

Virgo ENV update

The Virgo-ENV team
KAGRA-PEM meeting May15, 2020

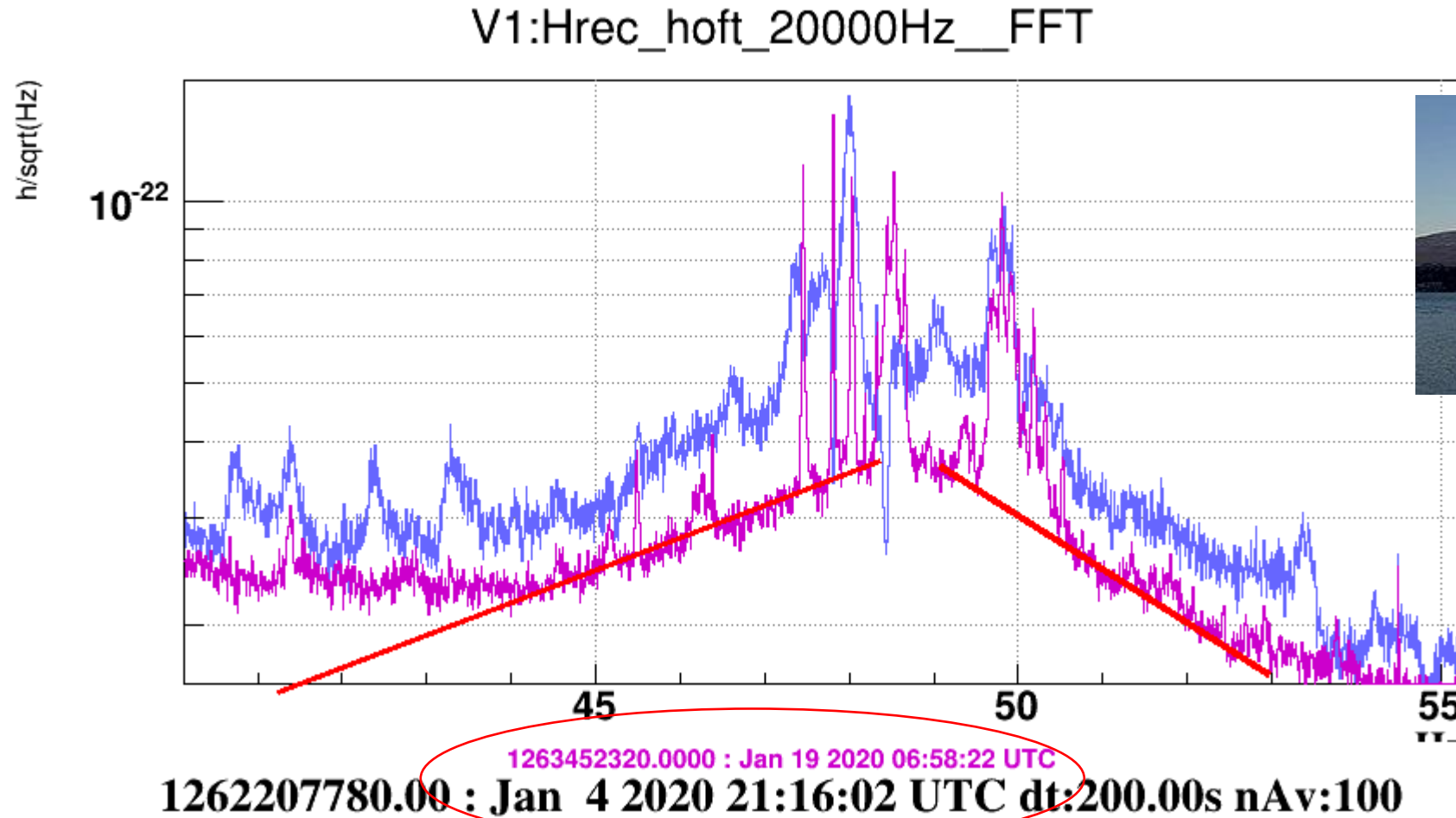
Last activities before COVID lockdown

- Scattered light noise investigations
- Noise projections for acoustic and magnetic

