

Commissioning in phase 1

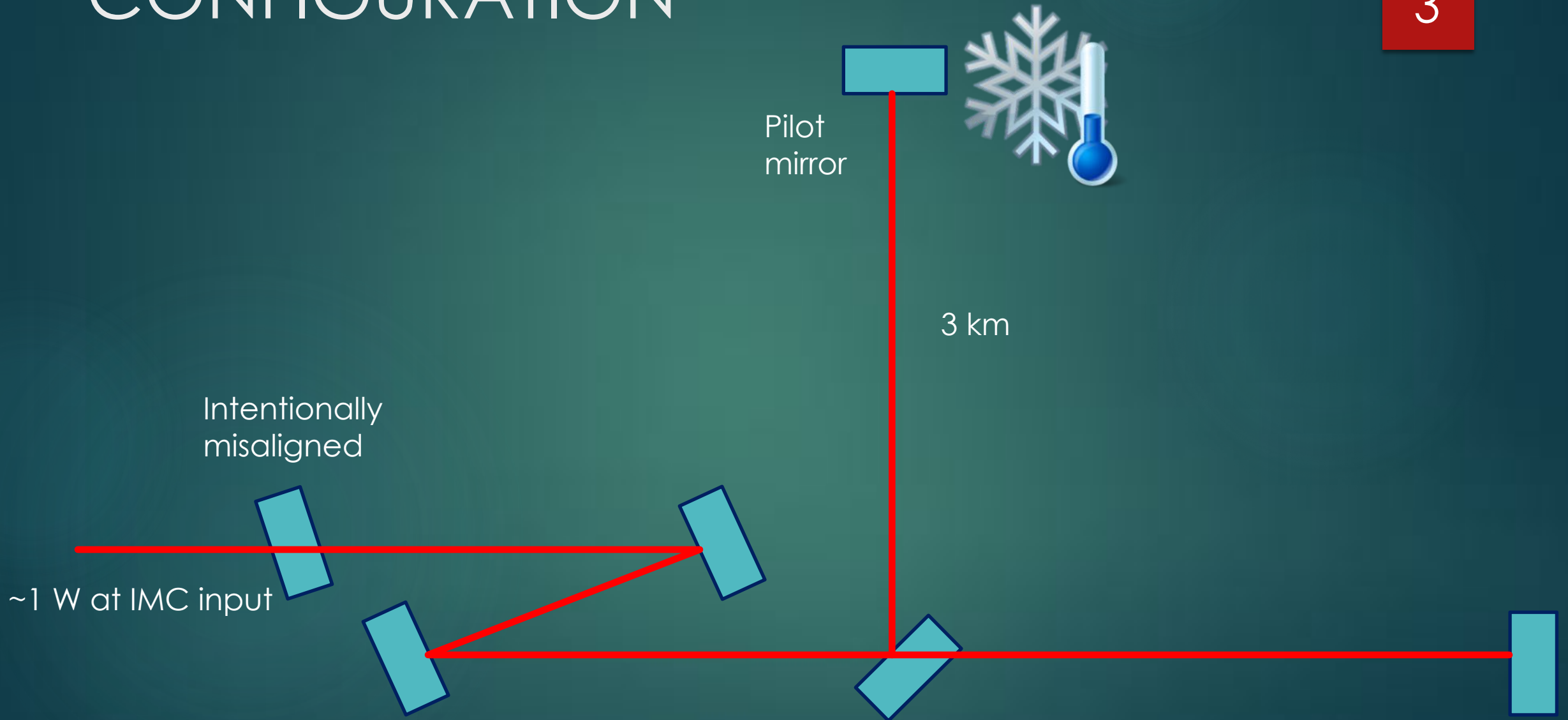
KIWAMU IZUMI

FOR THE COMMISSIONING TEAM (IT'S YOU ALL!)
KAGRA F2F AT OSAKA CITY UNIV. (MAY 18TH 2018)

CONTENTS

- ▶ Review of the interferometer control
- ▶ Issues that are identified
- ▶ Future

