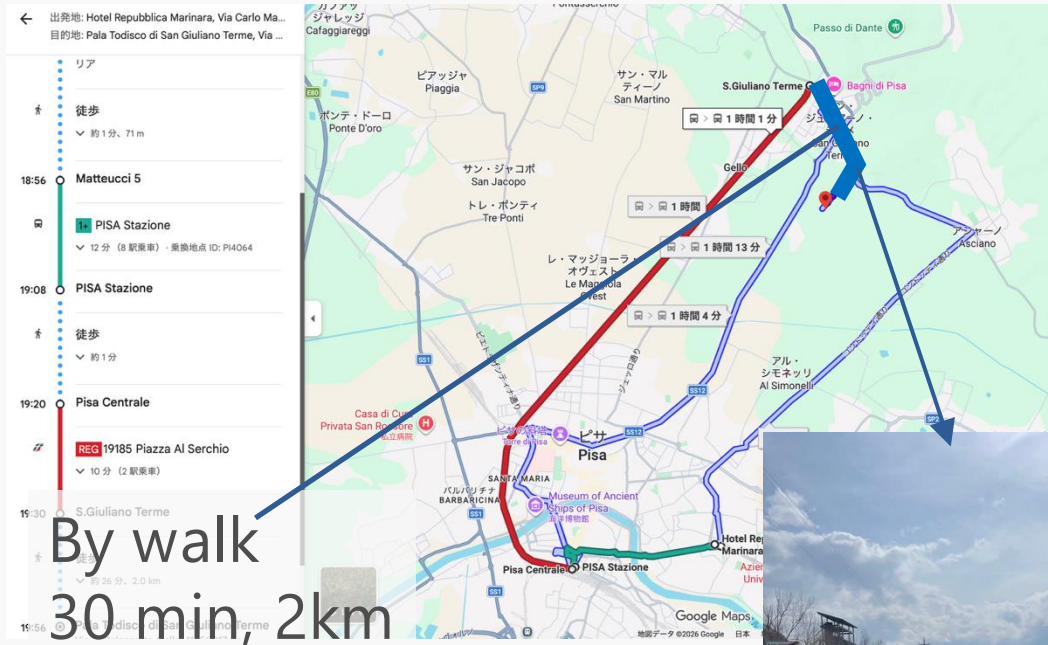
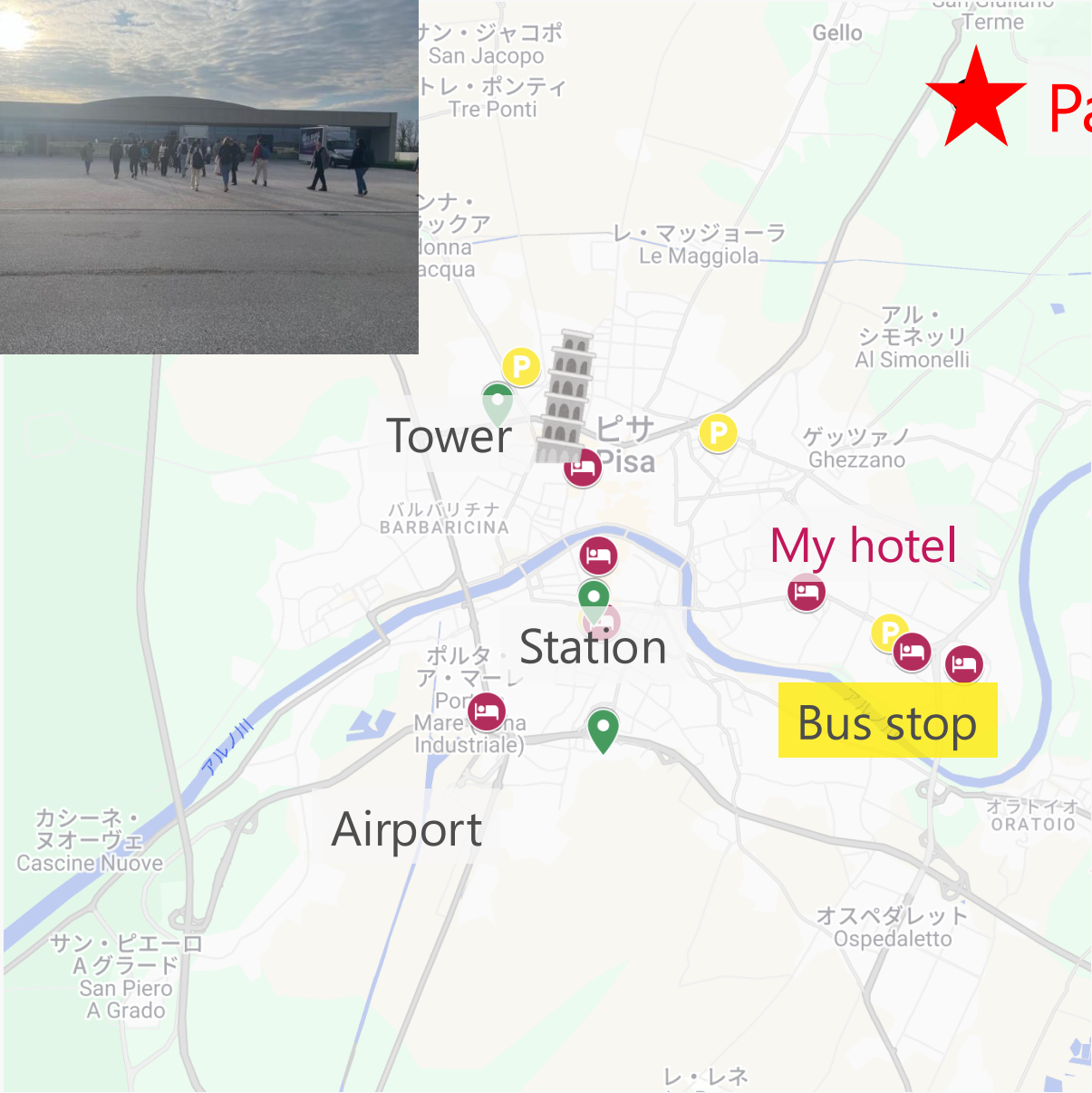
- Twice a year(March and September)
- Rotate among Europe, US, Asia?
 - Mar. 2025 @Melbourne
 - Sept. 2025 @Colorado
 - Mar. 2026 @Pisa
 - Sept. 2026 @Pune(India)
- Scientific parallel sessions in day1&2,
Poster session in day3
Reports and IGWN(?) Plenary session in day3&4,