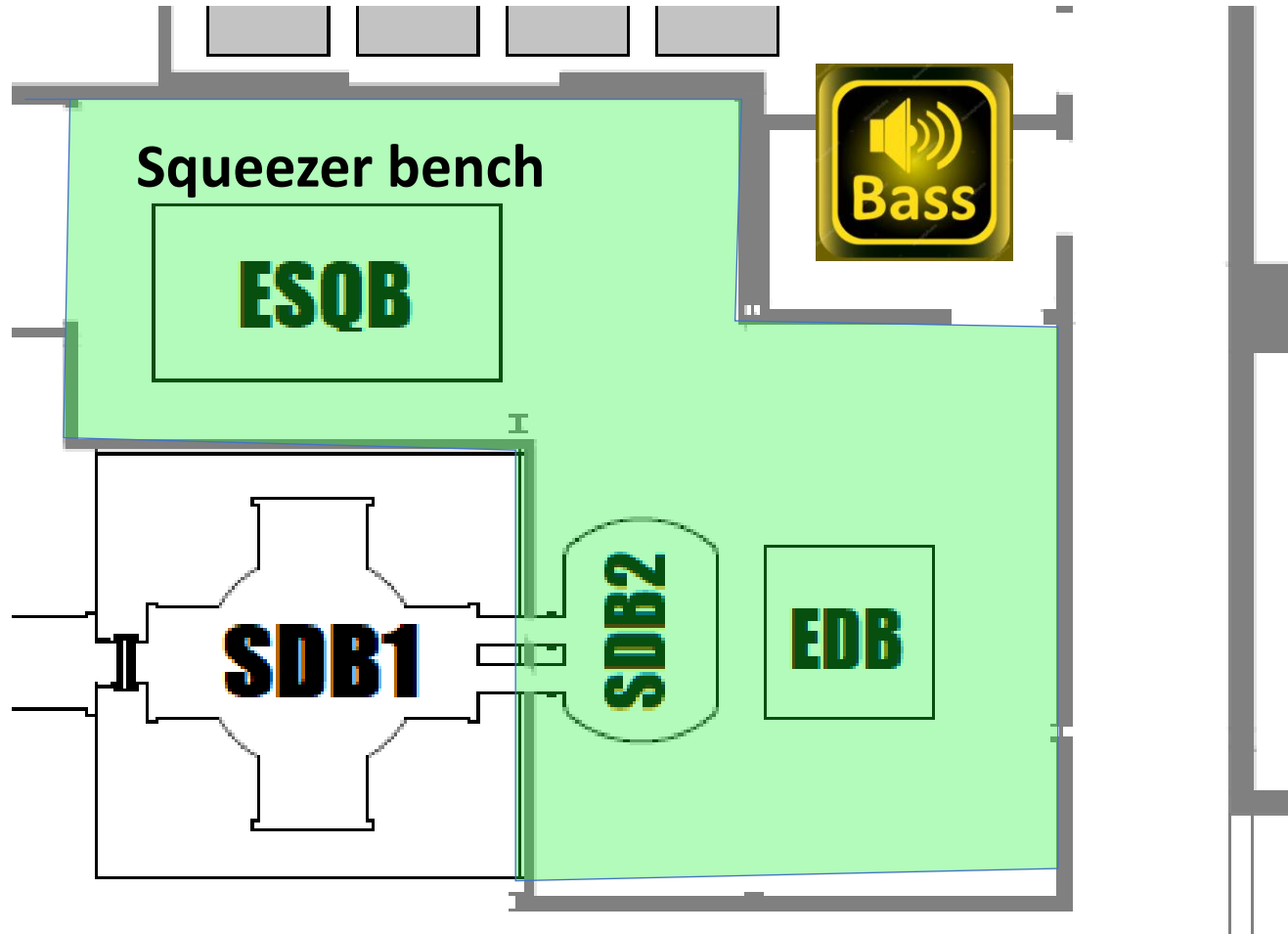
Last activities before COVID lockdown

- Scattered light noise investigations
- Noise projections for acoustic and magnetic [→ link Virgo TDS](#)

