The vibration noise around SR chamber

2019/9/24
pem meeting
mori

Purpose

- Measure the vibration of SR chamber(the oplev table, out frame)
- Check the coherence between SR oplev pit signal and PEM sensor
- Compare each SR chamber -> for future noise hunting of SR signal
- Peak search using fujimopy

PEM sensor with measurement

・accelerometer

TEAC 706

s9064 : $0.01022 [\mathrm{V/m/s^2}]$

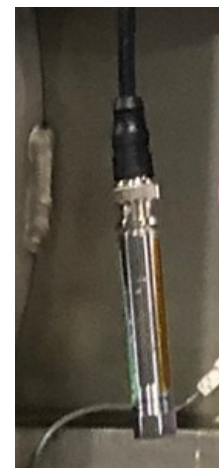s9065 : $0.00998 [\mathrm{V/m/s^2}]$

TEAC 710

s9325 : $0.311 [\mathrm{V/m/s^2}]$

・microphone

ACO-7146NL Ultra-low frequency mic

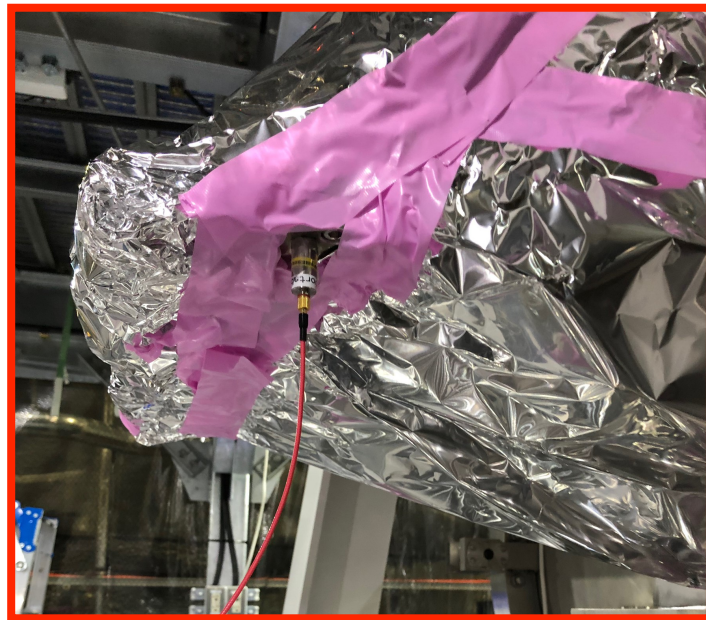s9036 : $0.0422 [\mathrm{V/Pa}]$
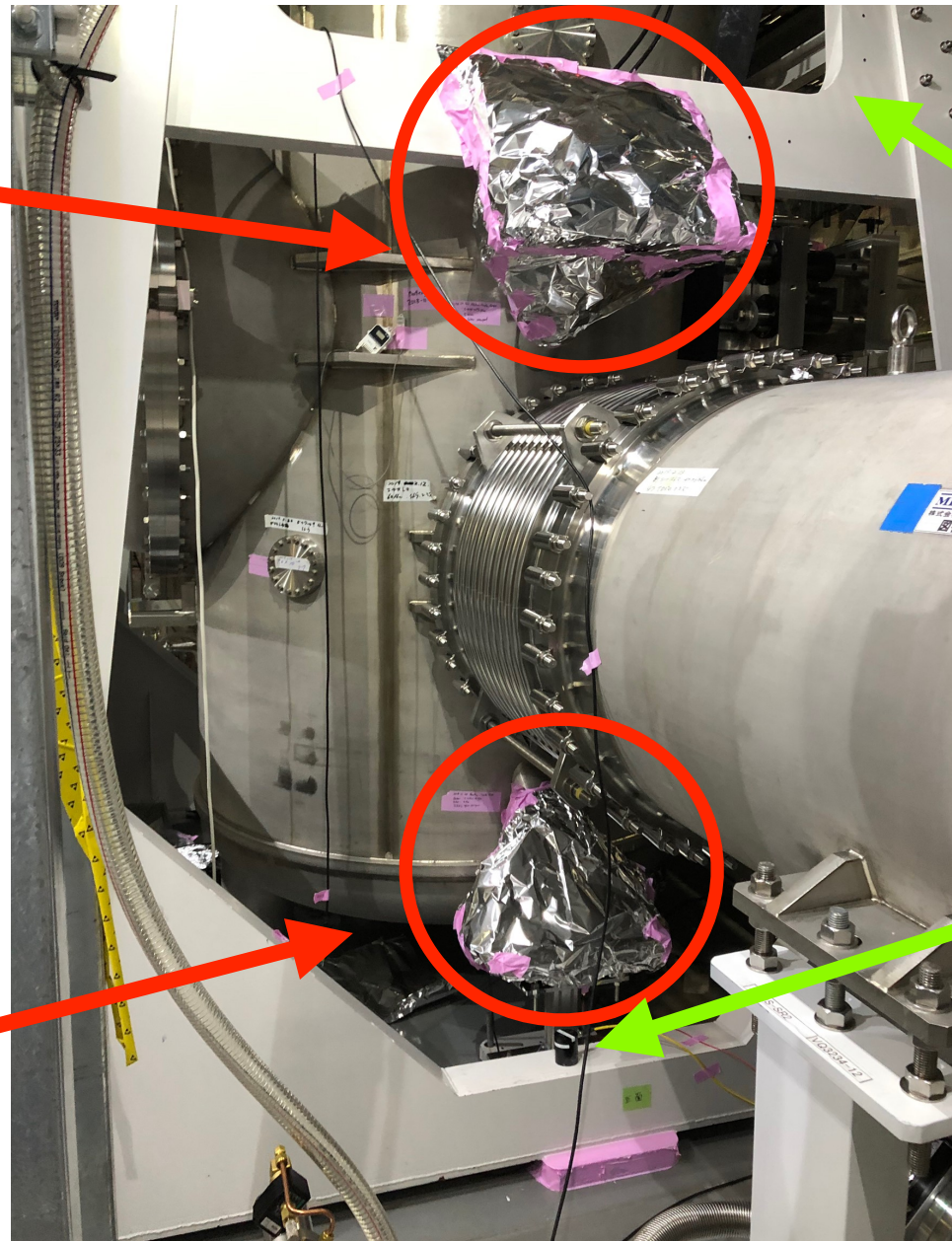