Souvenirs in this meeting



★ Pala Todisco

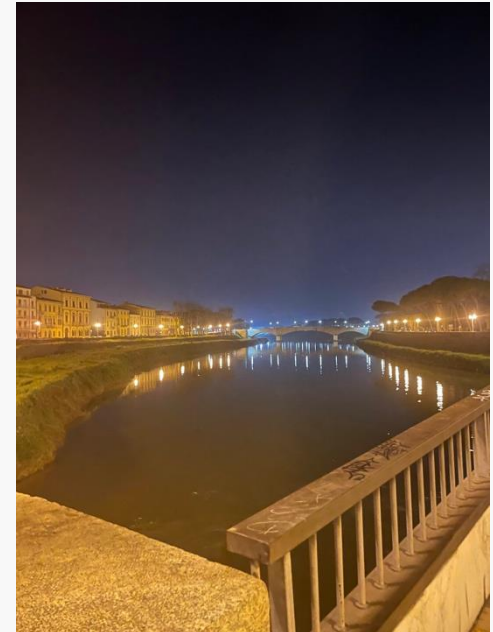


- Many participants from Europe (compared to Melbourne)
- Participants from Japan; T. Kajita, M. Ando, Y. Aso, K. Ohara, T. Sawada, T. Narikawa, N. Uchikata, I. Obata, T. S. Yamamoto, H. Fujimoto, Y. Sakai, K. Kobayashi, H. Imafuku
- Also Japanese participants from abroad, K. Kawabe, Y. Inoue, D. Tanabe, M. Iwaya
- Other KAGRA collaborators from Taiwan and South Korea