Volcano structure around 50Hz



Loudspeaker injections in DET lab

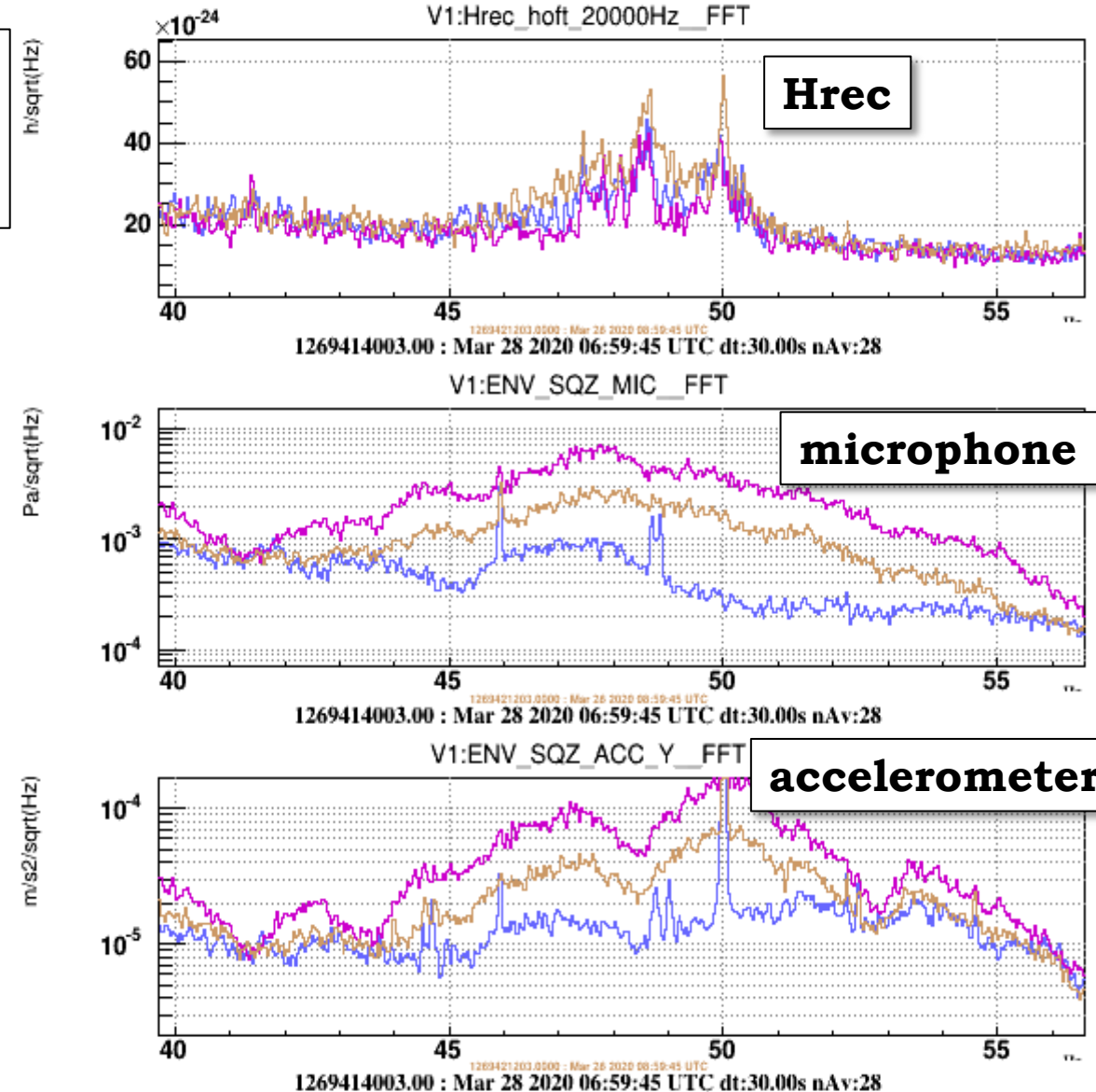


Loudspeaker injections in DET lab

QUIET
INJECTION
INJECTION with shutter closed

- Could excite easily some bumps in Hrec: 27Hz, 48Hz, 163 Hz
- Closed SQZ shutter and repeated injection ... and this time nothing excited
- ➔ Bumps are scattered light from Squeezer Bench:
- these frequencies are KNOWN resonances of optics on ESQB (camera, FI3 polarizer)
- Coupling can be reduced acting on SQZ beam alignment

This residual scattering from ESQB seems very touchy and needs constant attention



More scattered light limiting the low frequency

Data with SQZ shutter closed – 10 hours on March 28 ([48847](#))