BS

SR2

SR3

SRM

turbo & scroll pump
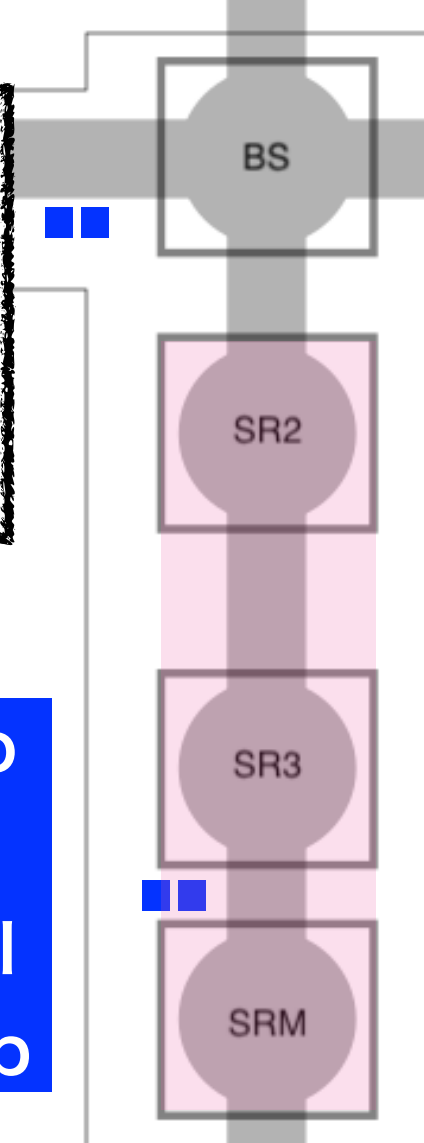
Measurement Point
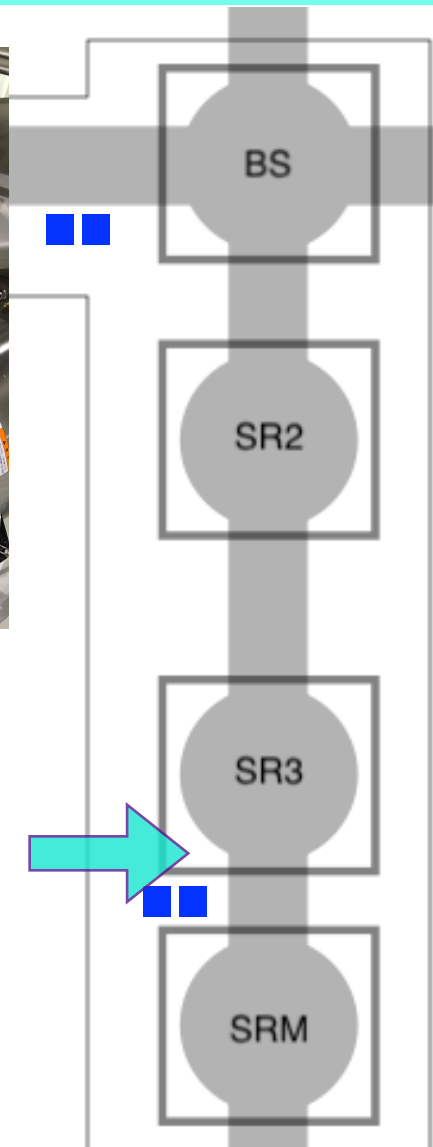
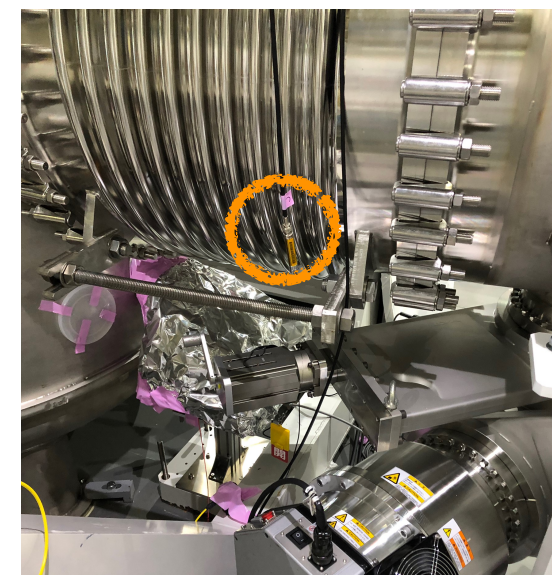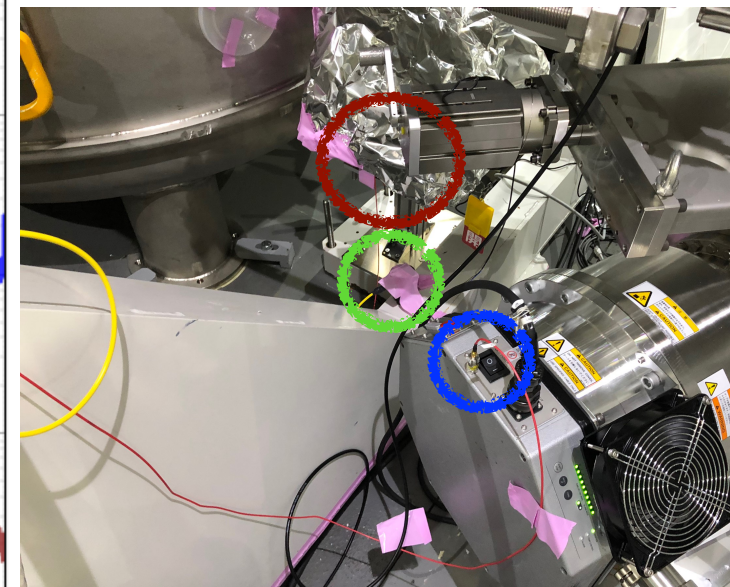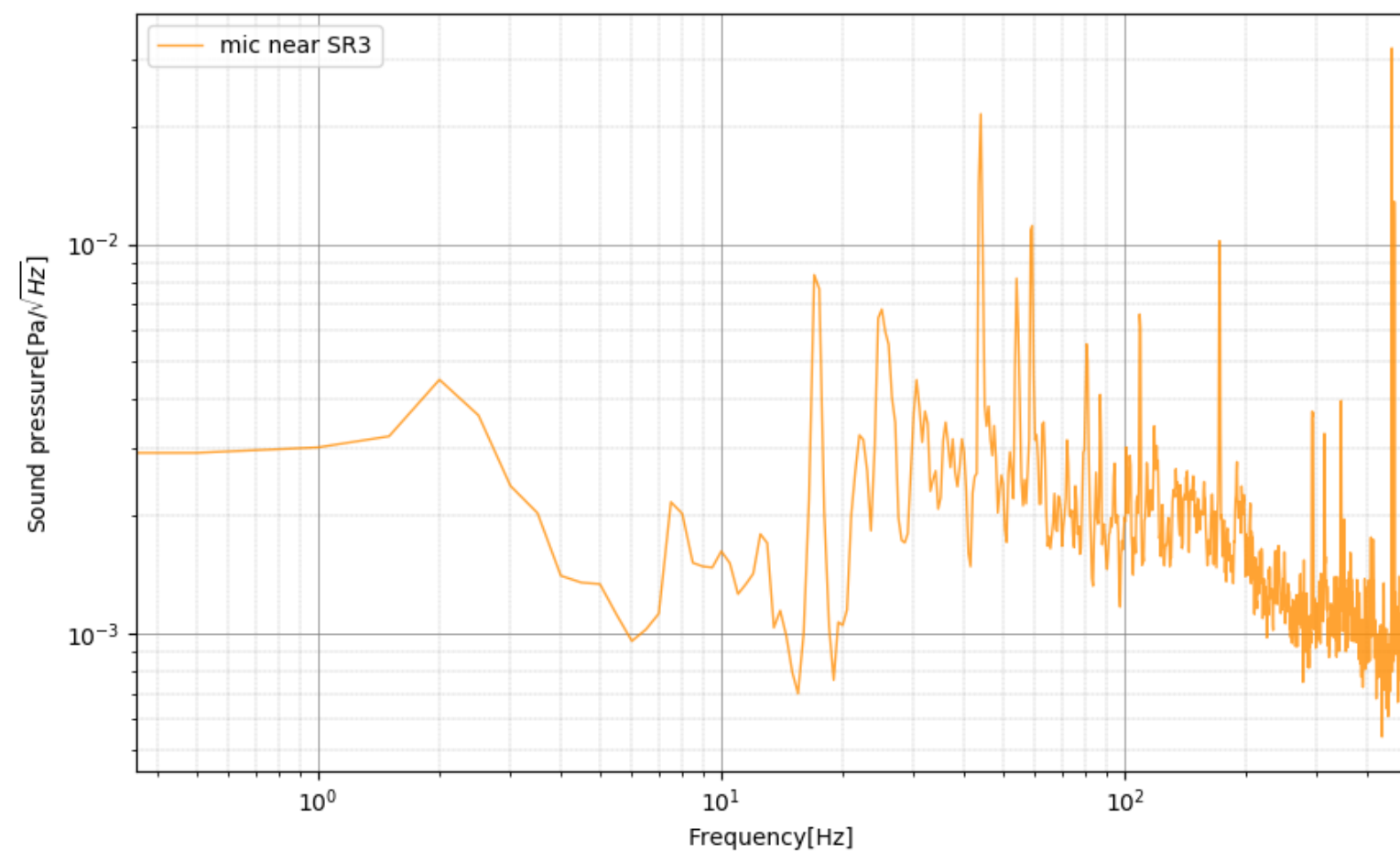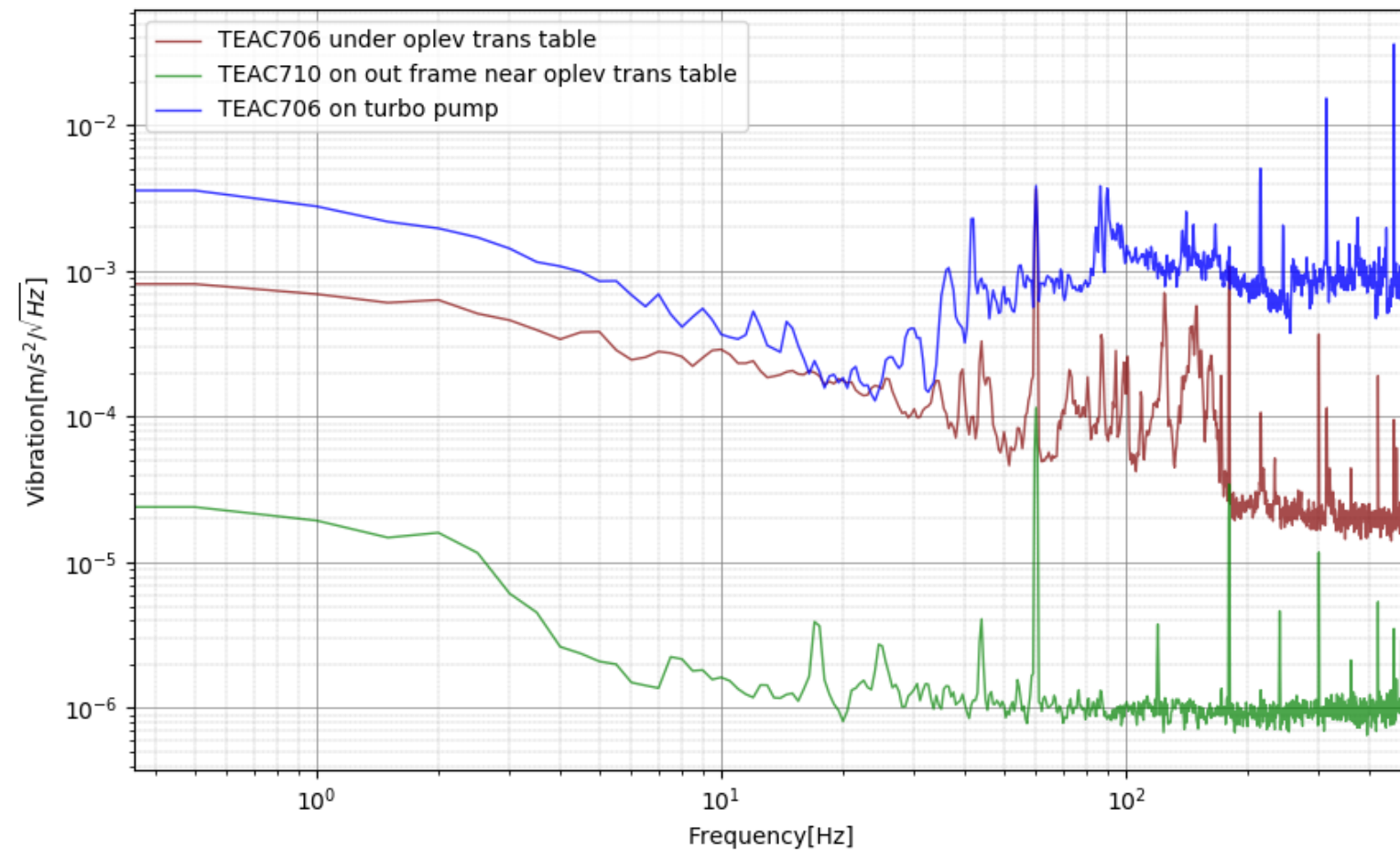around SR2, SR3, SRM