Overall Impression

6/21

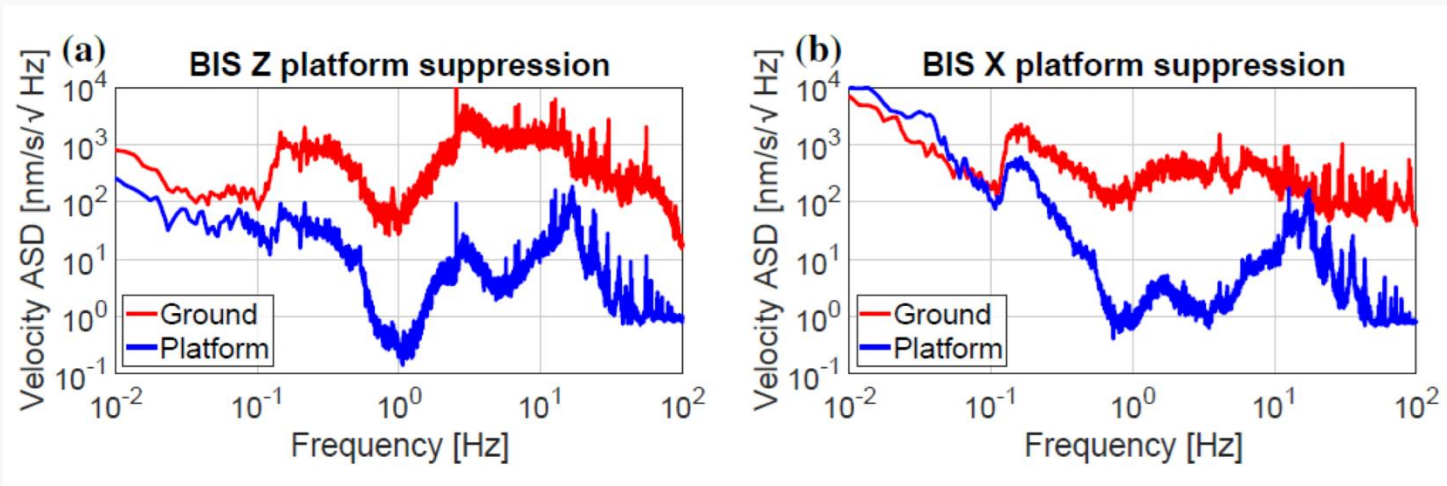
- Somebody said LVK is for building connections
- Different atmosphere than Melbourne
- Great discussions and networking
- Experimental field seems reaching maturity, yet seeing niche, sophisticated updates across all sectors
- Cryogenic still feels a long way off
- Discussions are limited by my English...
- Foods and scenery were totally nice



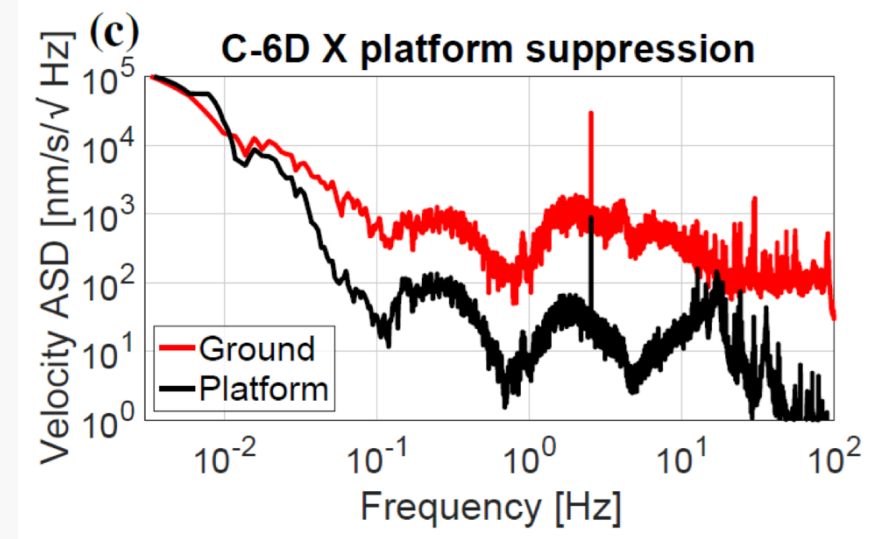
Talk about Birmingham experiment

8/21

- Presentation by Lari Koponen in Suspension Working Group
- About Laser Position Sensor, 6D Birmingham Inertial Sensor, Compact 6D
- Testing to stabilize HAM platforms with BIS, TM platforms with C-6D