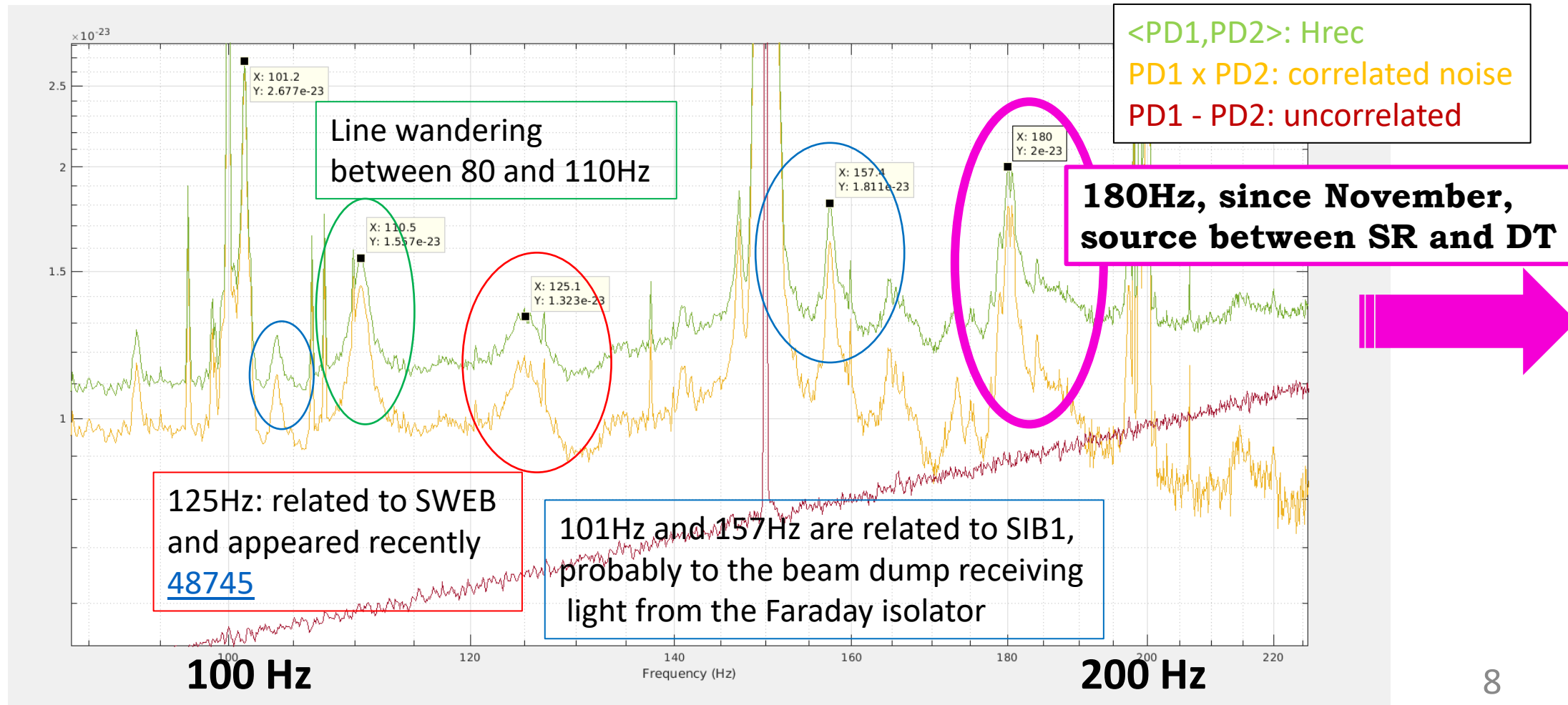
- Residual bumps on Hrec → low frequency seems dominated by noise from scattered light
- They are breathing, but not synchronously... different coupling paths?



