Current Status of Interferometer Alignment

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Status summary

✓ **Interferometer beam: good**

=> With the use of the optical lever, one can recover the alignment in a short length of time all the way back to BS.

✓ **Baffle PD at EYC: OK**

=> Two out of four were confirmed to be functioning.

=> The interferometer beam is occulted for the two non-responding PDs?

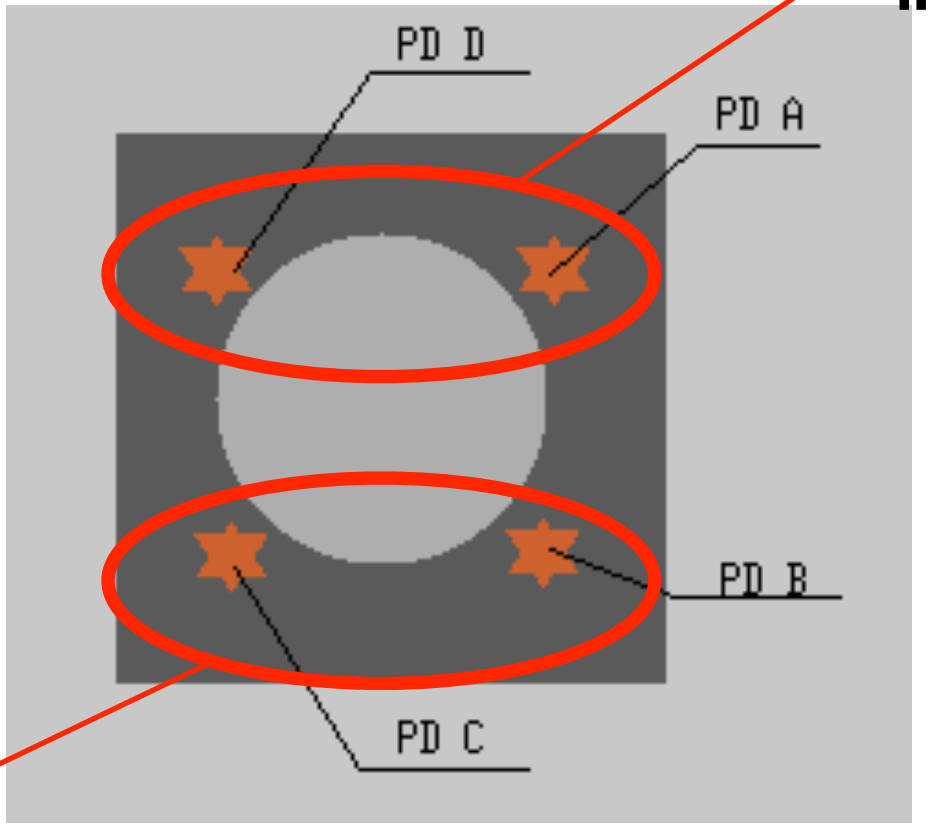
✓ **ETMY rubbing isse: tolerable**

=> Moving IPs somehow alleviated the issue.

✓ **REFL port alignment: not yet done**

=> Needs to commission the ETMY damping control loops.