BIS

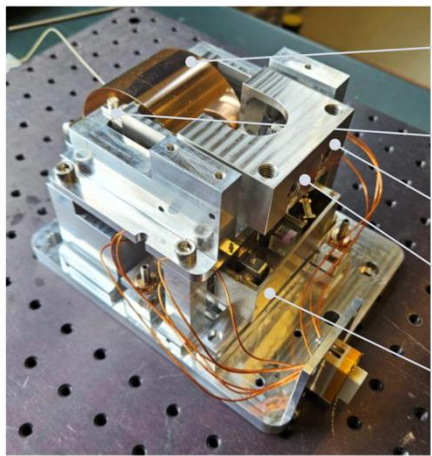


C6D

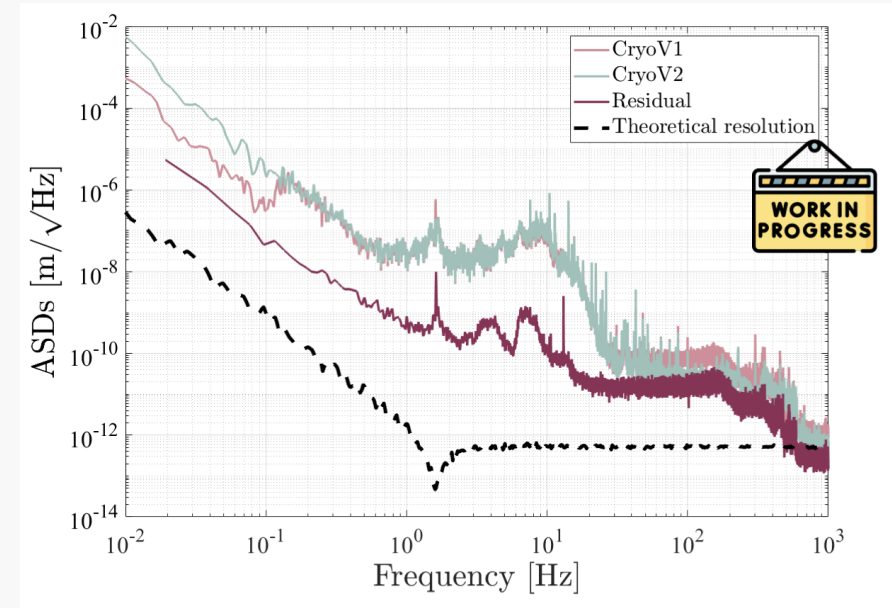
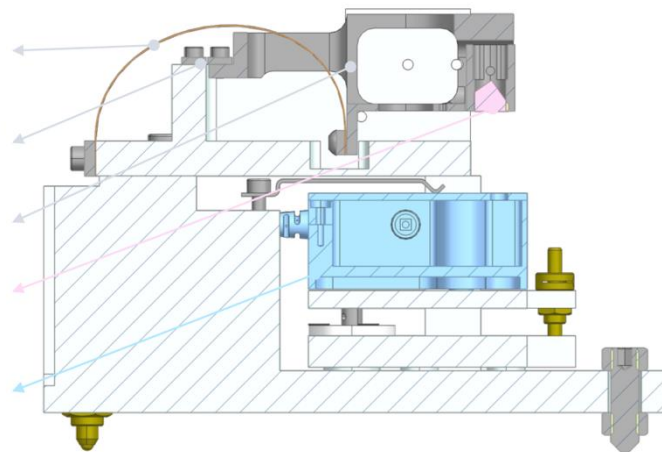
Talk about cryogenic inertial sensor

9/21

- Presentation by Morgane Zeoli from Liege Univ. in SWG
- Vertical cryogenic IS with interferometric readout for ETEST
- Tested optical elements, alignments, leaf spring in 5K
- HoQI in cryogenic!
- They are not using cryo. compatible motors