More scattered light limiting the low frequency

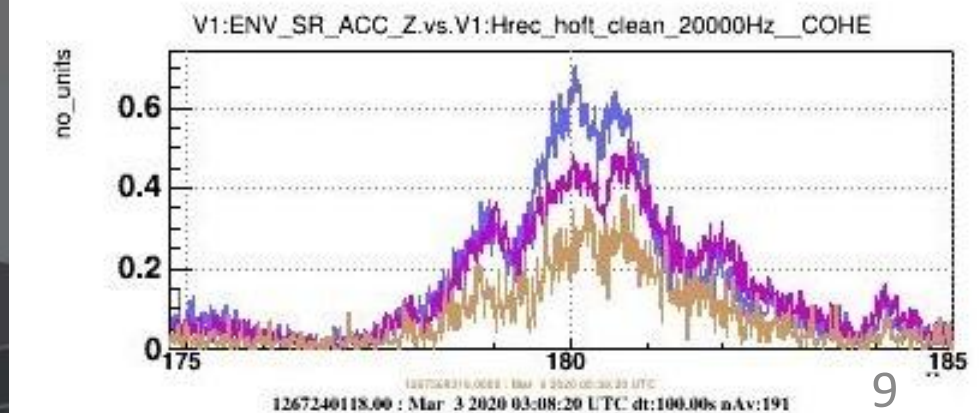
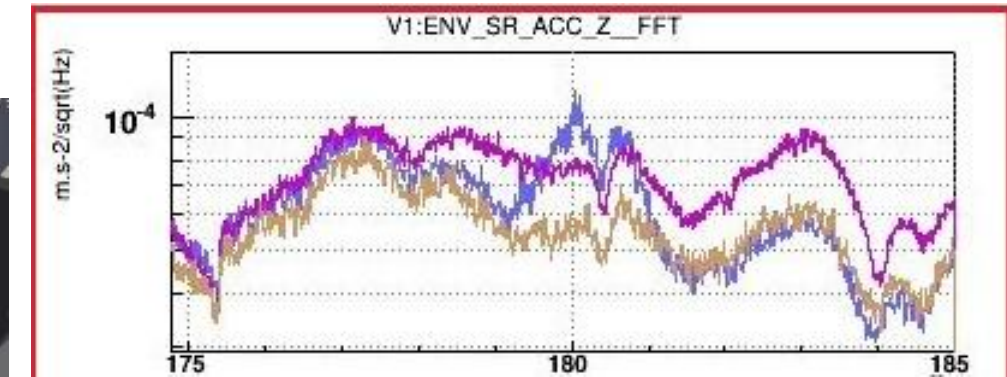
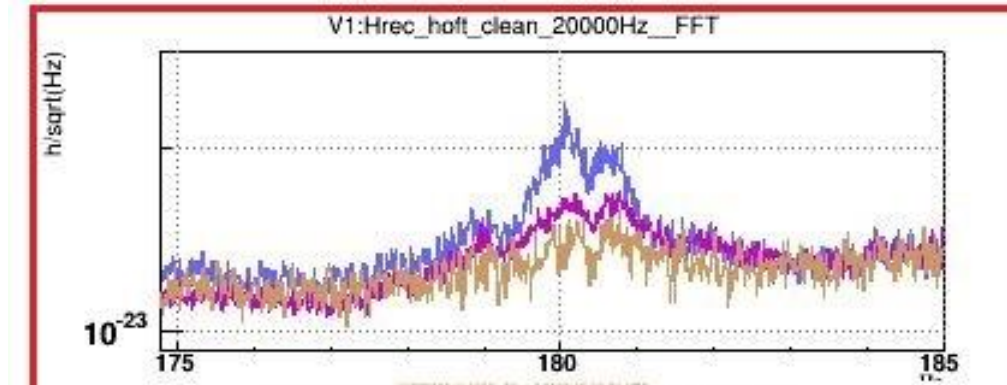
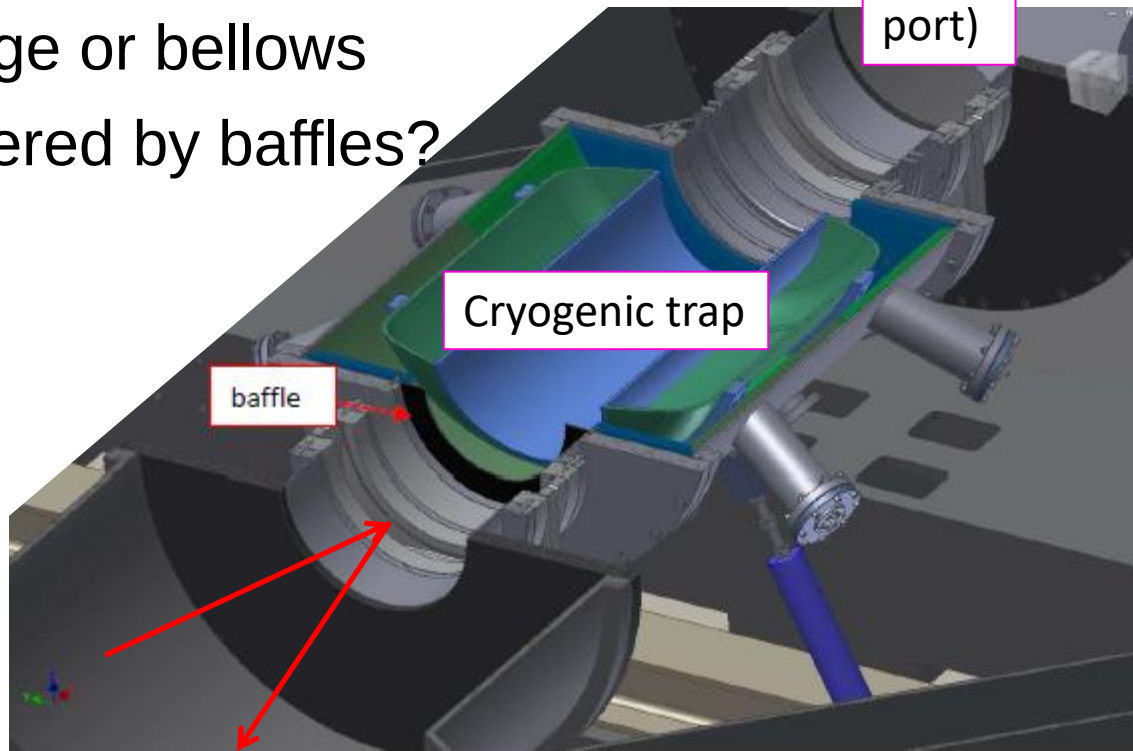
Data with SQZ shutter closed – 10 hours on March 28 ([48847](#))

- More structures between 100 and 200 Hz (see elog by [Michal Was](#) [48854](#)):