oplev receiver table

oplev trans table

out frame
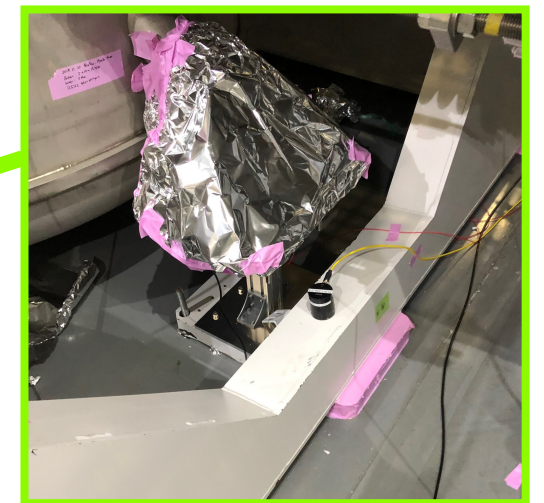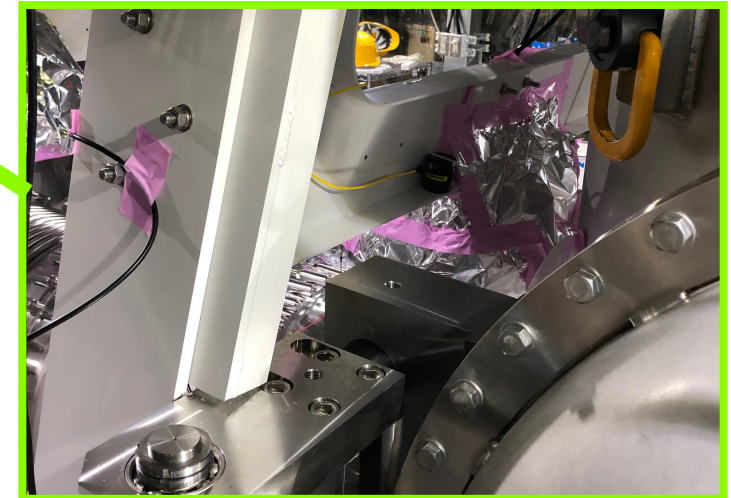
44, 72.5, 87, 124.5, 149.5, 162.5[Hz]
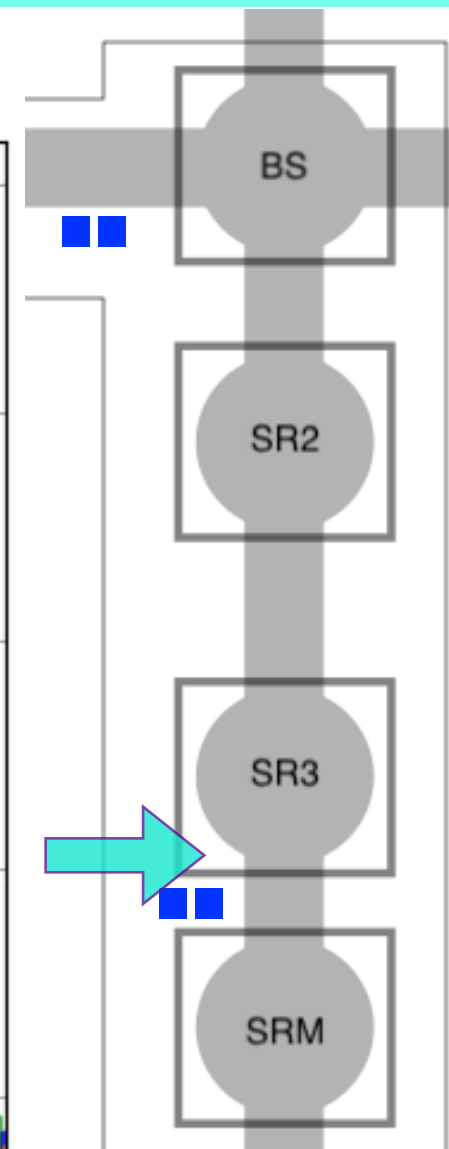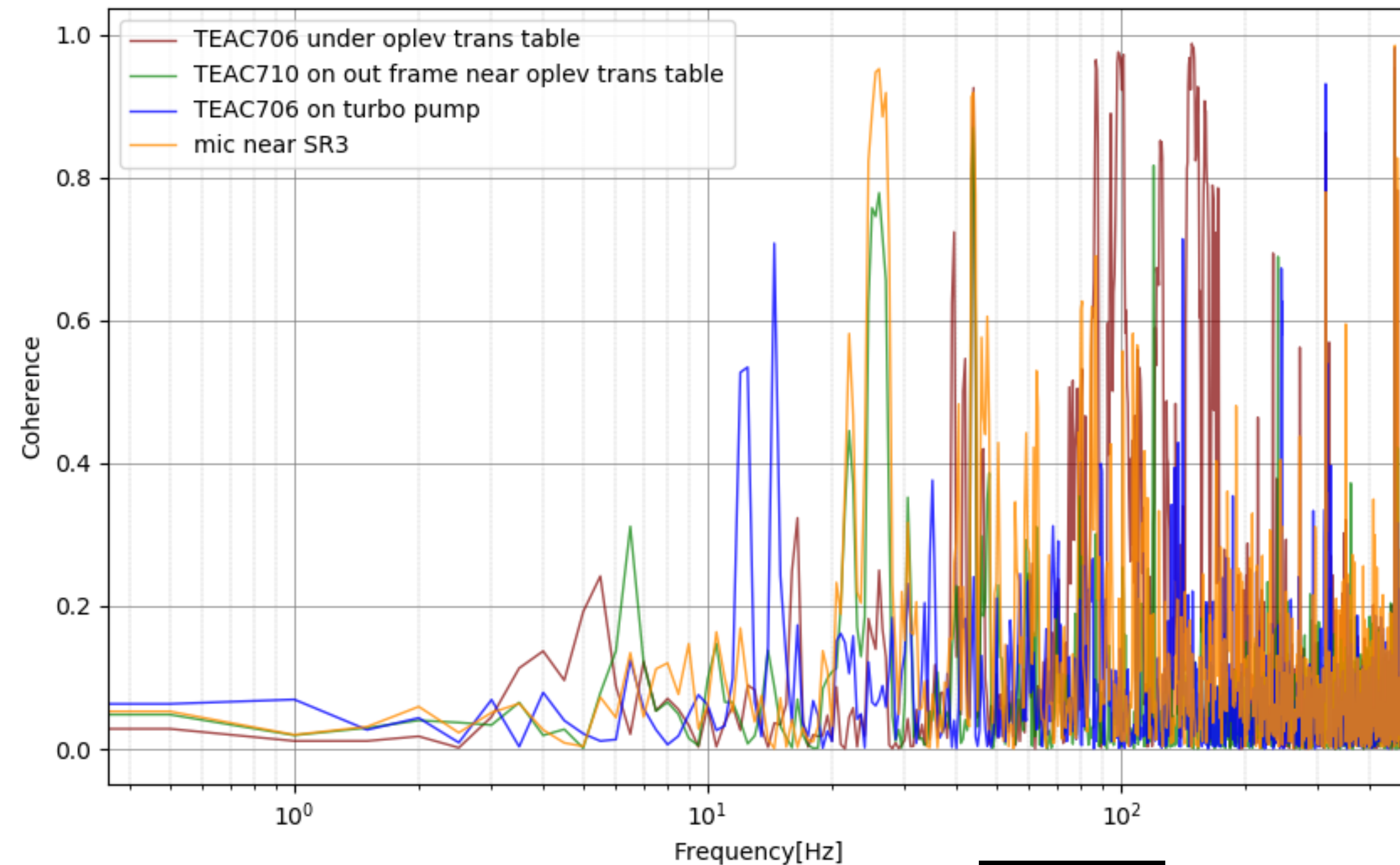
17, **44**, **460**[Hz]

42, 86.5, 141, 215, 313, 374, **460**[Hz]

17, **44**, 80.5, 109, 172, 292, 344.5, **460**[Hz]

※**bold highlight** is common peak

4

Coherence between the oplev pit signal at SR3 and PEM sensor

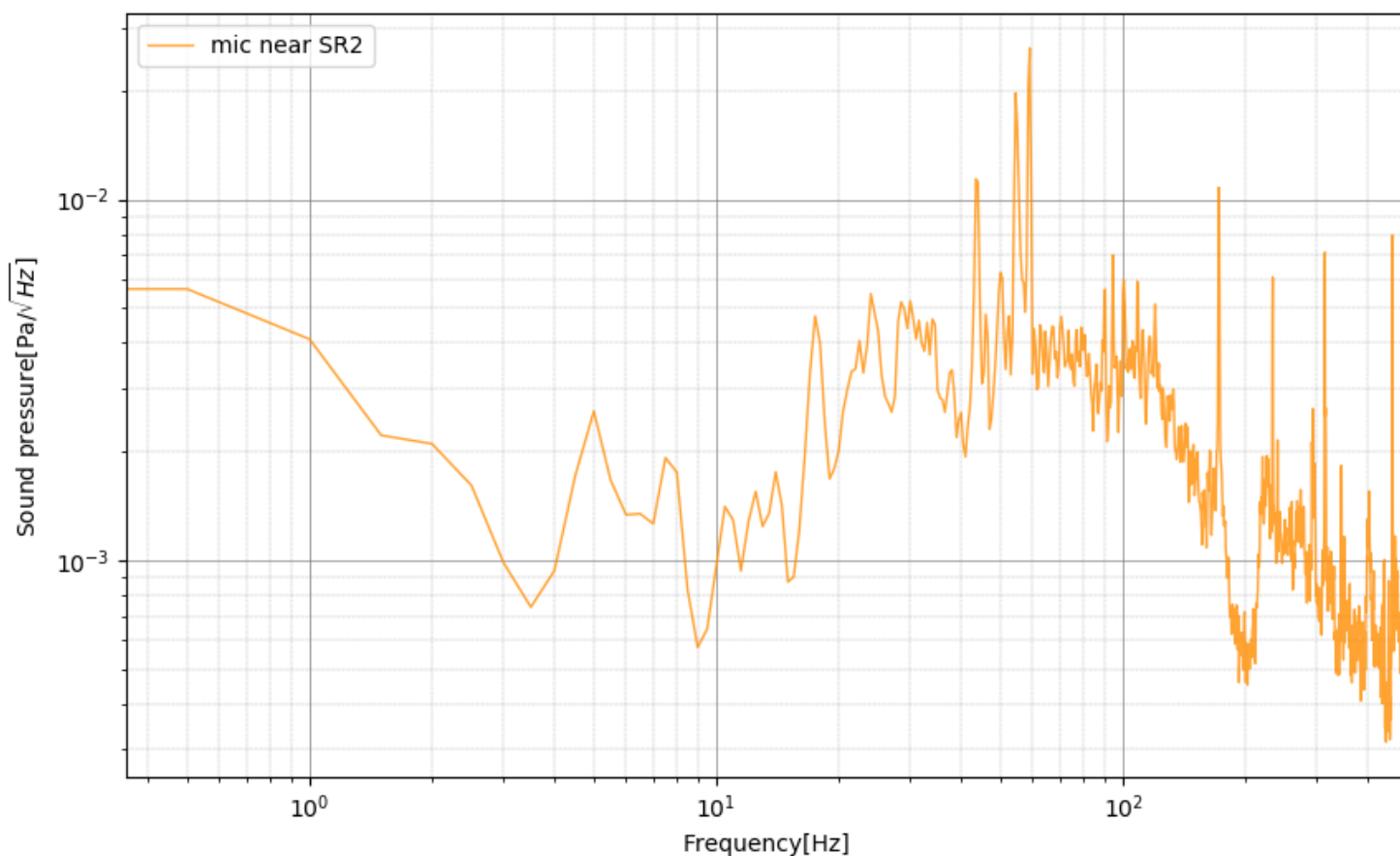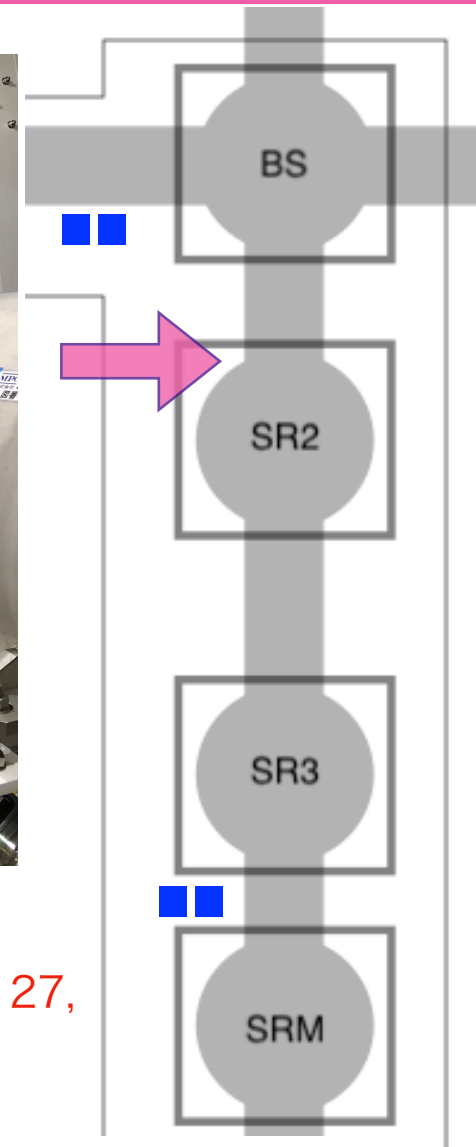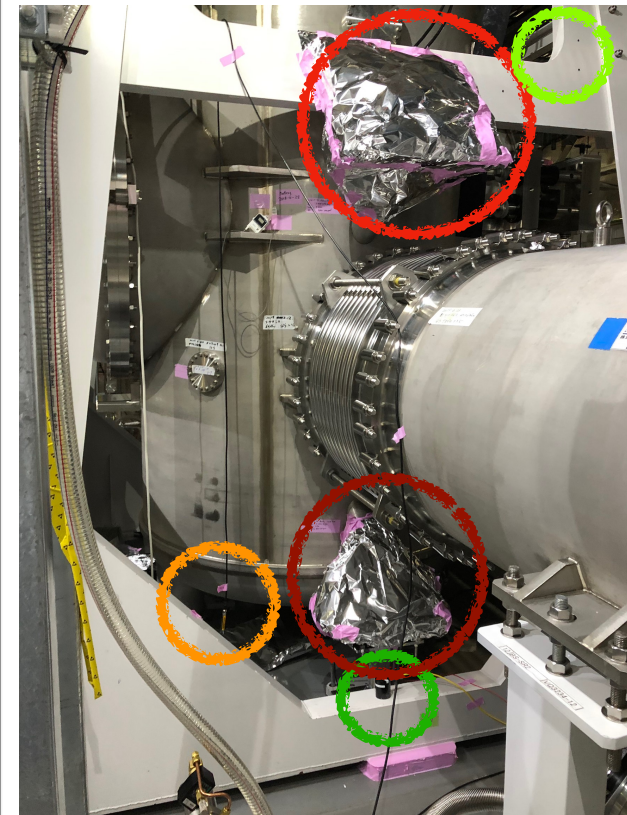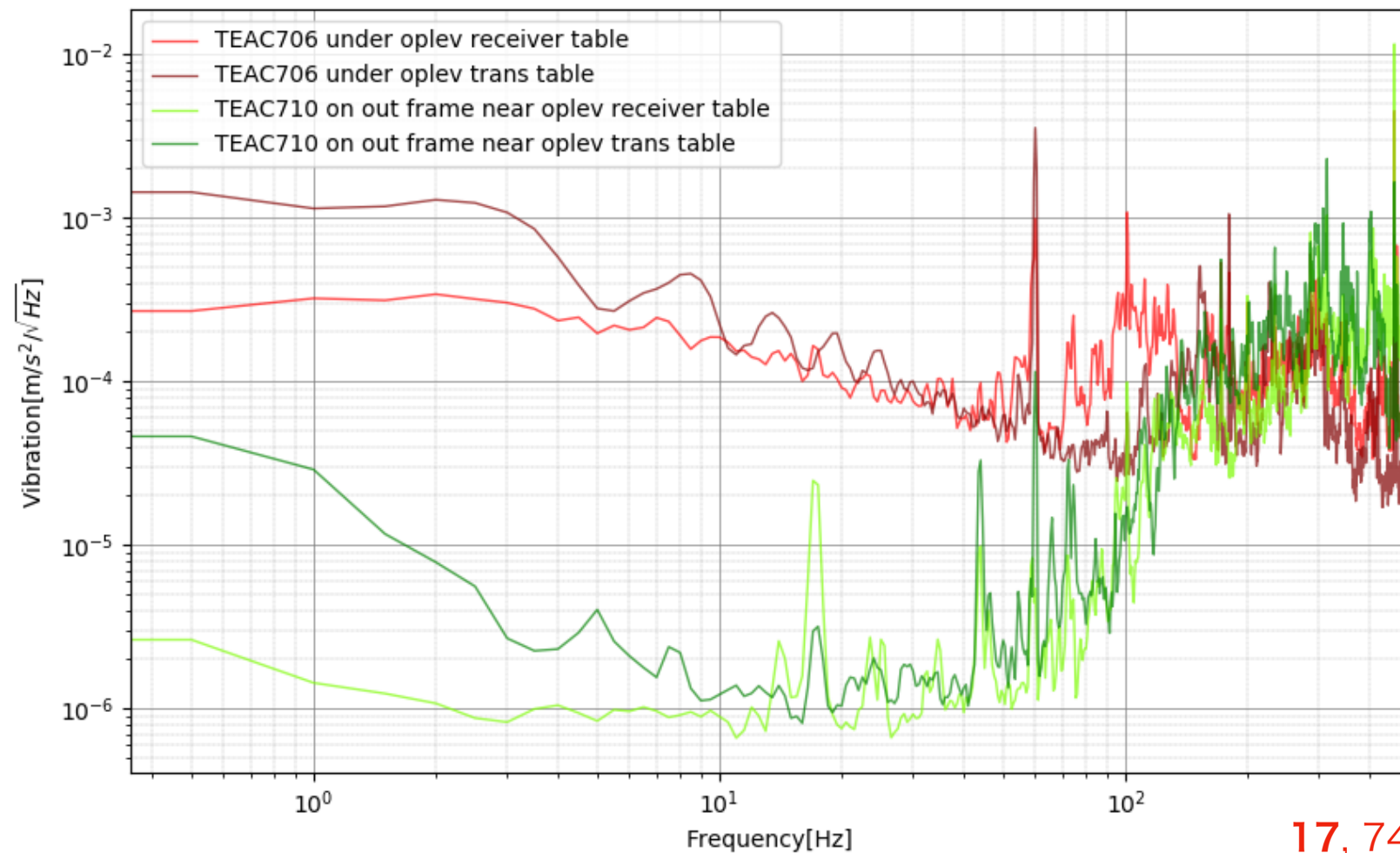44, 87, 98.5, 124.5, 148.5, 233.5, **313**, **460**[Hz]