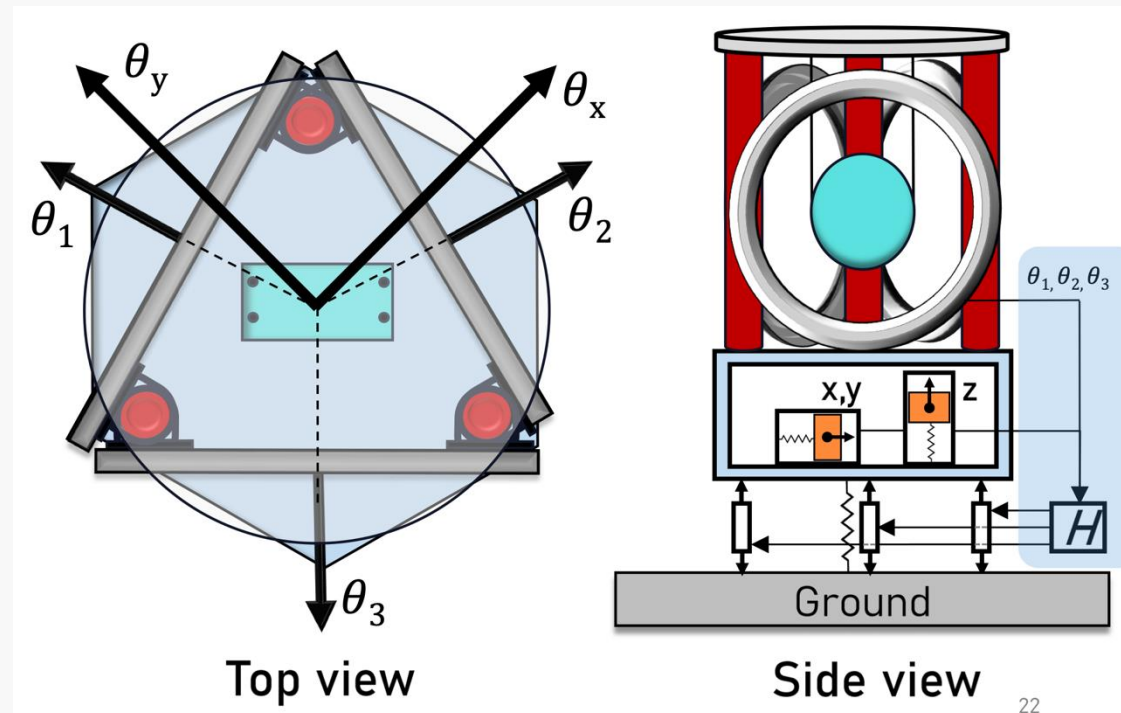
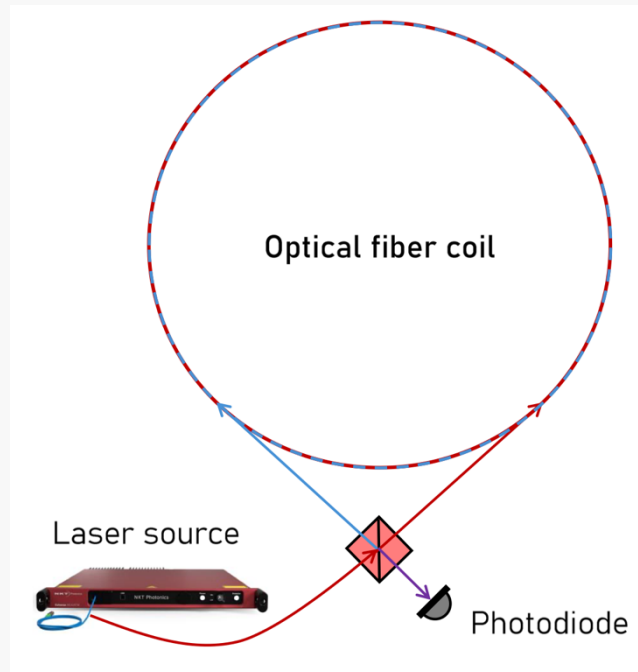
Leaf-spring suspension (BeCu)
Double-clamped blade hinge (BeCu)
Inertial mass
Corner cube
Homodyne quadrature interferometric readout
[Amorosi 2025](#)