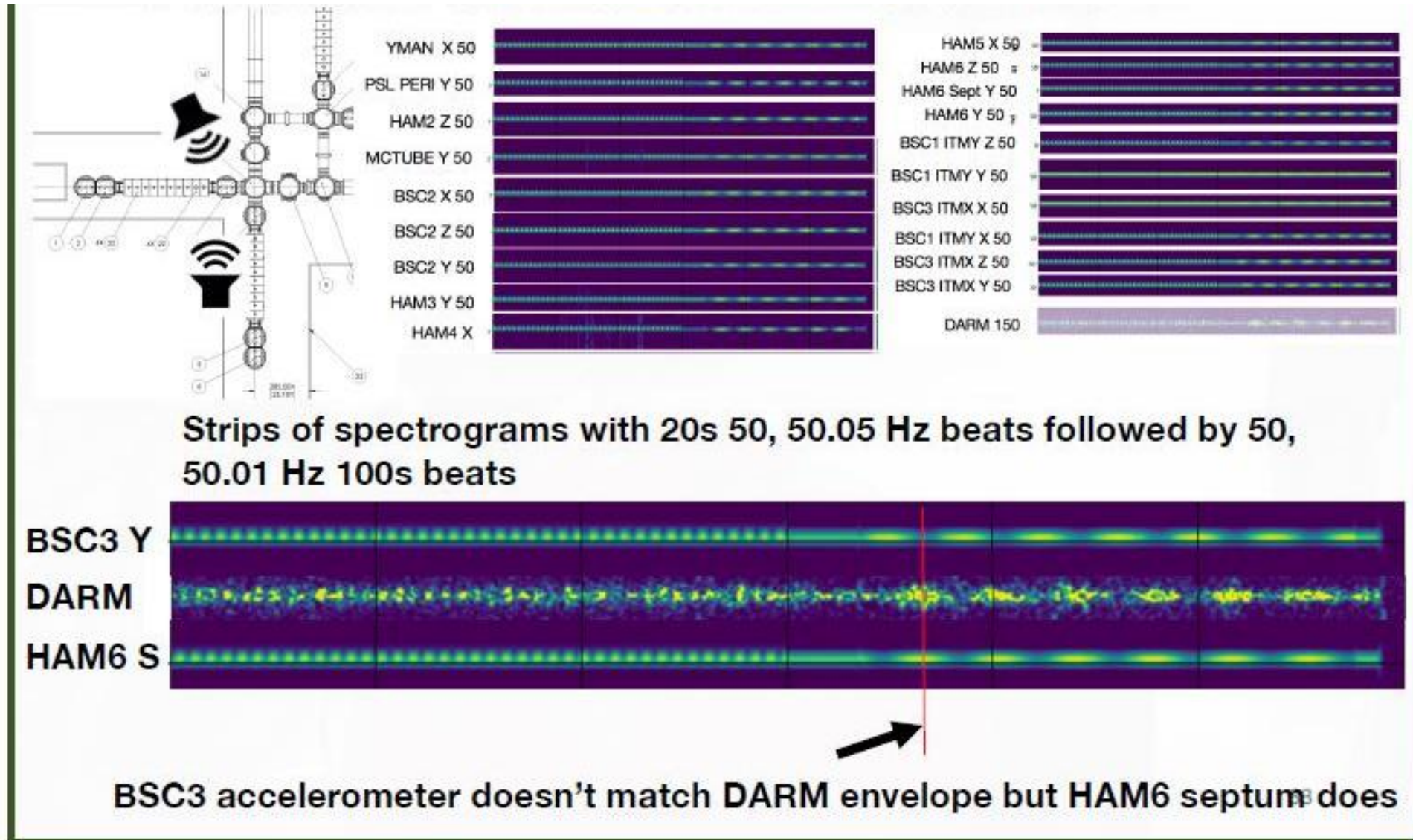
Investigation of 180Hz bump

- It appeared after the October break
- Good coherence with ENV accelerometers between SR and DT
- Hypothesis:
ghost beam from BS scattering off
SR flange or bellows
not covered by baffles?