CONFIGURATION

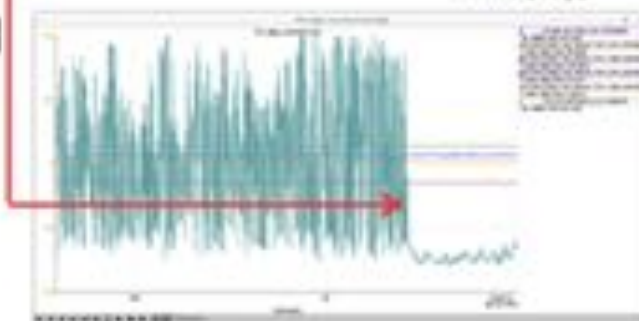
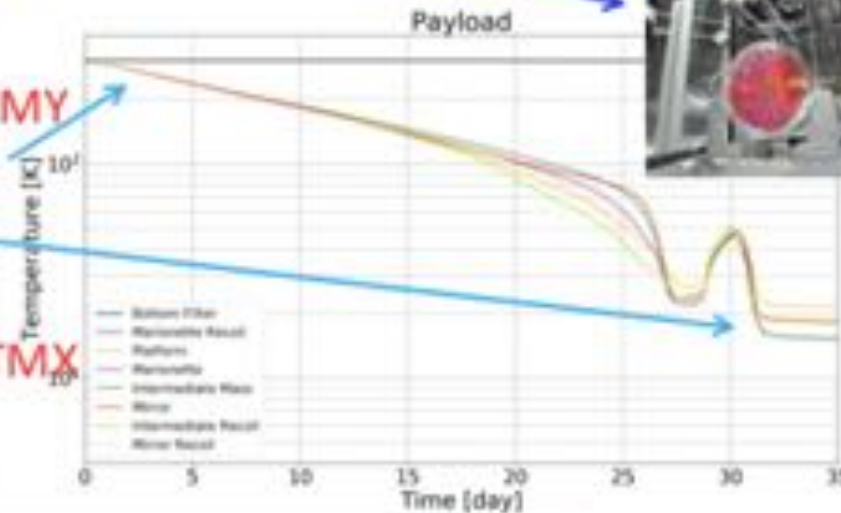
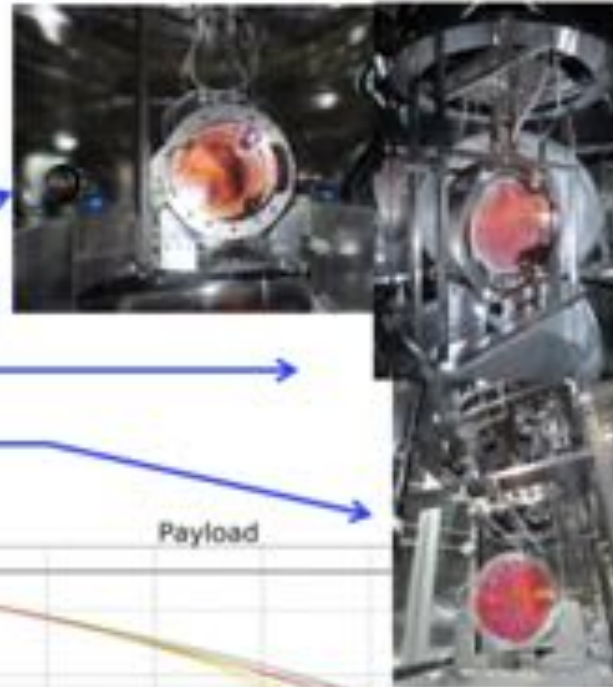