22, **26**, **44**, **460**[Hz]

14.5, 141, 244.5, **313**, **460**[Hz]

22, **26**, **44**, **313**, **460**[Hz]

comment

22Hz, 26Hz, 313Hz from the sound.
The pump doesn't affect much.

17, 74.5, 87, 96, **101**, **111.5**, 118, 127, **172**, 293, **460**, 466.5[Hz]

111.5, 152.5, 226, 254, **286, 314, 460**[Hz]

17, **24**, **44**, 95, **101**, **172**, **233.5**, **286**, **314**, 408, **460**[Hz]

17.5, **44**, 72.5, 84.5, **111.5**, **172.5**, **233.5**, **314**, 403, **460**[Hz]

17.5, **24**, **44**, **172.5**, **233.5**, **314**, 403, **460**[Hz]

comment

111.5Hz is only oplev receiver table.
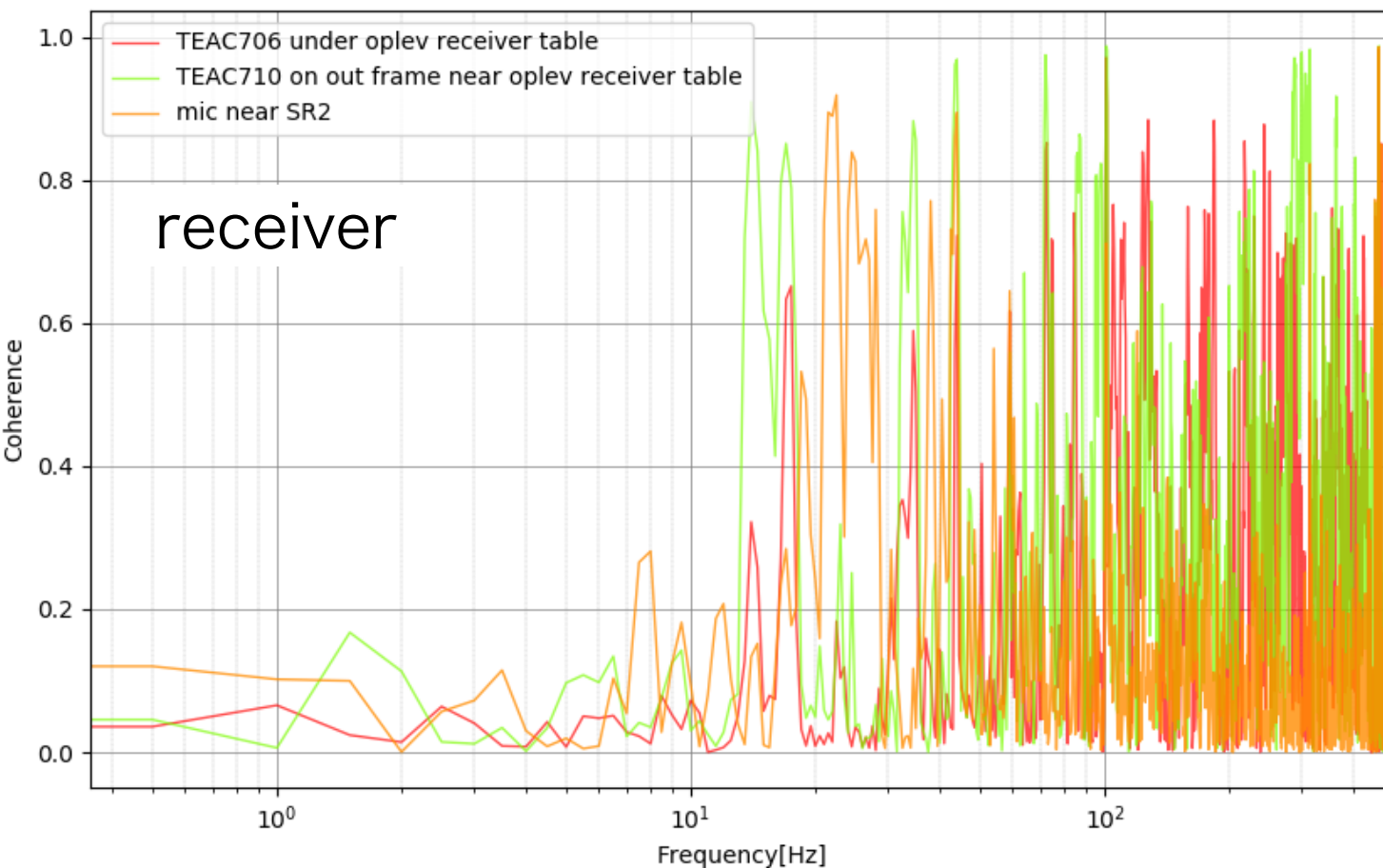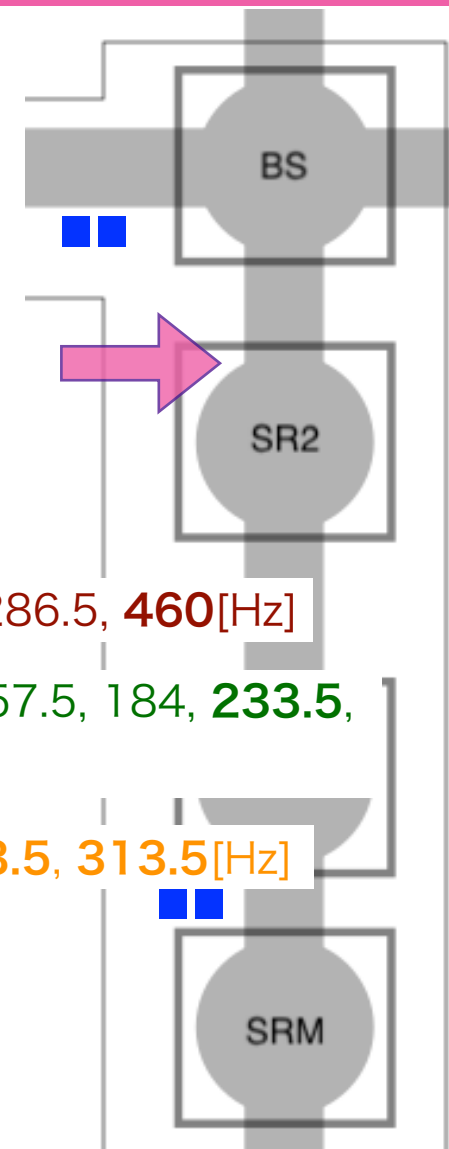
233.5Hz is only SR2.