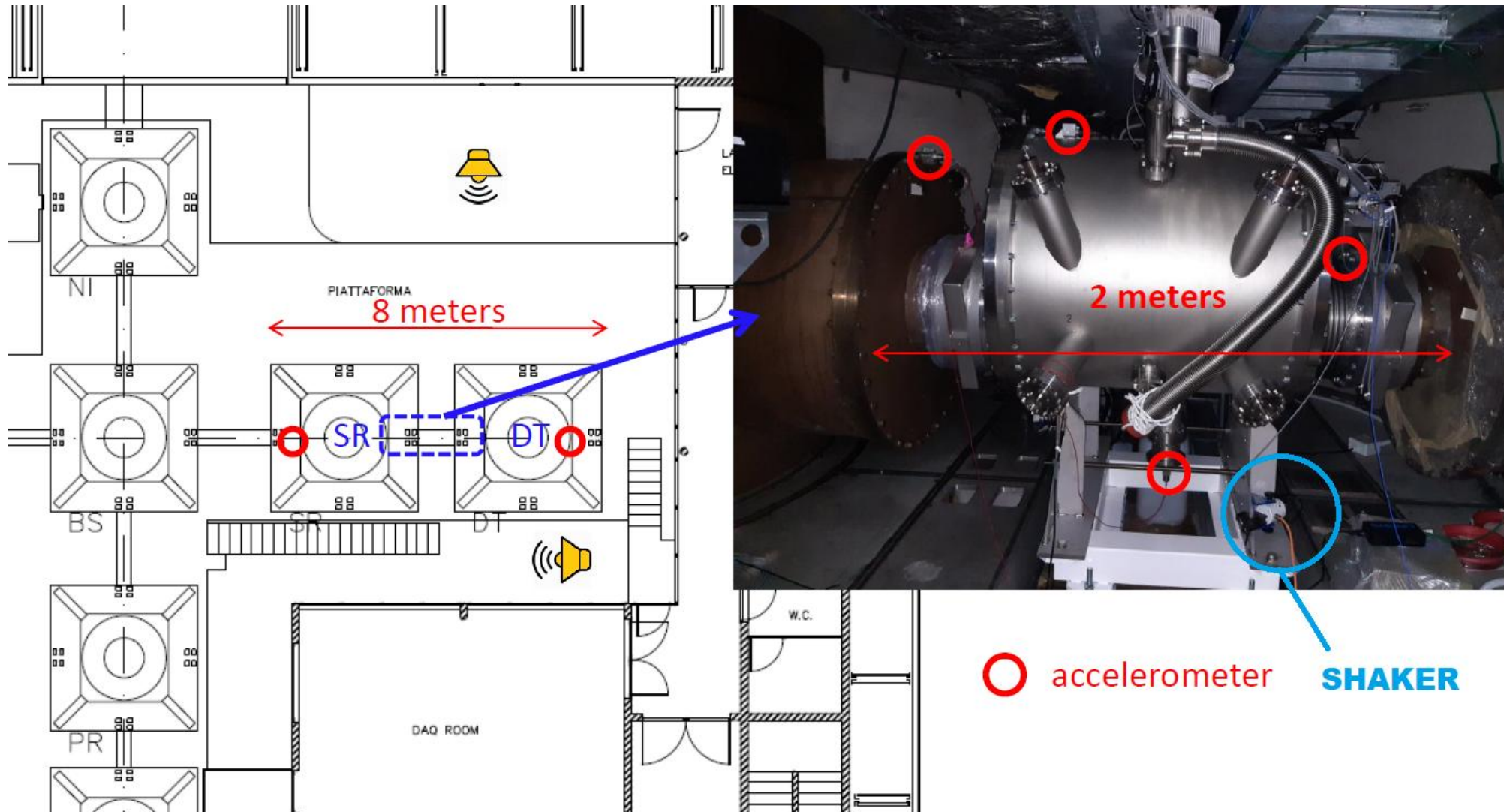
A new technique to localize scattering

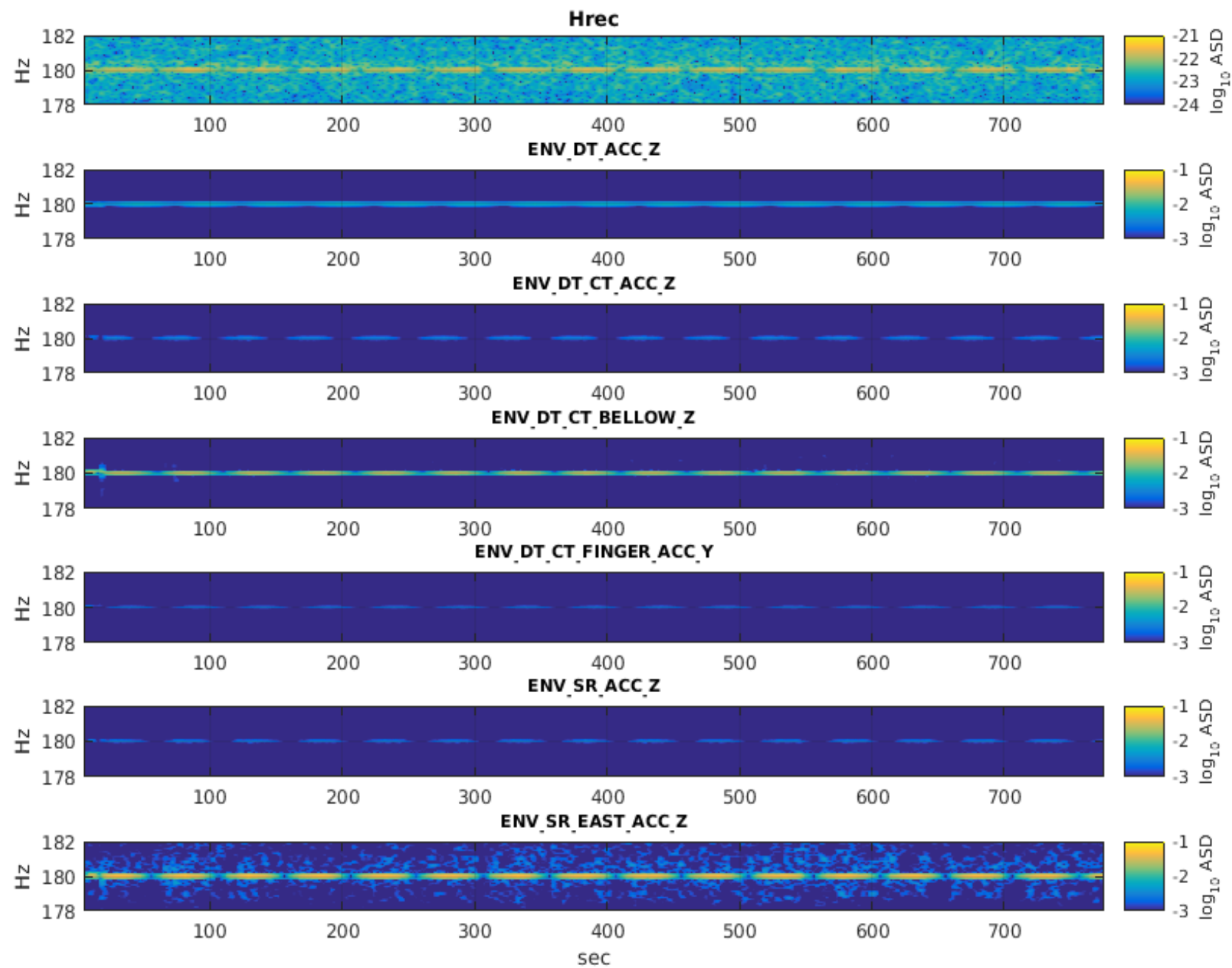
By R.Schofield, [LINK DCC](#). Beating notes with two loudspeakers