Phase 1 Overview

Suspension
Cryogenic
Interferometer

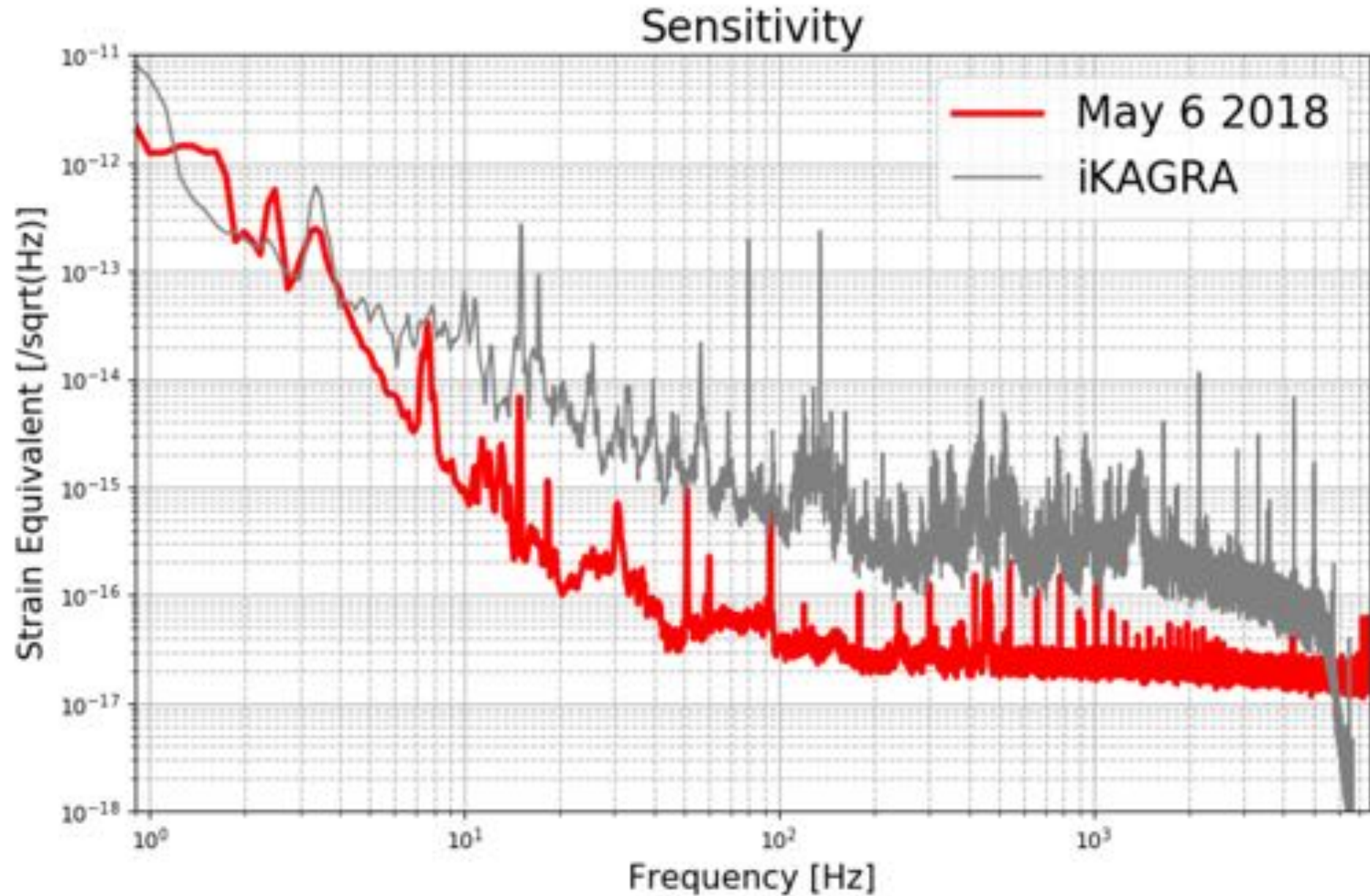
Milestones

- * Sept 19 2017: All PR suspension installation completed
- * Sept 21 2017: BS suspension installed
- * Oct 19 2017: Main beam reached X end
- * Oct 26 2017: Main beam reached Y end
- * Dec 1 2017: ETMY suspension installed
- * Dec 19 2017: Main beam returned from ETMY
- * Feb 7 2018: Cooling down of ETMY started
- * Mar 11 2018: ETMY reached 20 K
- * Mar 23 2018: ETMX suspension installed
- * Mar 29 2018: Main beam returned from ETMX
- * Apr 10 2018: Michelson fringe observed
- * Apr 20 2018: Michelson locked
- * Apr 28 2018: Phase 1 Operation started