6

Coherence between the oplev pit signal at SR2 and PEM sensor

trans
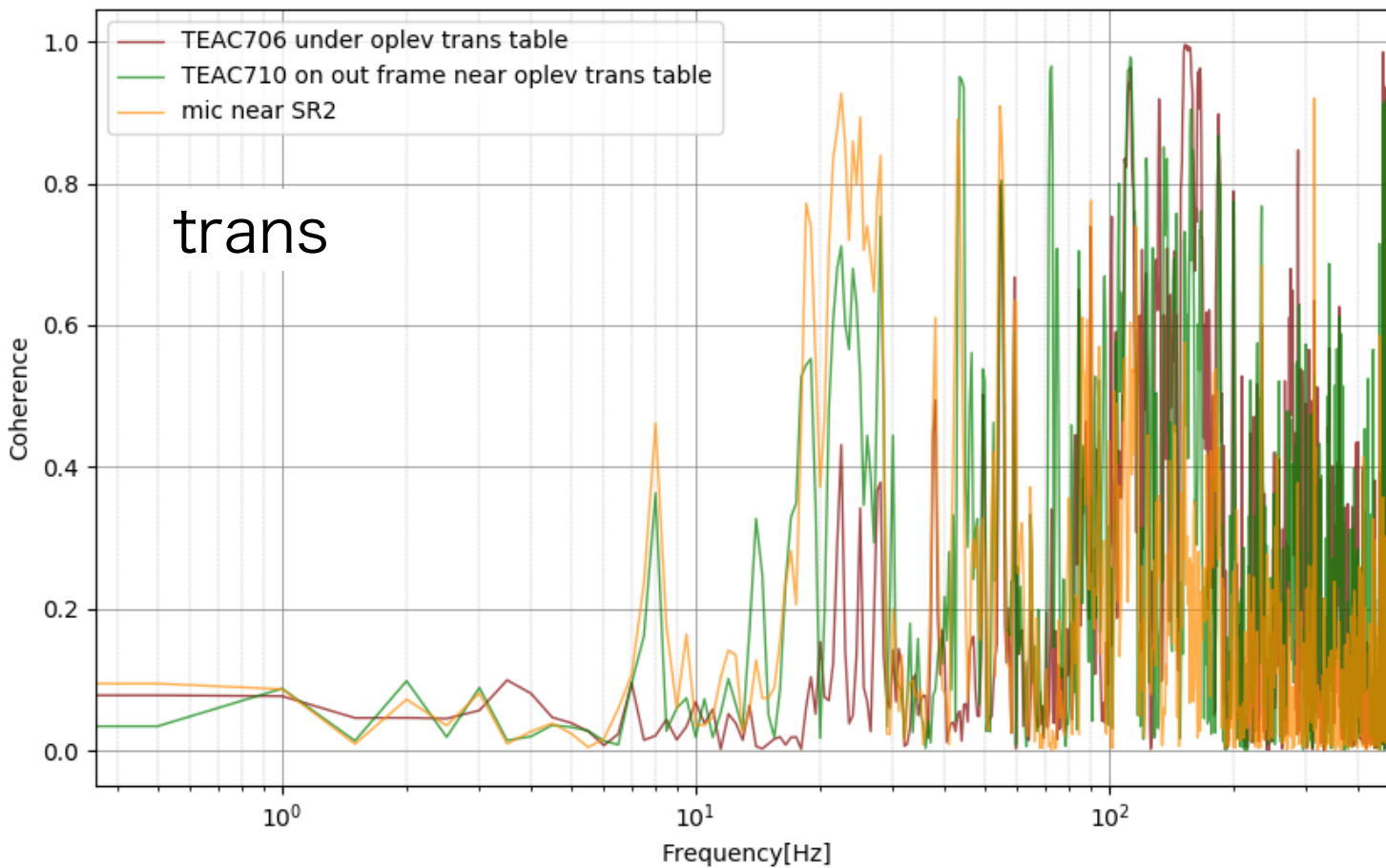
54.5, 90, **112.5**, 132.5, 153, **184,** 286.5, **460**[Hz]

22.5, **28**, 43.5, **72.5**, 112.5, 135, 157.5, 184, **233.5**, 288.5, 340, **460**, **466**[Hz]

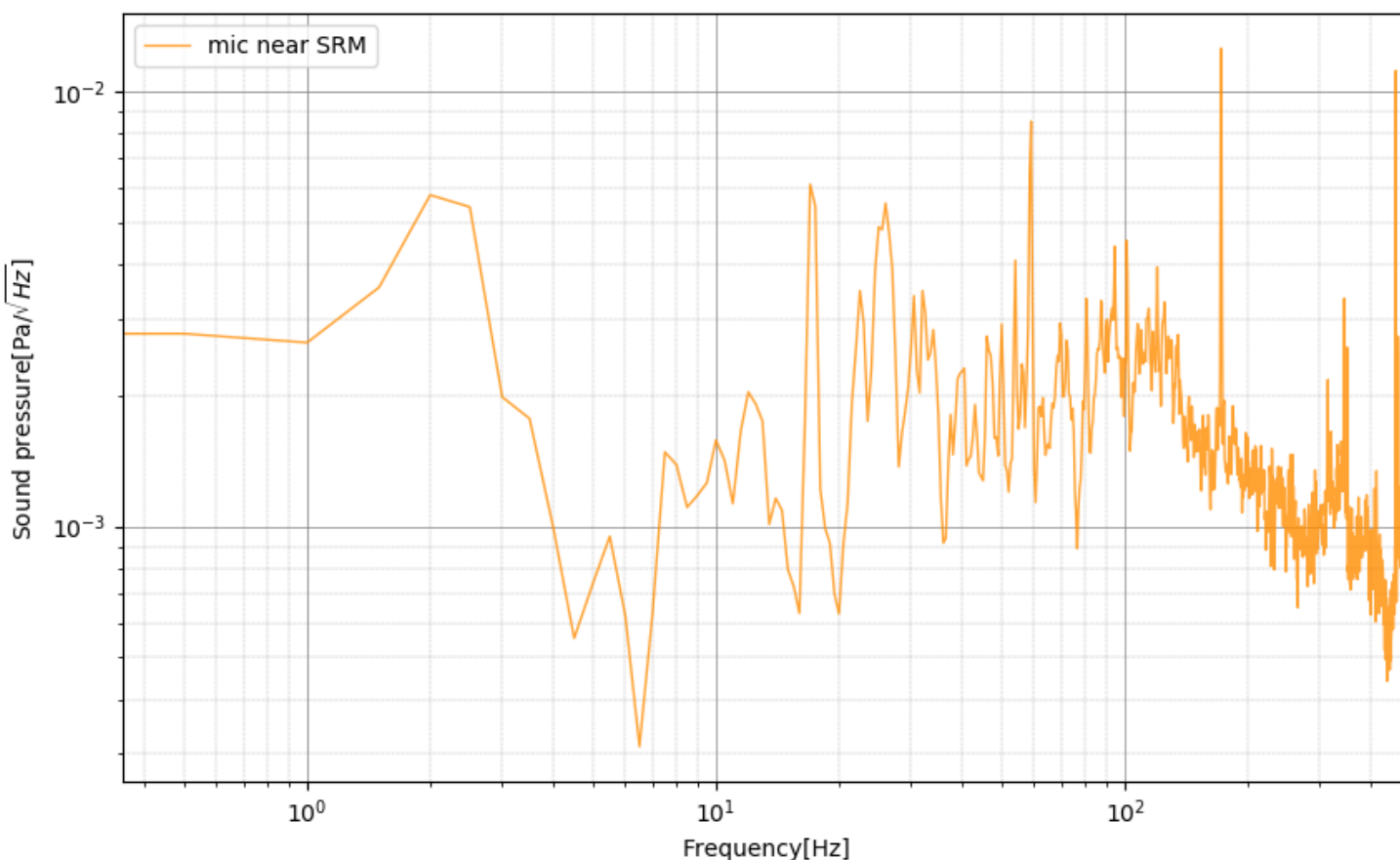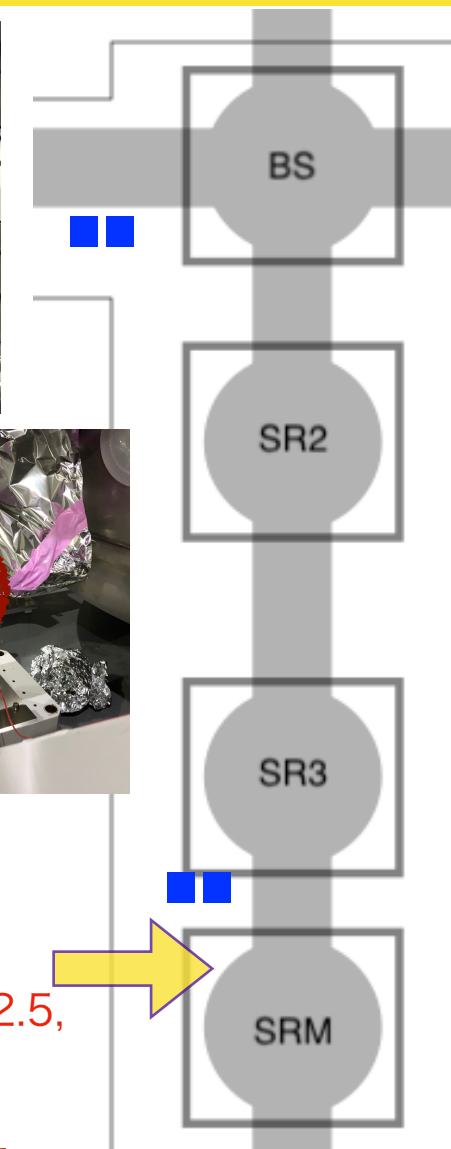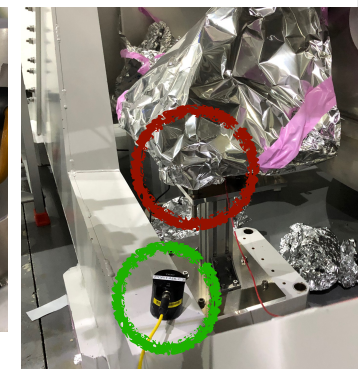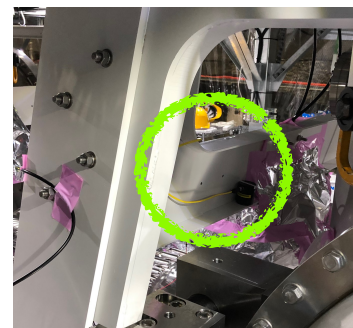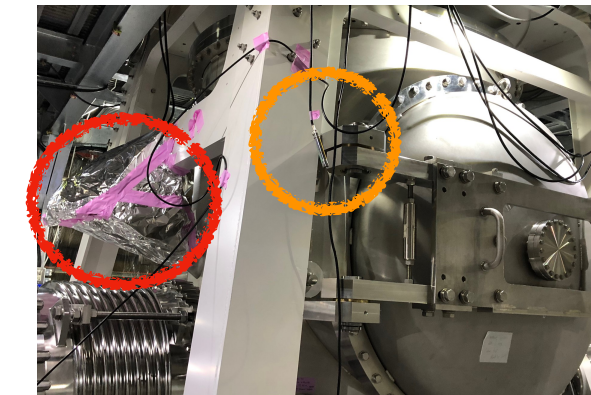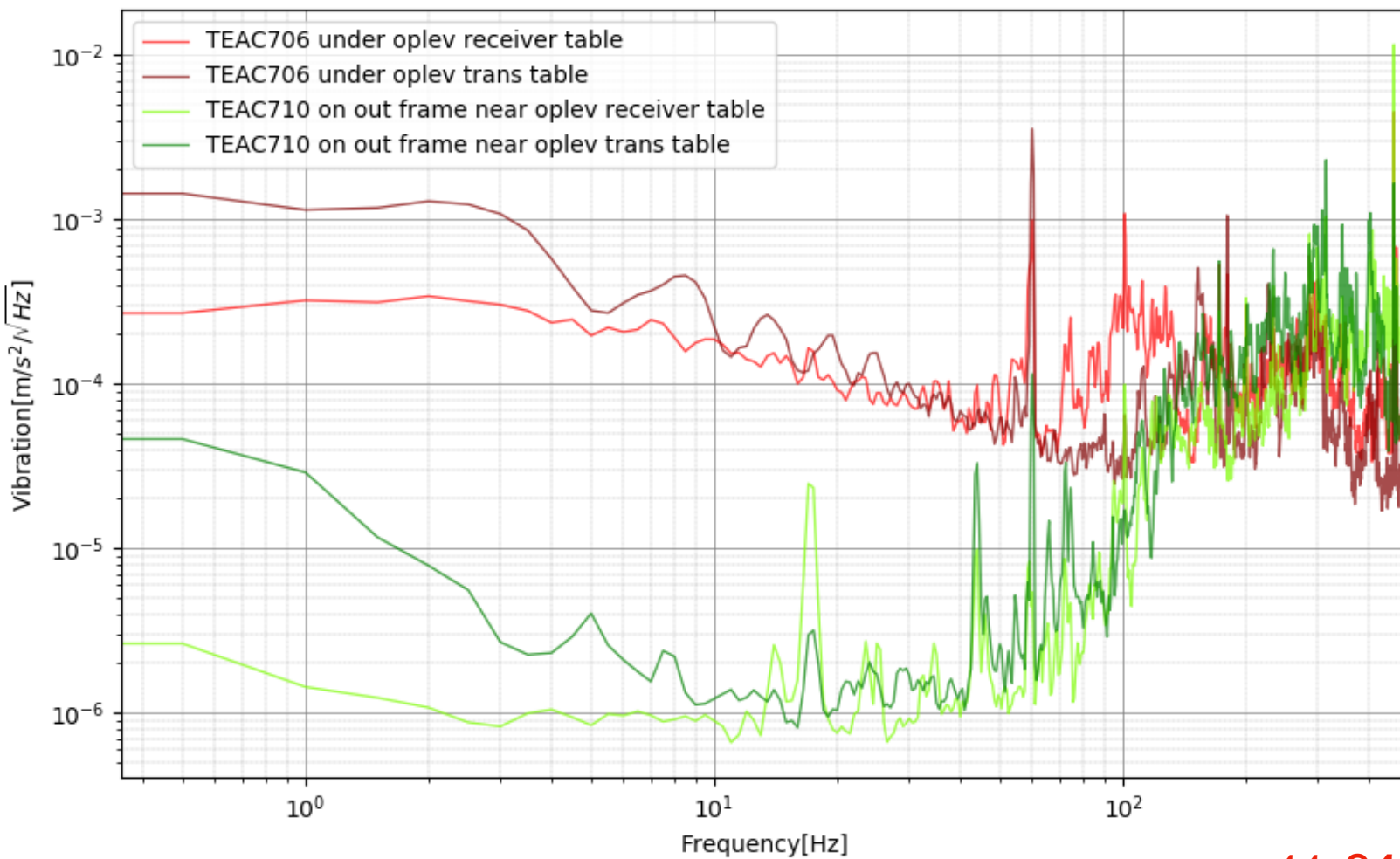**22.5**, **28**, 43, 54,5, 90.5, 116.5, **233.5**, **313.5**[Hz]