Talk about rotation sensor for inertial sensor

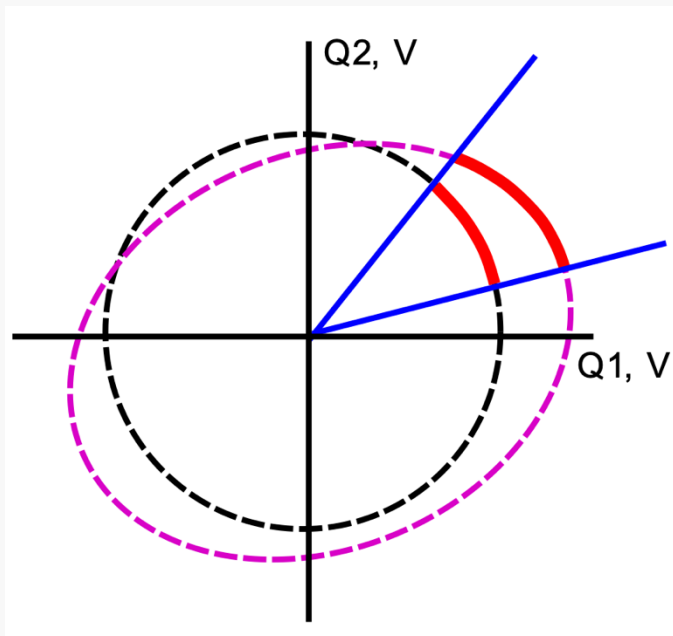
10/21

- Presentation by Brioux Thibaut from Liege Univ. in SWG
- To decouple the rotation from inertial sensing in low frequency
- Detect the rotation with Sagnac interferometer
- ~km long optical fiber?? Thermal noise?



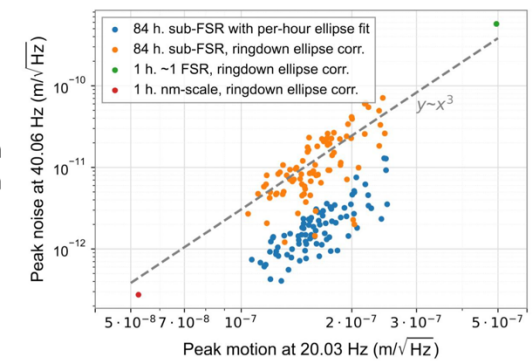
Liege from the flight home

- Presentation by Artem Basalaeu from AElin SWG
- Fused silica resonator + HoQI readout → FuSIS
- Imperfections of optics introduce elliptic distortion which results in nonlinearity of FuSIS
- Fujimoto-san knows more...