Investigation of 180Hz bump

Test of beating notes technique





Beating injections 180Hz: cross-correlation

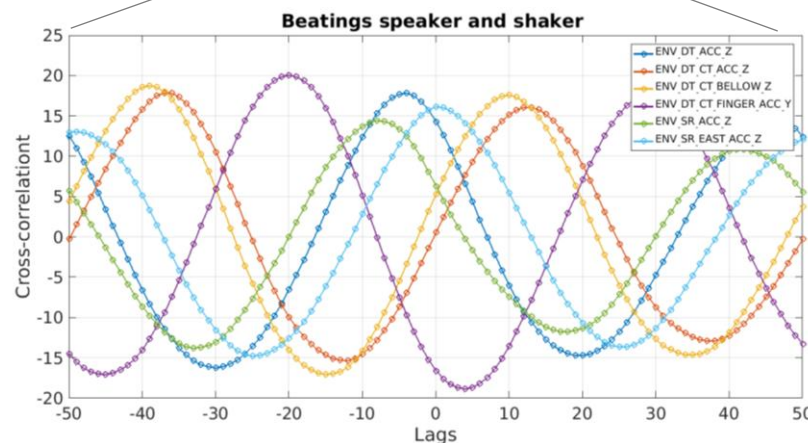
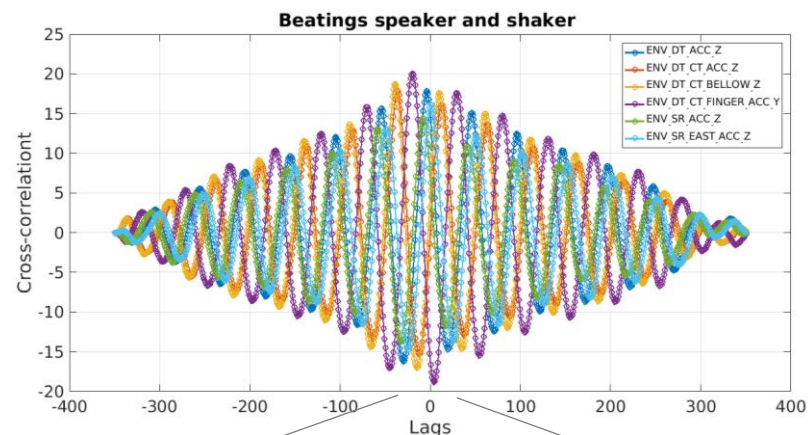
We compute the cross correlation between ASD(180Hz, t) of Hrec and each accelerometer.

- Repeated twice (loudspeaker1-loudspeaker2, loudspeaker2-shaker) and found different “winners”.
- Need to repeat changing loudspeakers position and increased volume

The accelerometer(s) that best match with Hrec is ...



ENV_DT_ACC_Z	-10
ENV_DT_CT_ACC_Z	-38
ENV_DT_CT_BELLOW_Z	2
ENV_DT_CT_FINGER_ACC_Y	-3
ENV_SR_ACC_Z	2
ENV_SR_EAST_ACC_Z	6



ENV_DT_ACC_Z	-4
ENV_DT_CT_ACC_Z	-37
ENV_DT_CT_BELLOW_Z	-39
ENV_DT_CT_FINGER_ACC_Y	-20
ENV_SR_ACC_Z	-8
ENV_SR_EAST_ACC_Z	0