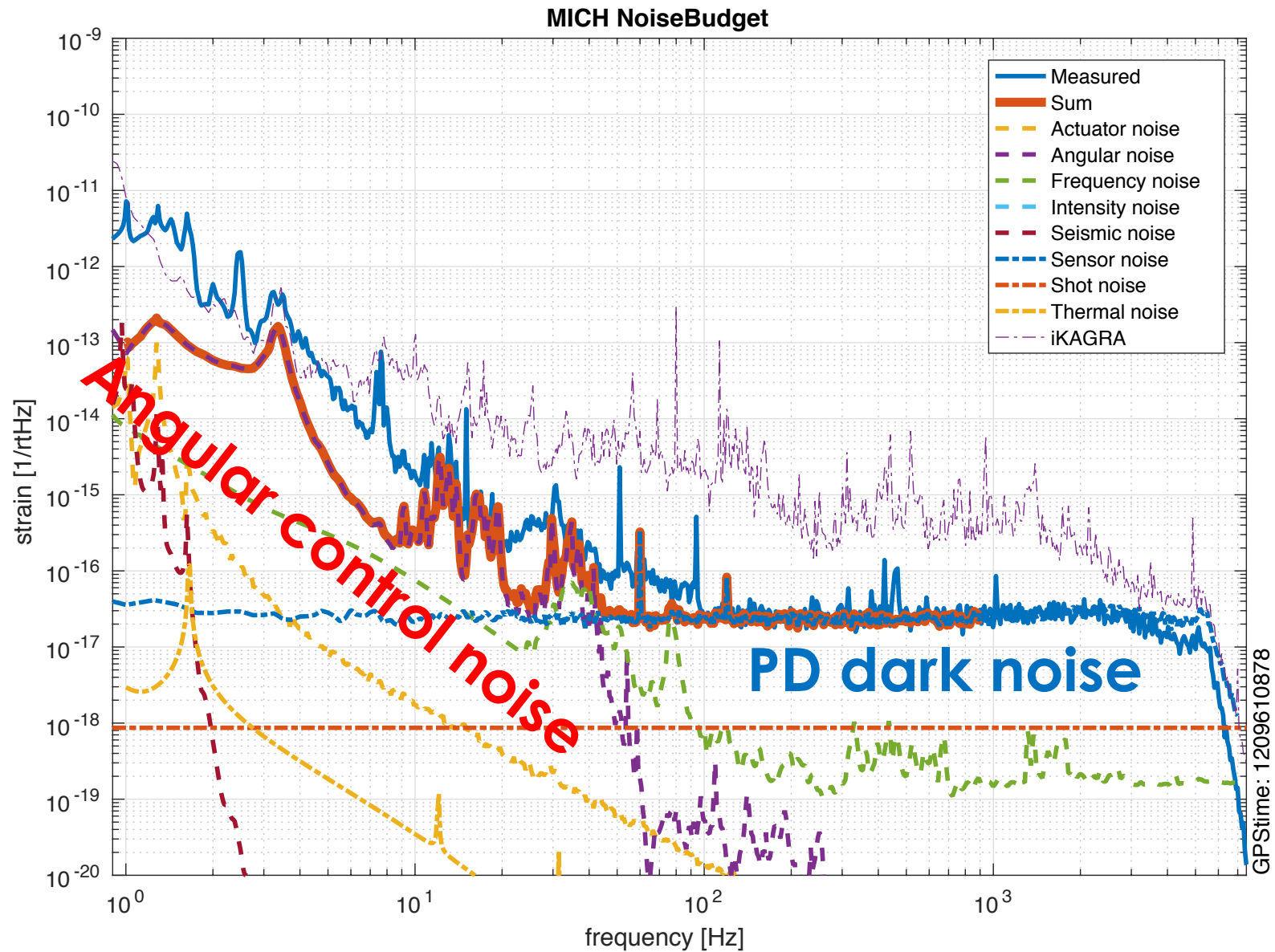
NOISE

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Plot by
Y. Enomoto

NOISE BUDGET



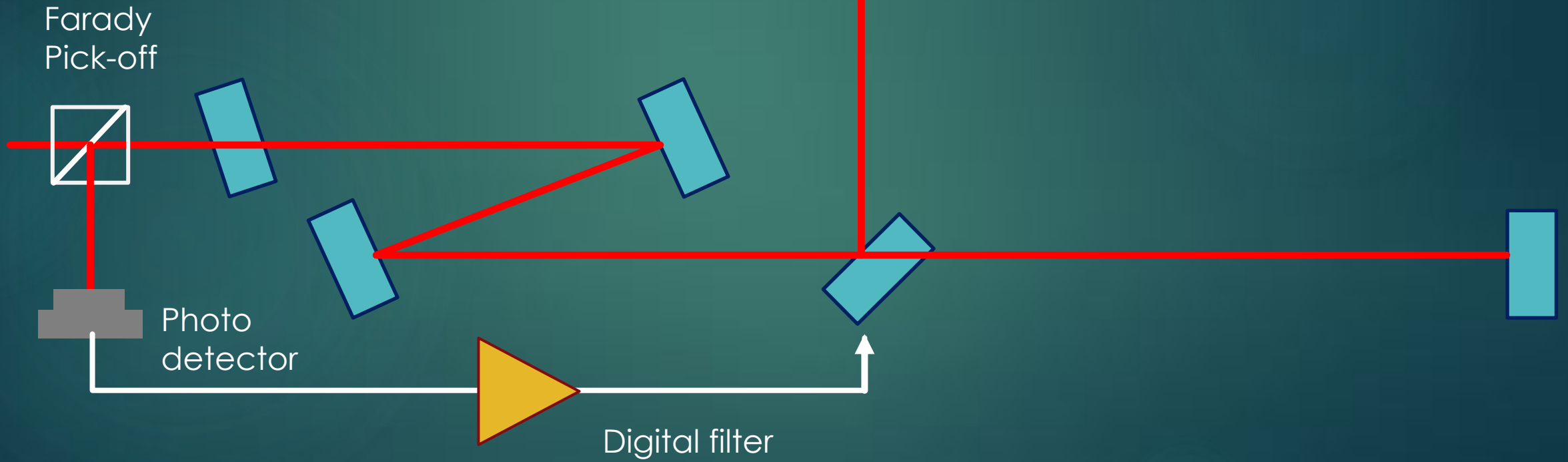
CHARACTERISTICS

- ▶ High visibility (~ 99%, klog 4775)
 - ▶ ETMs are balanced in their properties i.e., curvature and reflectivities including the BS's splitting ratio.
- ▶ ETM position asymmetry not well quantified (klog 4960)
 - ▶ Measured to be 3.4(5) – 4.5(7) m while design = 3.3 m
 - ▶ Needs to assess severity from P.O.V. of interferometer control.
- ▶ F1 modulation depth (klog 4876)