receiver

17.5, **44**, **72.5**, 84.5, **101**, 127.5, 218, **230**, 243, 251, 355, 365, 422, **460**, **467**[Hz]

14, 17, **44**, **72.5**, 82, **101**, 212, 214, **230**, 288, 306, 375, 363, 404, **460**[Hz]

22.5, **44**, **101**, 313.5, **460**, 467[Hz]

7

44, **94.5**, **101**, **115**, **172**, **198.5**, 282.5, **313**, **365.5**, 408, **460**, **466**[Hz]

13, **17**, **94.5**, **101**, **115**, 152.5, 172.5, 199, **261**, 282, **313**, **460**[Hz]

17, **94.5**, **101**, 117.5, **172**, **198.5**, 238.5, 246.5, 286.5, 317, **350**, 365.5, 413, **460**, **466**[Hz]

17, 47, 79, **172**, **261**, 284.5, **350,** 382.5, **460**, **466**, 491.5

17, 26, **94.5**, **101**, 172, 314, 344.5, **460**, 466.5[Hz]

comment

261Hz is only oplev trans table.
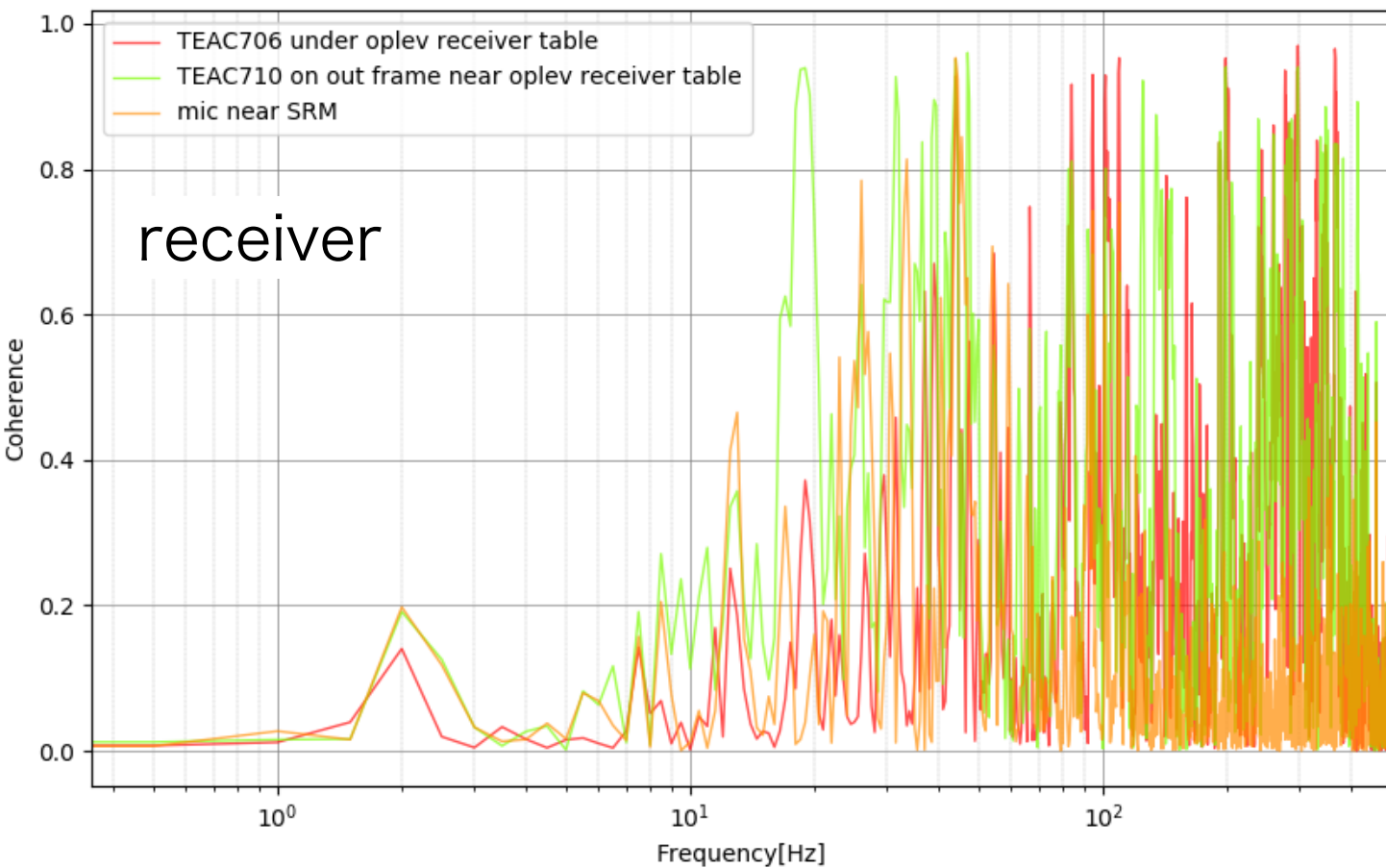94.5Hz,115Hz is only SRM.

Coherence between the oplev pit signal at SRM and PEM sensor

trans
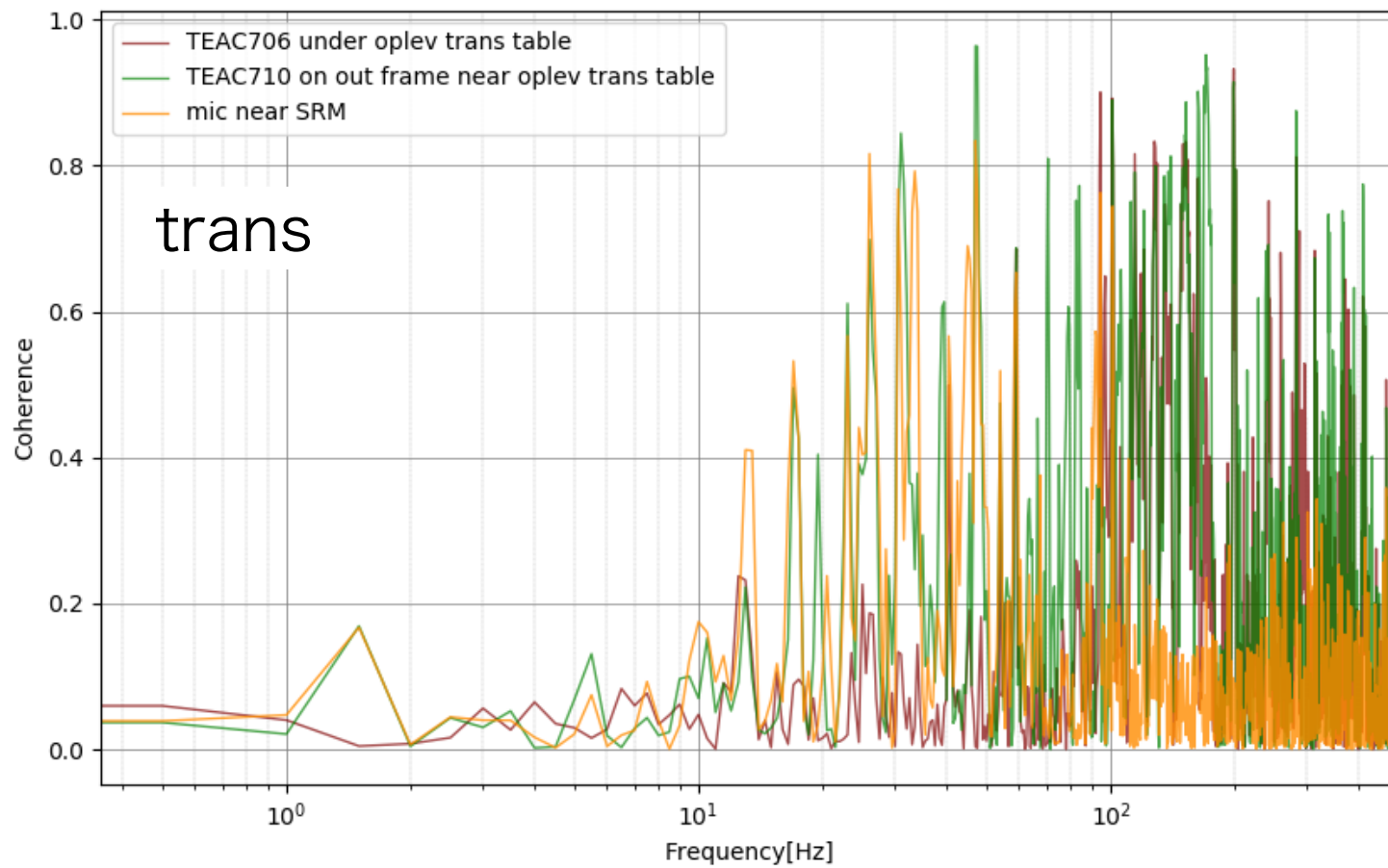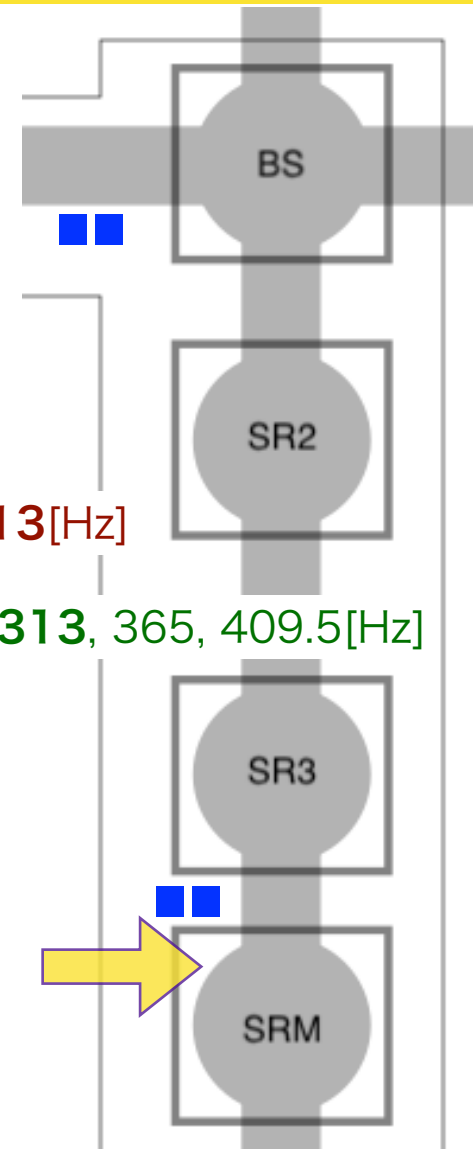
94.5, 101, 201, 242, 258, 282, 313[Hz]