Baffle PDs



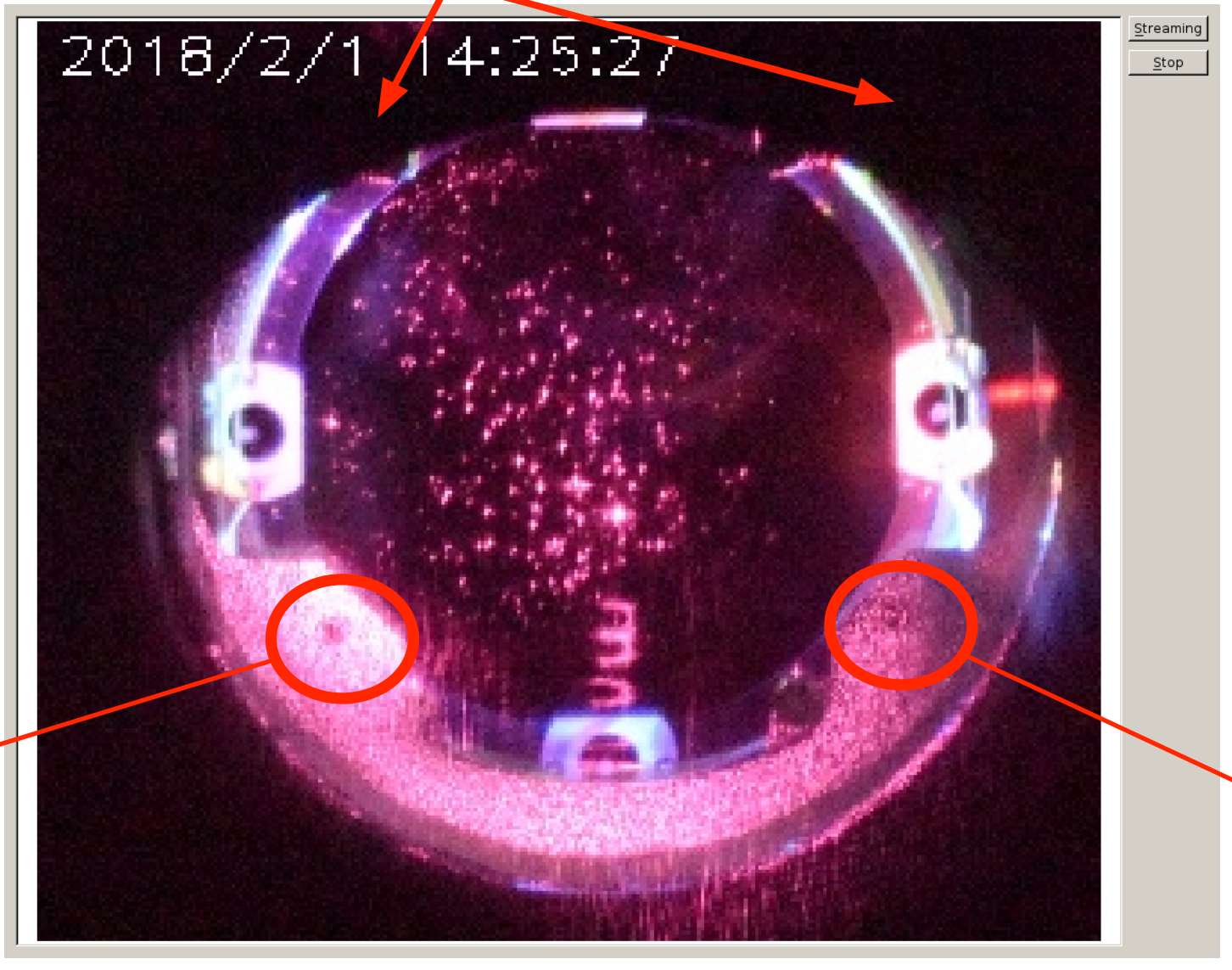
no response to the interferometer beam

good!!

Note: all the PDs were tested in air and determined to be functional

PDs A and D are occulted?

It looks like this black aperture occults the beam.



Rubbing issue

✓ **As we move the BF yaw picomotor, the horizontal LVDTs changed their DC positions.**

=> This sounds more like something below (e.g., the payload) was rubbing.

=> Ideally, the DC positions must not change.