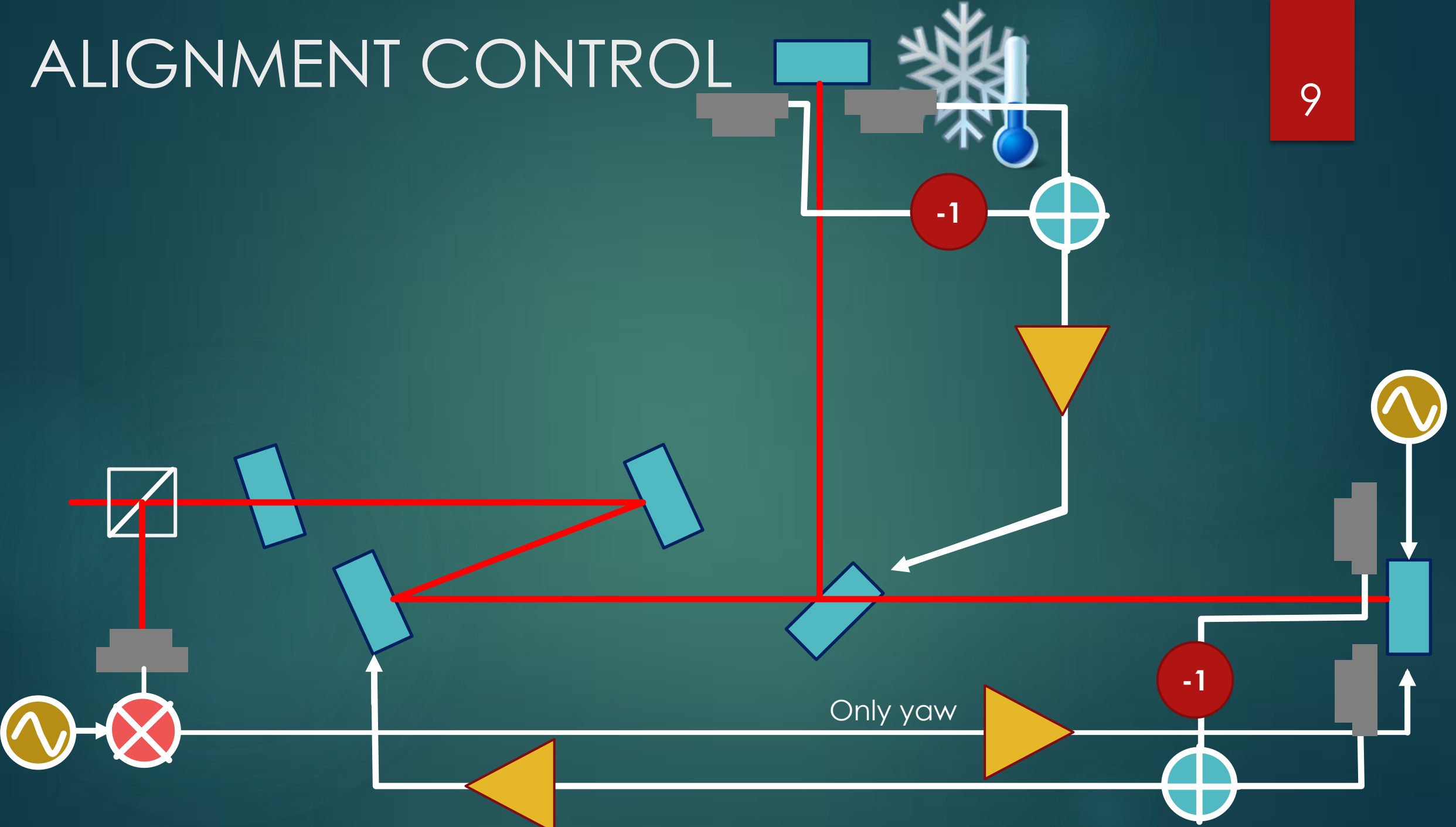
LENGTH CONTROL



UGF ~ 50 Hz.
Feedback to BS TM and IM stages
with xover at ~ 0.1 Hz



ALIGNMENT CONTROL



ALIGNMENT CONTROL (contn'd)

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- ▶ Manual fine adjustment ~ every half a day
- ▶ No global control on ETMY angle
 - ▶ Optical lever local control was good enough
- ▶ ETMX needed a global control
 - ▶ Servoing to optical lever had a long term drift issue (~ a day)
 - ▶ Global control lets ETMX follow ETMY
 - ▶ Seemingly worked fine

QUALITATIVE ARG. ON ALIGNMENT

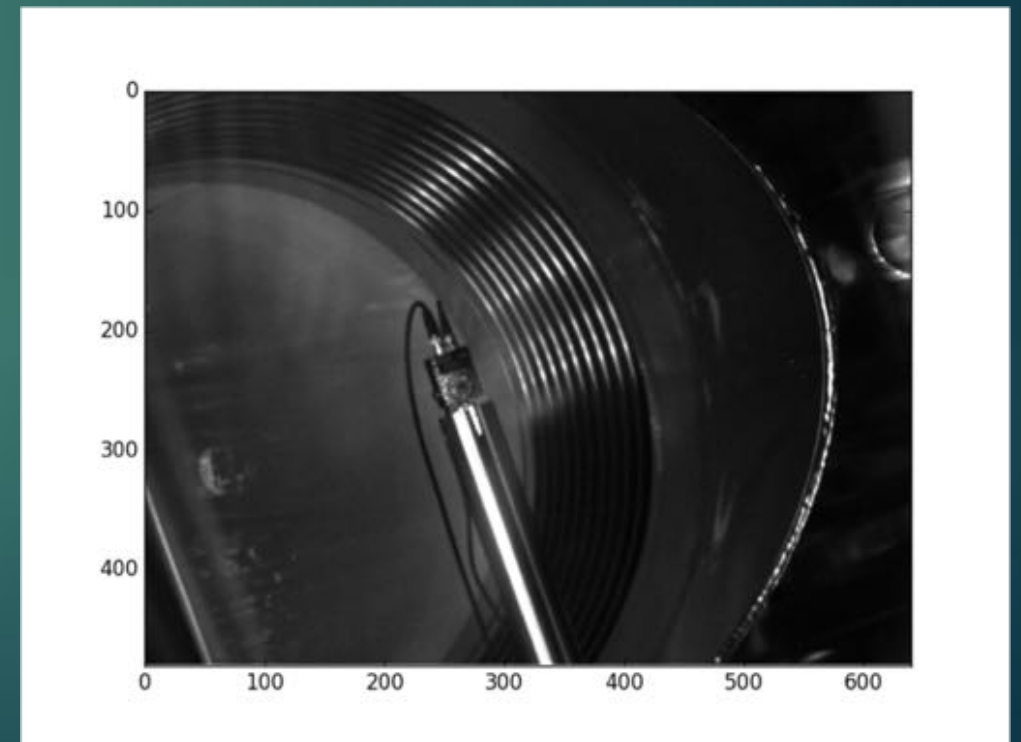
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- ▶ Things became stable once under vacuum.
 - ▶ Smaller number of manual adjustment for suspension alignment

- ▶ Several different sensors helped us understanding the alignment condition.