17, 31, 47, 101, 170.5, 201, 282, 313, 365, 409.5[Hz]

17, 26, 33.5, 47, 94.5, 101[Hz]

receiver

44, 84, 94.5, 109.5, 191.5, 201, 242, 259, 276.5, 297, 330, 365[Hz]

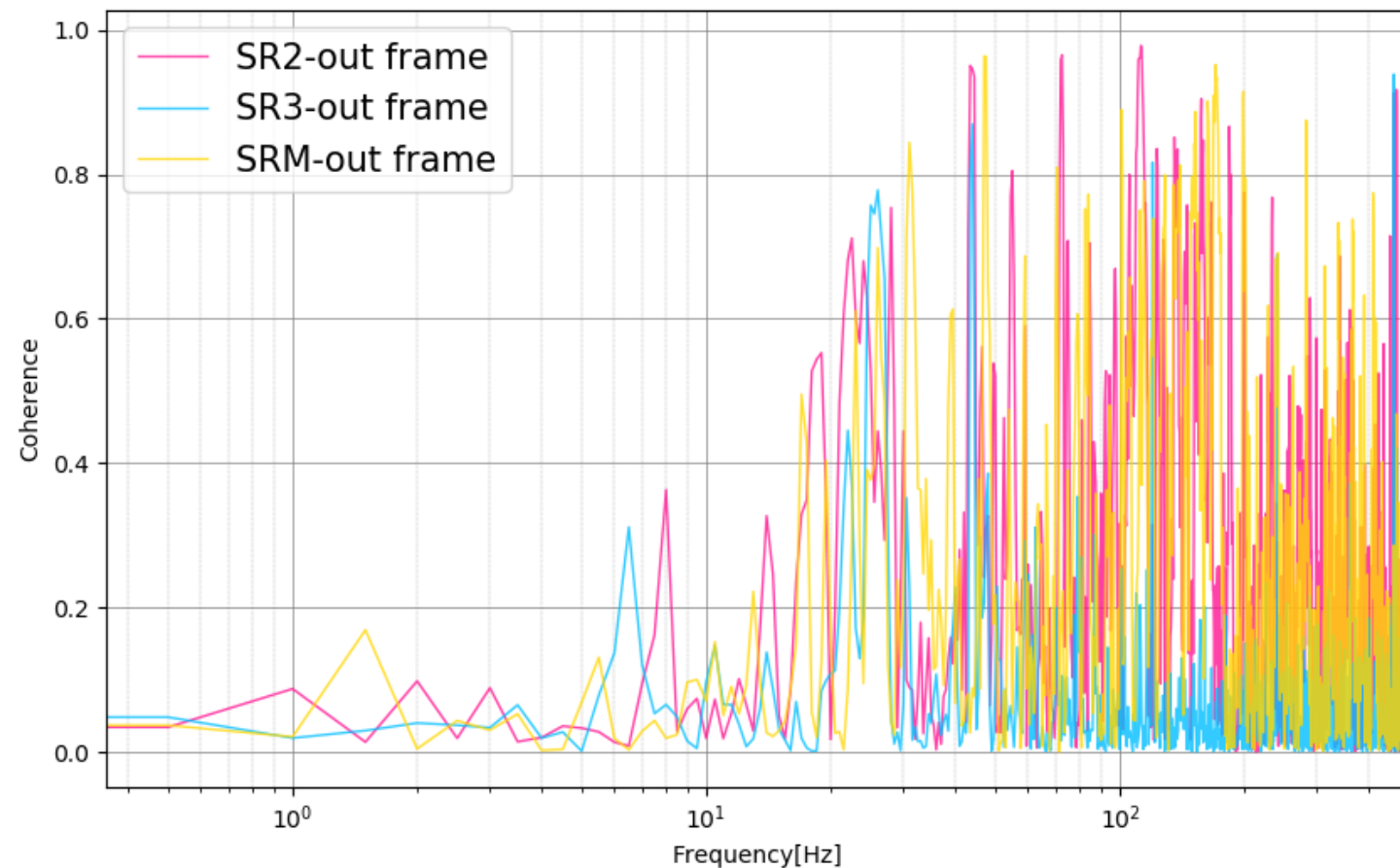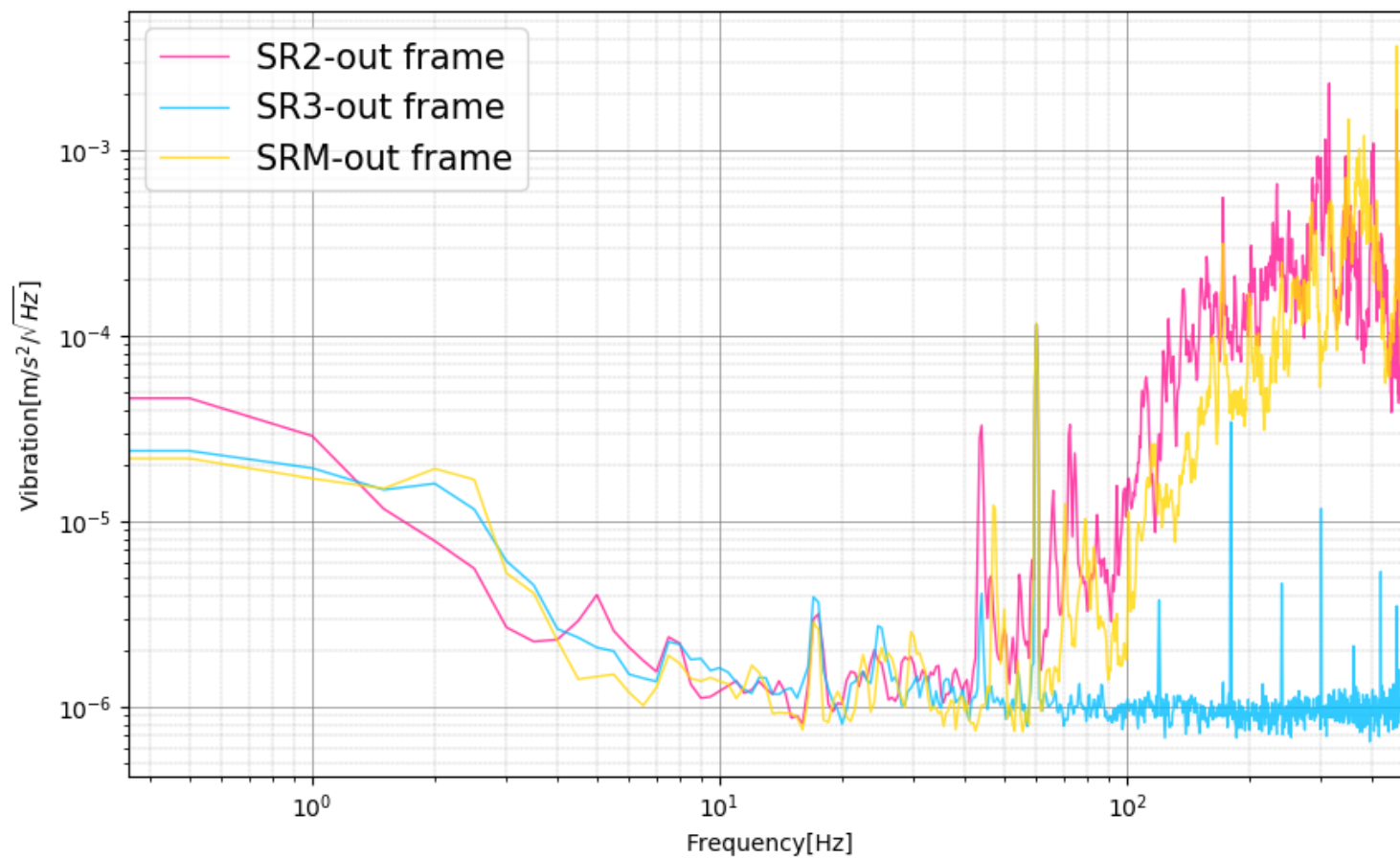19, 31.5, 47, 125, 134, 198.5, 205, 238, 259, 286.5, 297, 336.5, 346.5, 382, 414[Hz]

13, 26, 33.5, 44[Hz]

9

comment

- Vibration noise is larger the optical table than the out frame in lower 100Hz.
- Vibration noise is larger the optical receiver table than the optical trans table around 70Hz~200Hz.
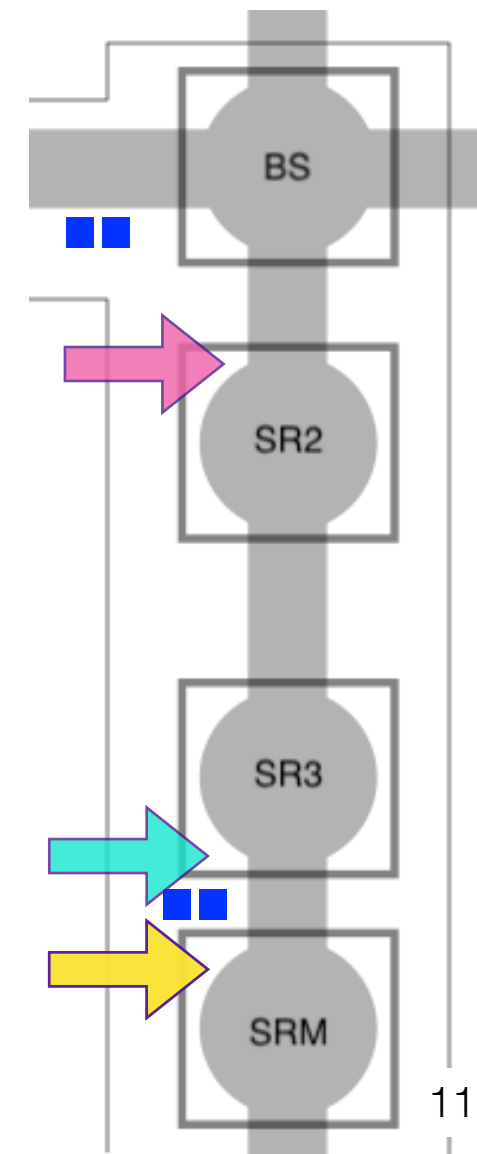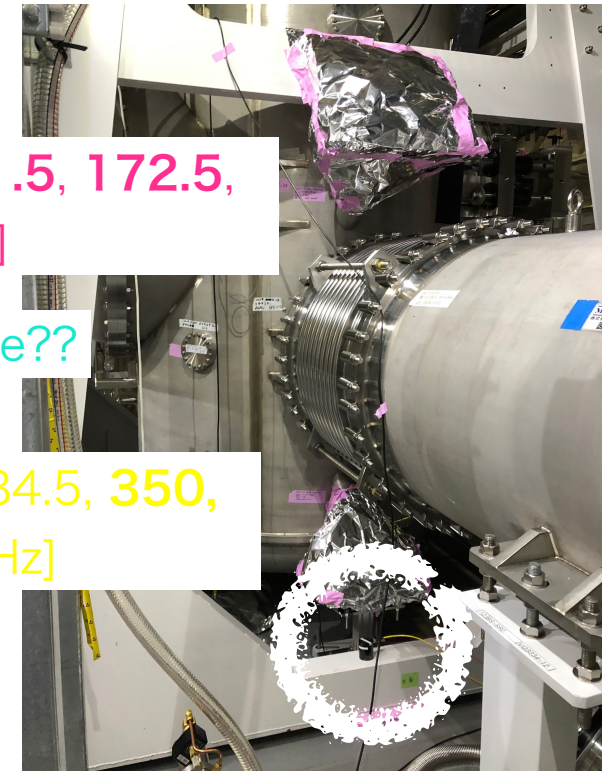- common peak : 101Hz(from sound), 111.5Hz, 172Hz(from sound),

out frame near the oplev trans table

17.5, **44**, 72.5, 84.5, **111.5**, **172.5**, 233.5, 314, 403, **460**[Hz]

17, **44**, **460**[Hz]⋯strange??