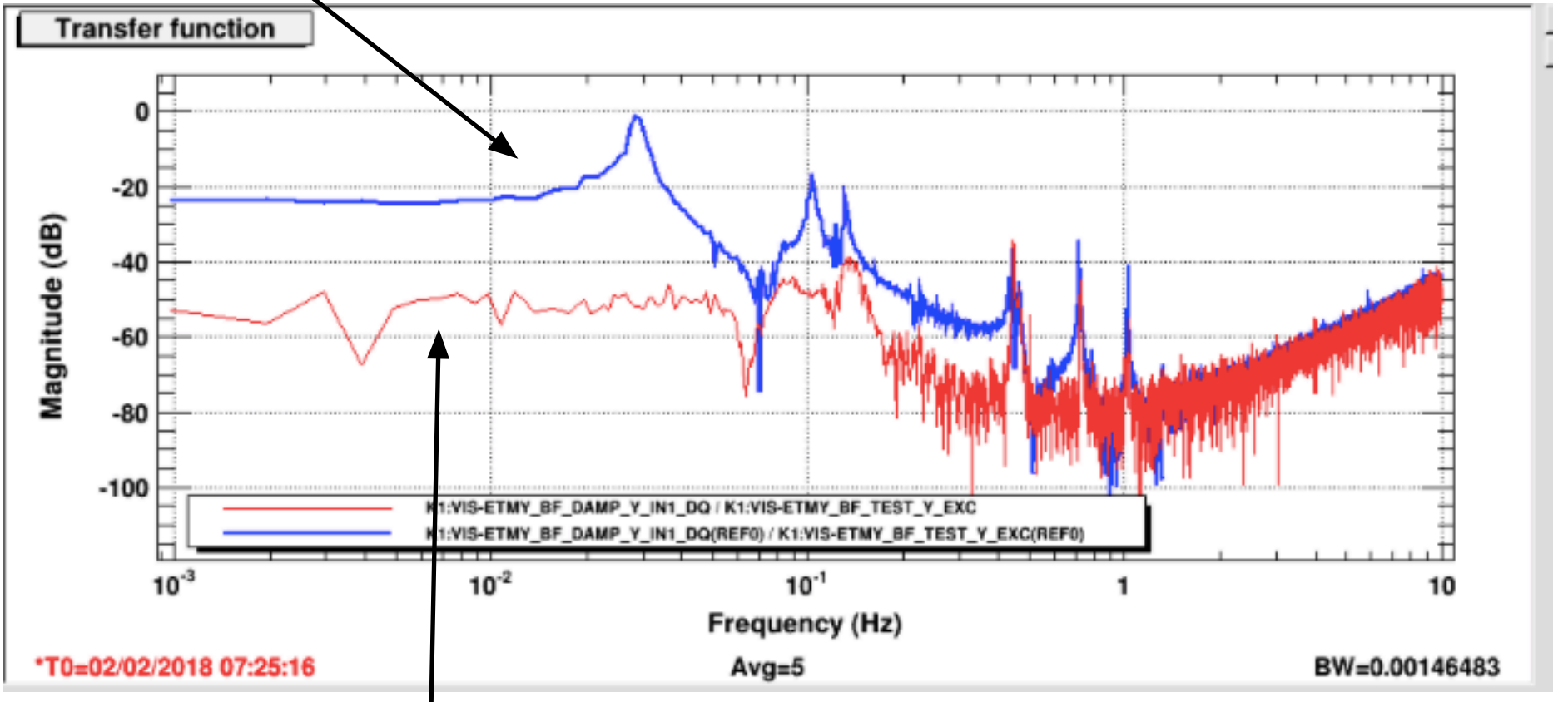
=> This was corss-checked by moving the same picomotor for ETM*X* which didn't show a shift in the DC position.

✓ **The BF yaw transfer function was corrupted.**

=> In particular, the DC stiffness increased a lot, making the DC level lower by more than a factor of ten.