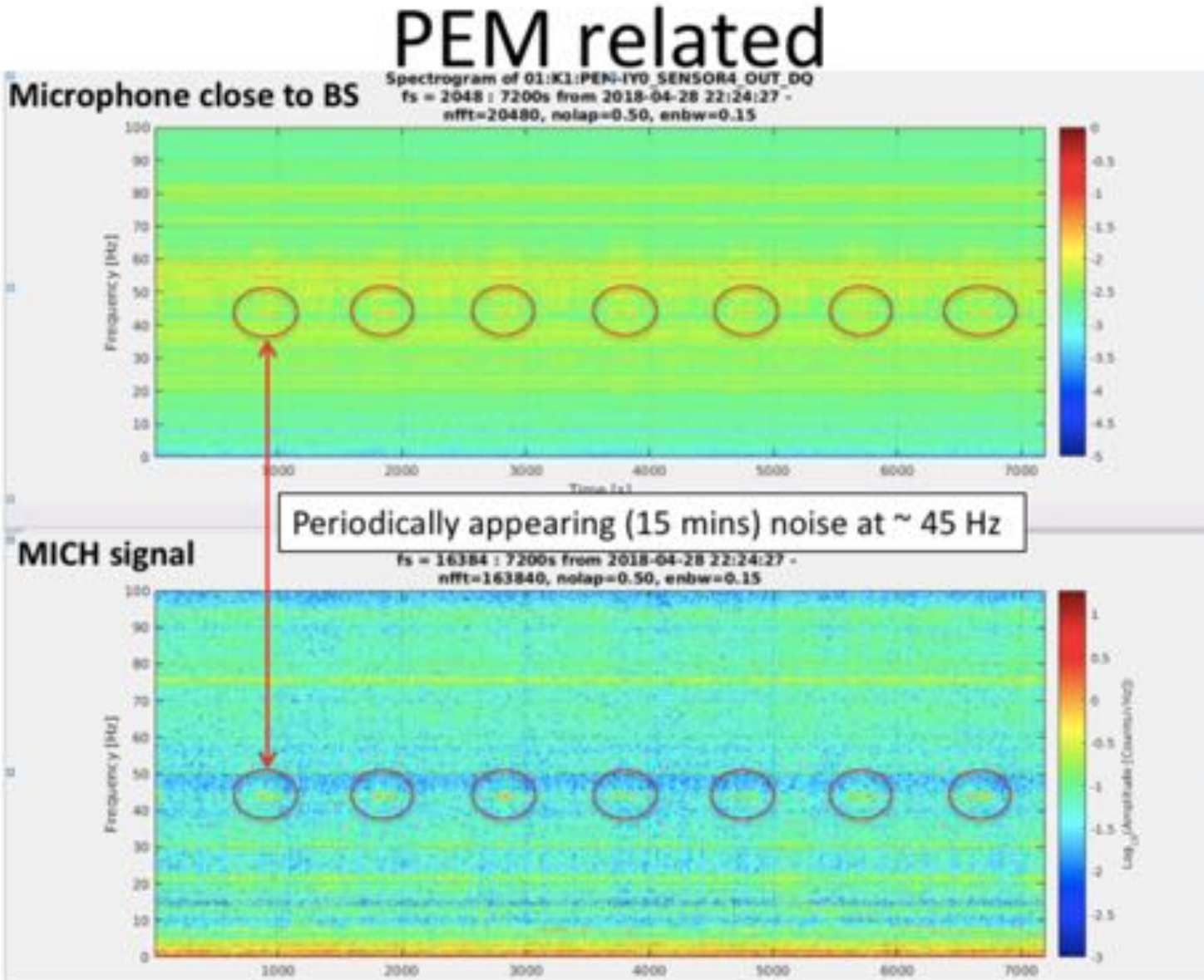
- ▶ VIS local sensors, optical levers, Tcams, gigE-cams and baffle PDs.

EXA temporary PD as seen by gigE cam



HUNTING SOME NOISE

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Slide by
Y. Enomoto
JGW-G1808217

ISSUES THAT ARE IDENTIFIED

PR3 SLIPPING

- ▶ See logs 3634 and 3780.
- ▶ PR3 found to be off in angle in pitch by 10 mrad.
- ▶ Associated with a power-down of IO chassis.
 - ▶ Best guess is a jolt onto the mirror bringing the mirror to another stable point.
- ▶ Temporarily circumvented it by mechanically locking the mirror to its recoil mass.
- ▶ No indication of another slippage so far.

PR3 SLIPPING (contn'd)

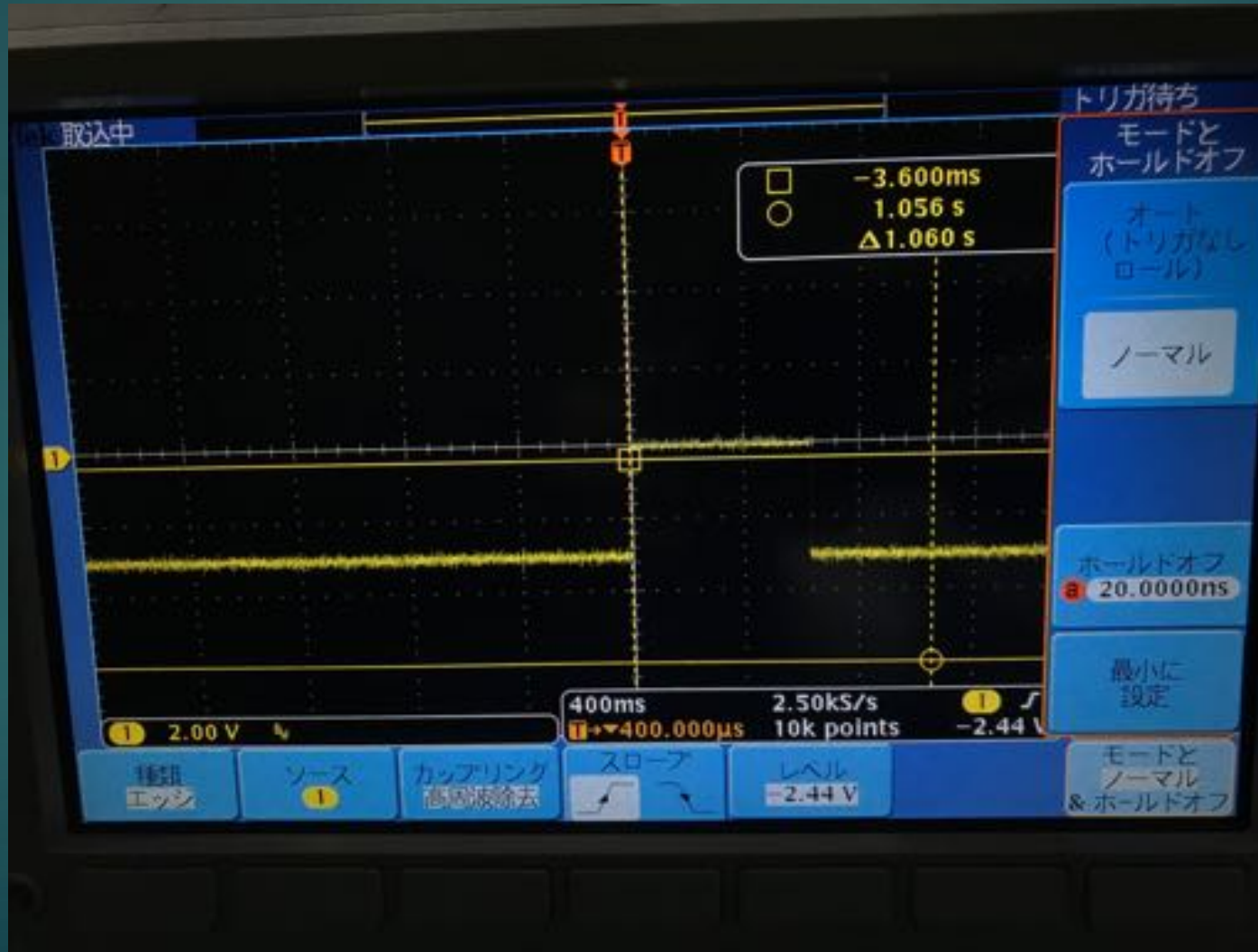
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- ▶ Similar events was observed with PR2 which remained no issues since Nov. 2017
- ▶ See also JGW-G1707405 by Shoda-san.
- ▶ VIS group is incorporating Virgo's technique to address this issue for SRs.