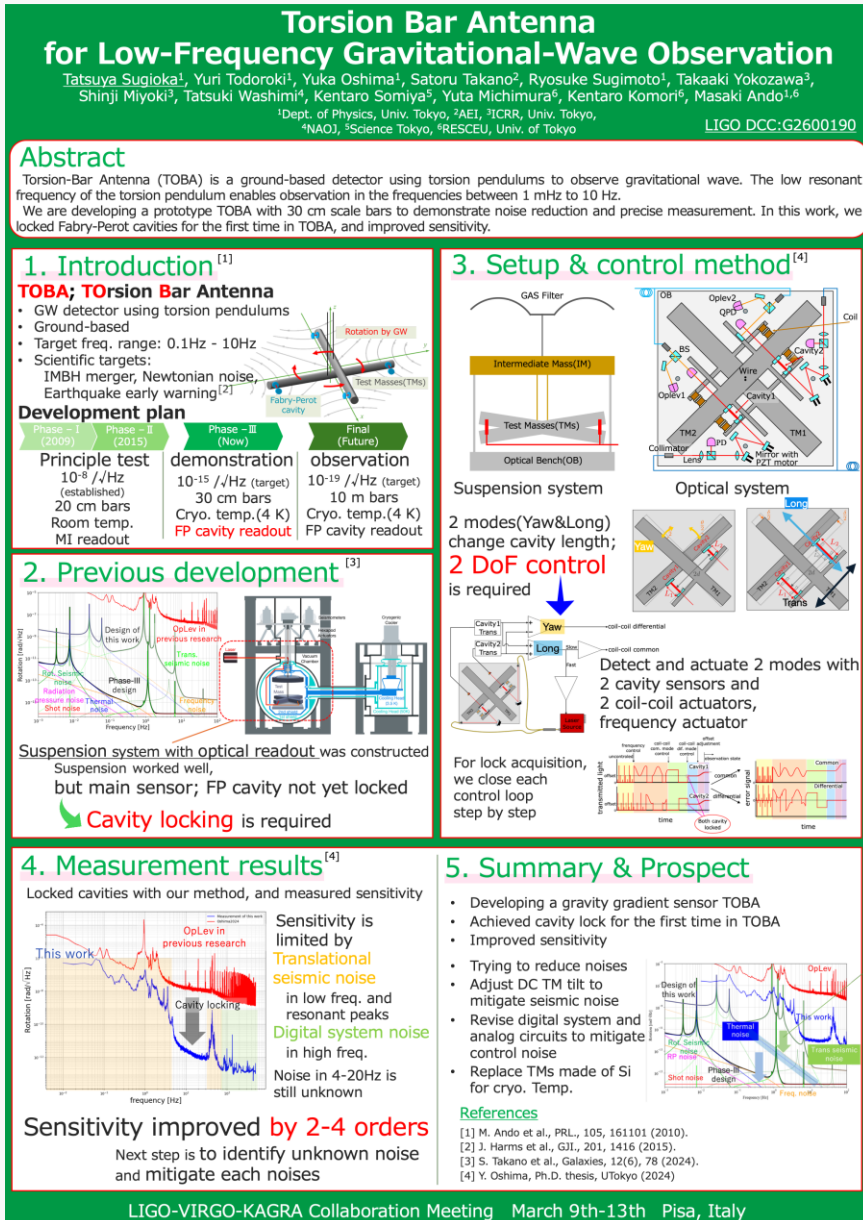


Summary: performance for different motion ranges

- **μm range:** ellipse fitting in HoQI readout
 - Always a good idea, at least **4x noise reduction!**
 - Remaining deviations at 0.05% level: hysteresis effects, likely specific to FuSIS
- **Sub-μm range:** additional fit for every hour of data
 - Beat note of FuSIS resonance and isolation table as „nonlinearity gauge“
 - Around **2x further noise reduction** on average
- **nm-range:**
 - Whitening filters important: **large effect on ADC noise suppression (~3x)**
 - Sensitive to tolerances in electronics → *measure* TF instead of estimate



J Lehmann et al 2025 arXiv:2511.04386



- Steady stream of visitors kept me at my booth throughout the session
 - Cavity control might impressive?
- Bram, Kawabe-san and Inoue-san had some insightful questions
- Some questions about the configuration

TOBA is completely new for some people
- Several people said “Your improvement is nice! And your goal is…”

Phase-III is still so far

Bram

- Discussion about lock acquisition
- In TorPeDO, they don't control TM at all
- Avanish locked 2 cavities out of 4!
- Invitation for me to visit TorPeDO
- "I know how difficult it is!"



Bram

Aso-san

- Method for decoupling
- Clio site is not good choice
- Super spring

Brieux

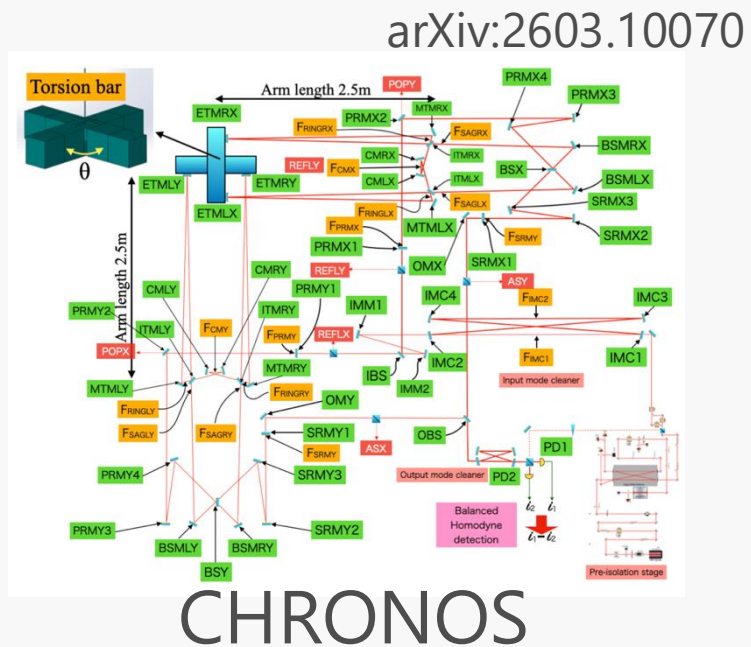
- Rotation sensor might be too large to install in TOBA
- In case of inertial sensor, rotational control is required only below 0.1 Hz or something