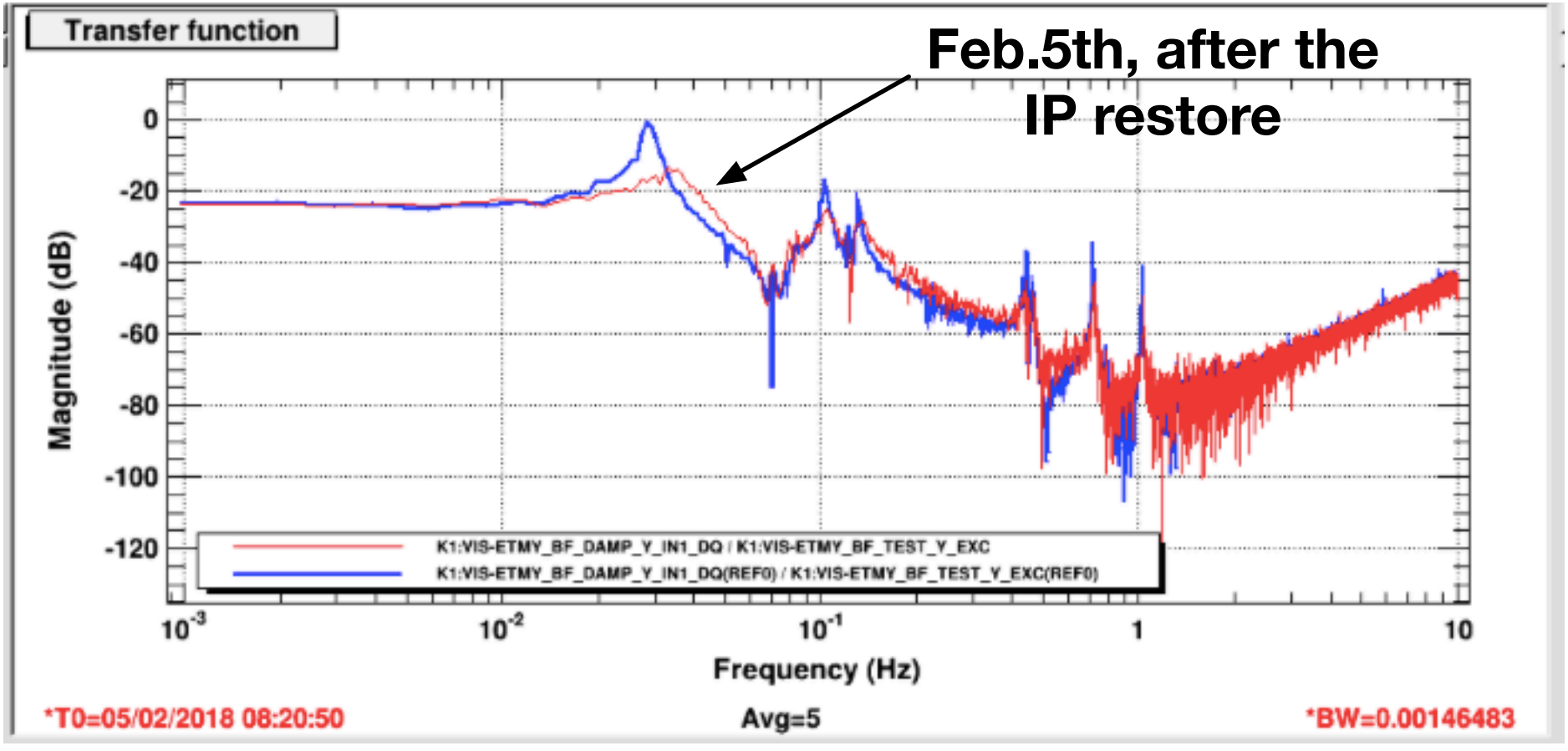
Corrupted TF

Jan.13th
good



Feb. 2nd
bad

After restoring the IPs



Much better although it seems still rubbing somewhere.

Conclusions

- Something was touching somewhere.

- Our best guess is that something below the BF stage was making the torsion degree of freedom stiffer by some means.

- The stiffness was found to be a function of the IP position and also the BF rotation angle (that controlled by the picomotor).

- The rubbing point is not yet identified.

Other concerns

- The H1 and V2 LVDTs on BF don't show reasonable responses.
  => should be fixed from the outside of the chambers.
  => confusing when diagnosing the rubbing issue.

- Commissioning the ETMY damping loops is still under process. No real progress in this past week or two.
  => needs to be done before the REFL alignment.

- A type-A suspension has so many channels to investigate and makes diagnostic tasks very hard.
  => Needs some help from detchar e.g., summary page.

Review of the week starting Jan.31st

- ✓ Jan. 31st: Interferometer beam found at ETMs X and Y and BS. The EYA gate valve was found to be closed (4065).
- ✓ Jan. 31st: VIS team tried to release the support jack at EYV with no success (4066).

- ✓ Feb. 1st: The EY BF glitches were studied— they show up when there are constant DAC outputs. No idea why (4072).
- ✓ Feb. 1st: The interferometer beam was aligned again with the EYA gate valve open. Strange patterns were found on the ETMY mirror (4074).
- ✓ Feb. 1st: The baffle PD test was performed. Two out of four PDs are confirmed to be functional. Good enough (4085).
- ✓ Feb. 1st: optical lever spectra were found not to show the torsion peak at 20-30 mHz (4086).

- ✓ Feb. 2nd: BF yaw transfer function was found to be bad (4101).
- ✓ Feb. 3rd-4th: some remote measurements to assess the ETMY situation (4102-4107). The peak disappeared on 17th of Jan.
- ✓
- ✓ Feb. 5th: The ETMY IPs were pushed back to their original positions with a bit of success (4111).