DAC GLITCHES

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- ▶ Observed in ETMY, PRs 2 and 3, and BS controllers.



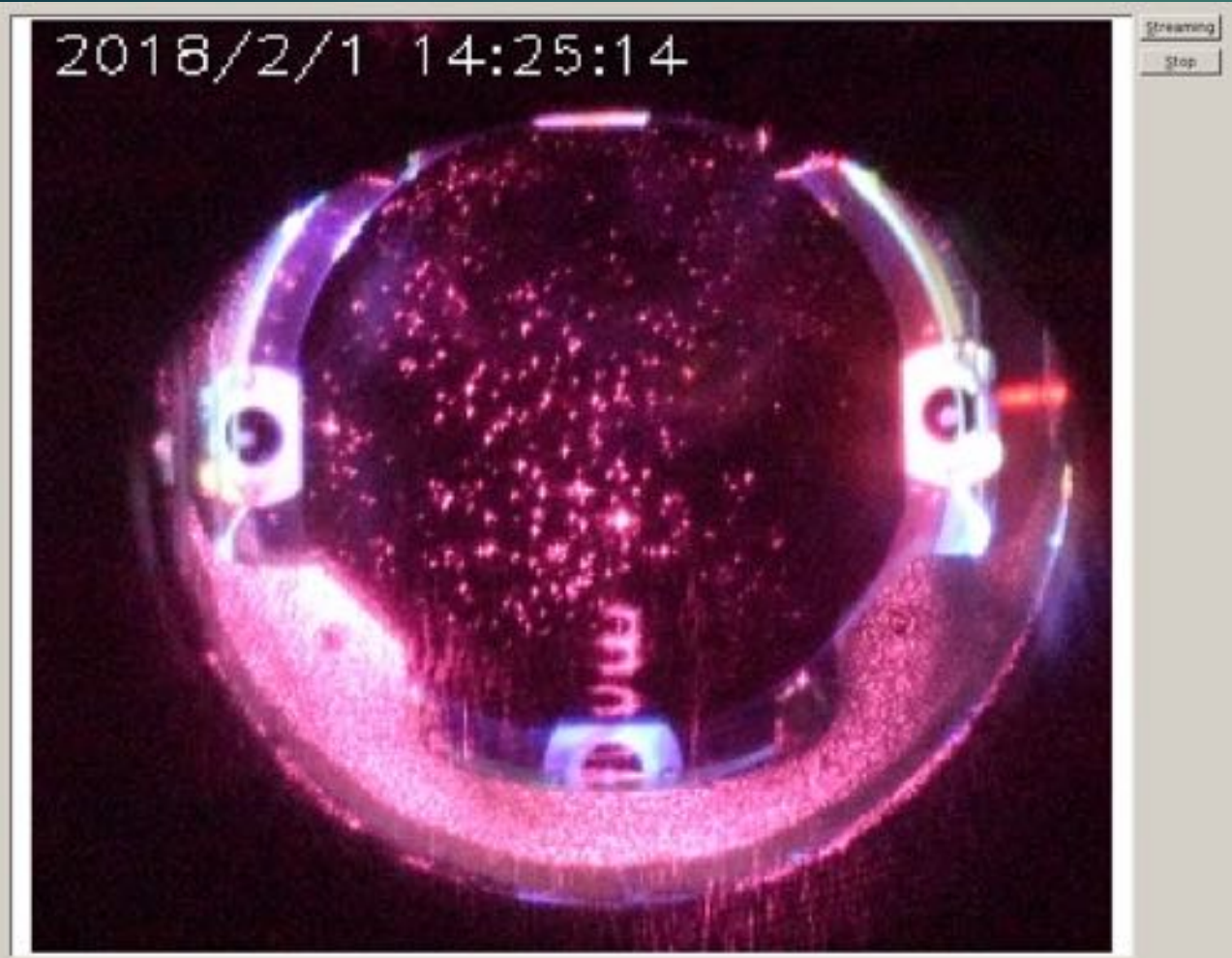
Klog 4254

DAC GLITCHES (contn'd)

- ▶ No real solution so far.
- ▶ Reducing the sampling rate (16 -> 2 kHz) reduced the glitch rate to an OK-level.