- Senior scientist in LIGO Hanford
- His research experience and why he joined LIGO
- Old story of AEI
- Current commissioning of LIGO
 - Labor shortage
 - Alignment matters due to temperature change?
- Kindly introduced LSC Fellowship to visit LIGO site for several months
 - Maybe Ono-san uses this fellowship?
 - Work at the site depends on the time



From LIGO Twitter

- Associate Prof. in National Central University(Taiwan)
- Plans to start torsion bar experiment in Taiwan
- Has several workshop in Taiwan which are very nice for education
- Discussed suspension systems and torsion control schemes



From his Instagram



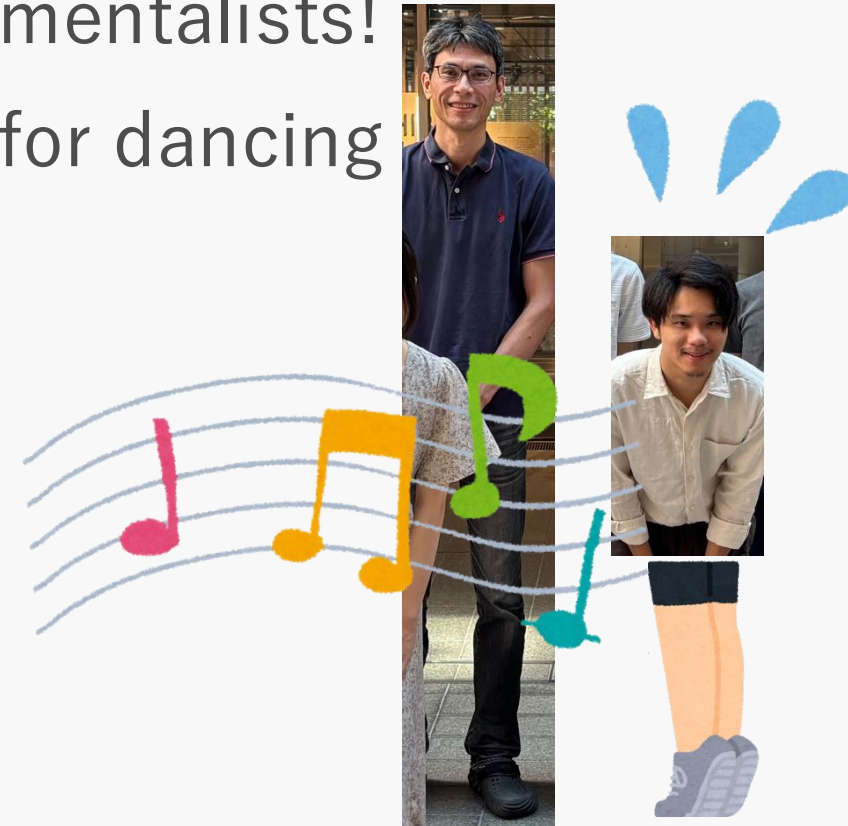
<https://10m.aei.mpg.de/team/>



Gabriella from AEI

- It was preceded by a 2-hour standing reception
- I was in Korean Table
- Korean guys (students and posdocs) are very nice, and some of them are experimentalists!
- After the dinner, it was time for dancing
- Chatted with Gabriella and some other guys from AEI

- Very nice person
- Remembers Oshima-san
- Visited Ando Lab. before
- She said banquet in Toyama was the best





- The dancing lasted over 1 AM
- I got back to hotel in 2 AM
- Somebody said...
“Why Masaki isn’t here!”
→ maybe Kajita-san?

- In day4, we had dinner together
- Ando-san reserved excellent pizzeria!
- Young people were in 上座, although Ando-san and some other professors were outside...



The best pizza
I've ever had !



- Venue is pretty nice
- Easy access to the control room is also nice
- Well equipped for outreach activities
- The road to the site was very narrow and unpaved
- I didn't know that end of the arms in VIRGO are cooled down







SAT(Super Attenuater)

Looooong Inverted Pendulum!