BRIGHT SPOTS

ETMY Tcam image

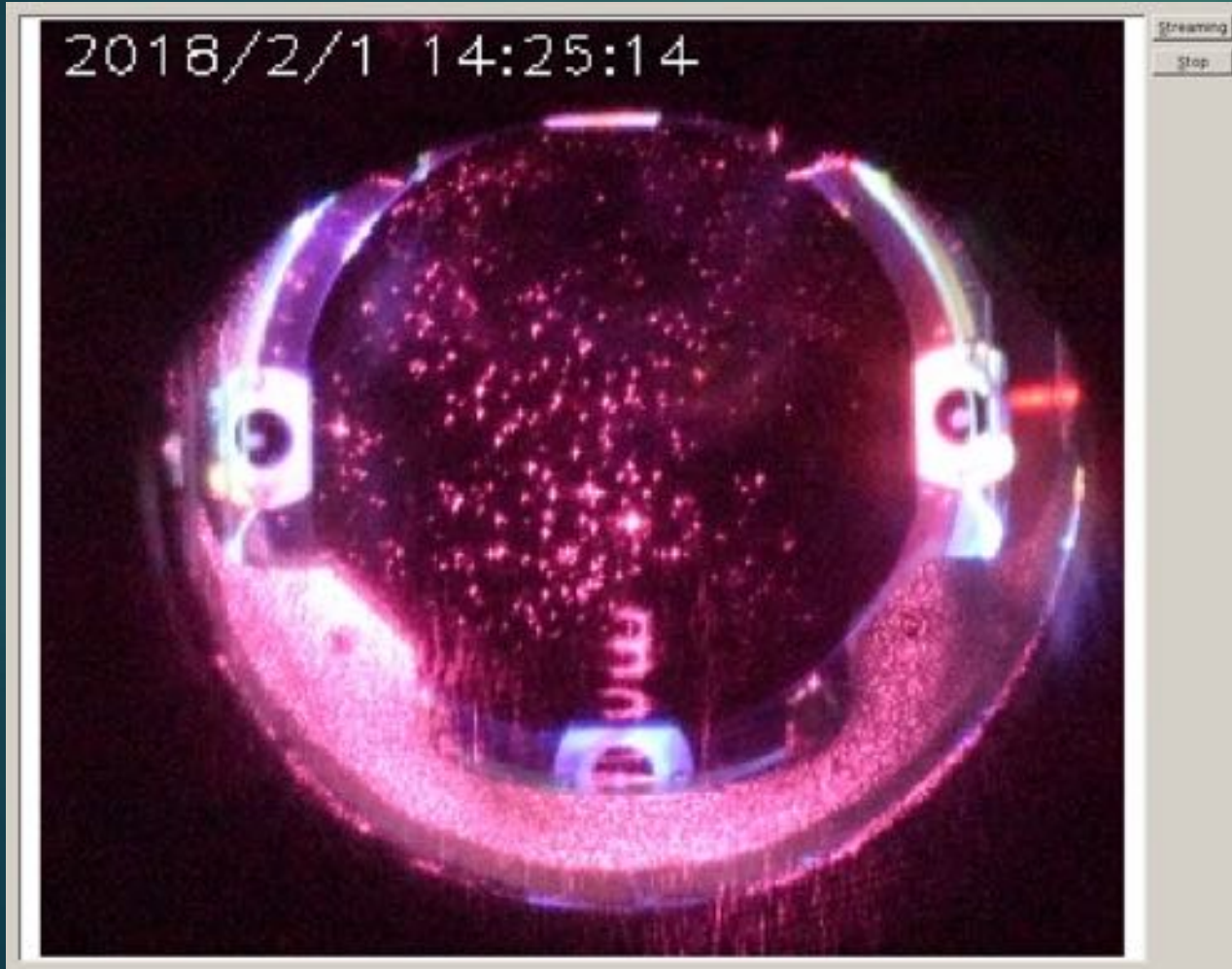


ETMX Tcam image, klog 4767



ETMY BAFFLE PDs

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- ▶ Unable to bring the interferometer beam to the upper two PDs.
- ▶ Needs to assess what went wrong.

OTHER ISSUES

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- ▶ PR3 optical lever glitches.
- ▶ Lots of challenges in ETMY local control
- ▶ Brute-force coherence (BRUCO) not ready in time
- ▶ How do we spot anomalous suspension drift and glitches?
- ▶ etc.

FUTURE

REMOTE PARTICIPATION

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- ▶ A number of us actually reside afar
 - ▶ VIS experts at Mitaka, MIF experts at Hongo, Detchar experts all around Asia...
- ▶ Their remote participation for commissioning activities is a key to increase our productivity
- ▶ High demand for rapid communication with the crew on site.
- ▶ Aso-san is addressing the communication part of it by introducing remote participation systems.
 - ▶ Zoom remote system, TeamSpeak, ...



By N.Kijbunchoo

SUMMARY

- ▶ Overall, commissioning was successful.
- ▶ A number of issues are identified.
- ▶ Remote participation seems another key.