17, 47, 79, **172**, **261**, 284.5, **350**, 382.5, **460**, 466, 491.5[Hz]
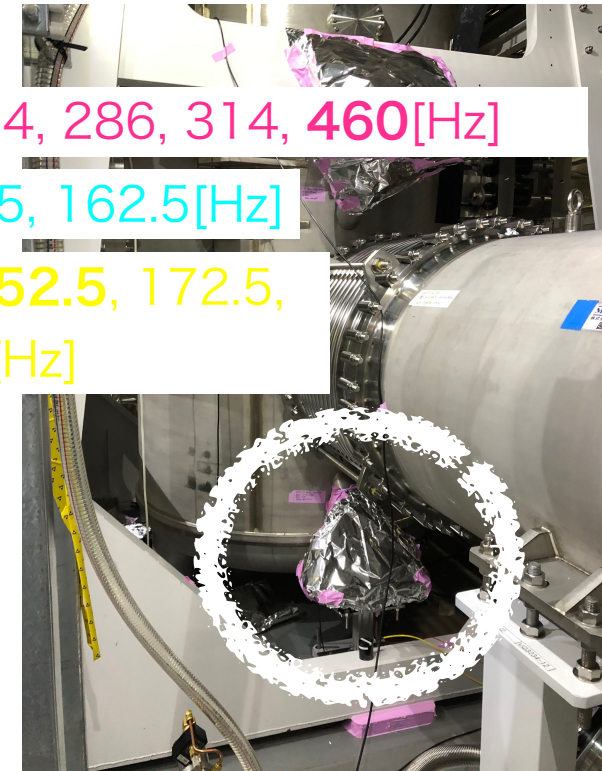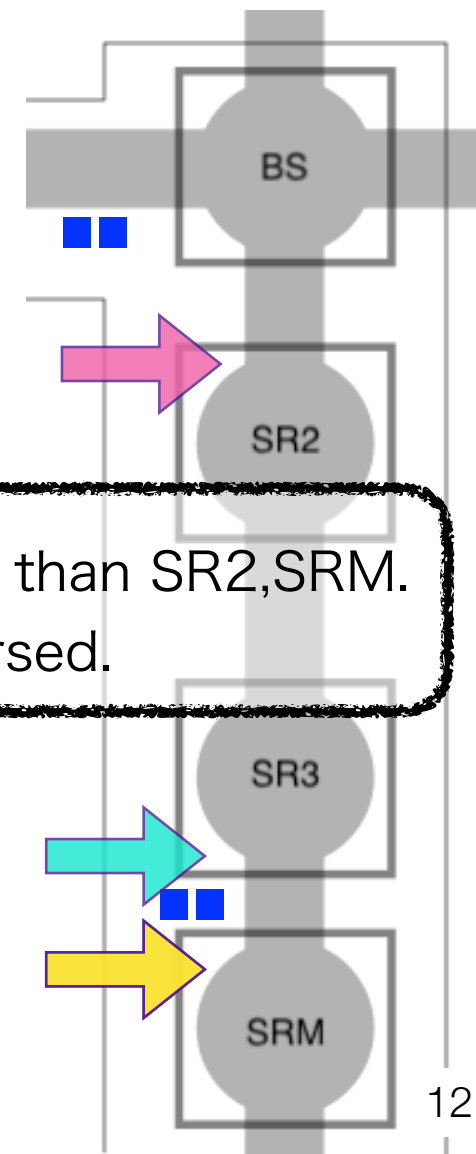
11

the oplev trans table
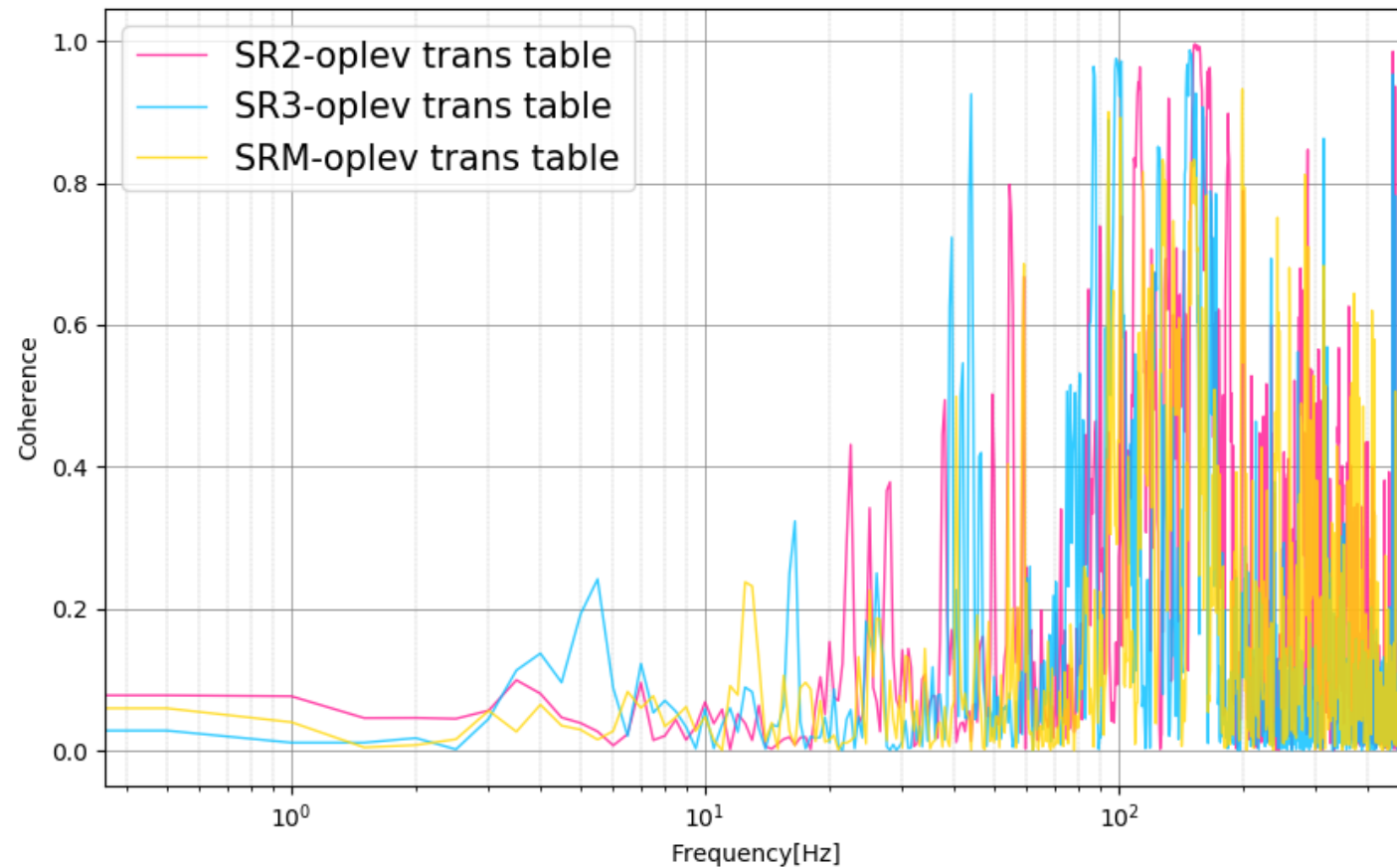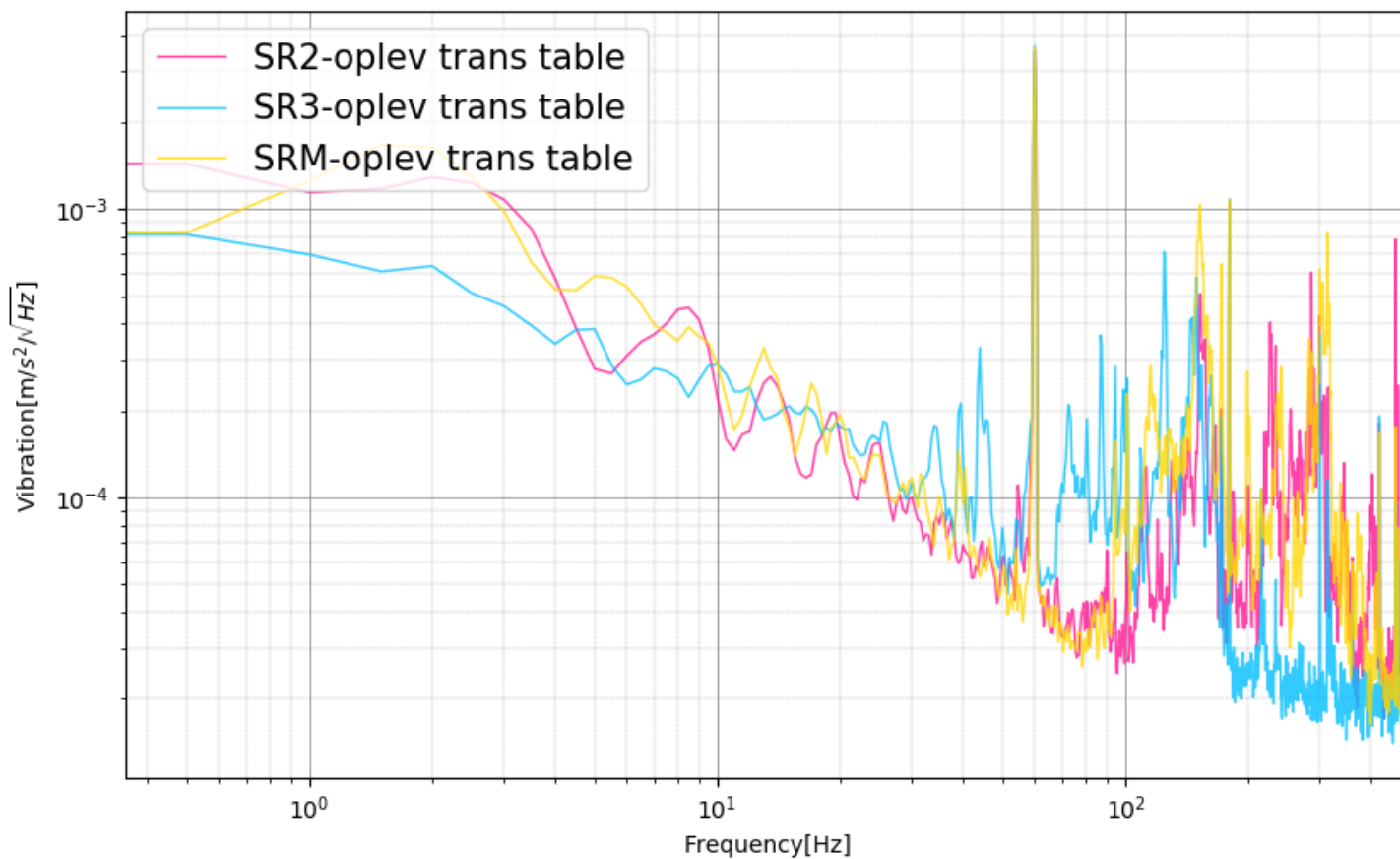
13, 111.5, 152.5, 226, 254, 286, 314, **460**[Hz]

44, 72.5, 87, 124.5, 149.5, 162.5[Hz]

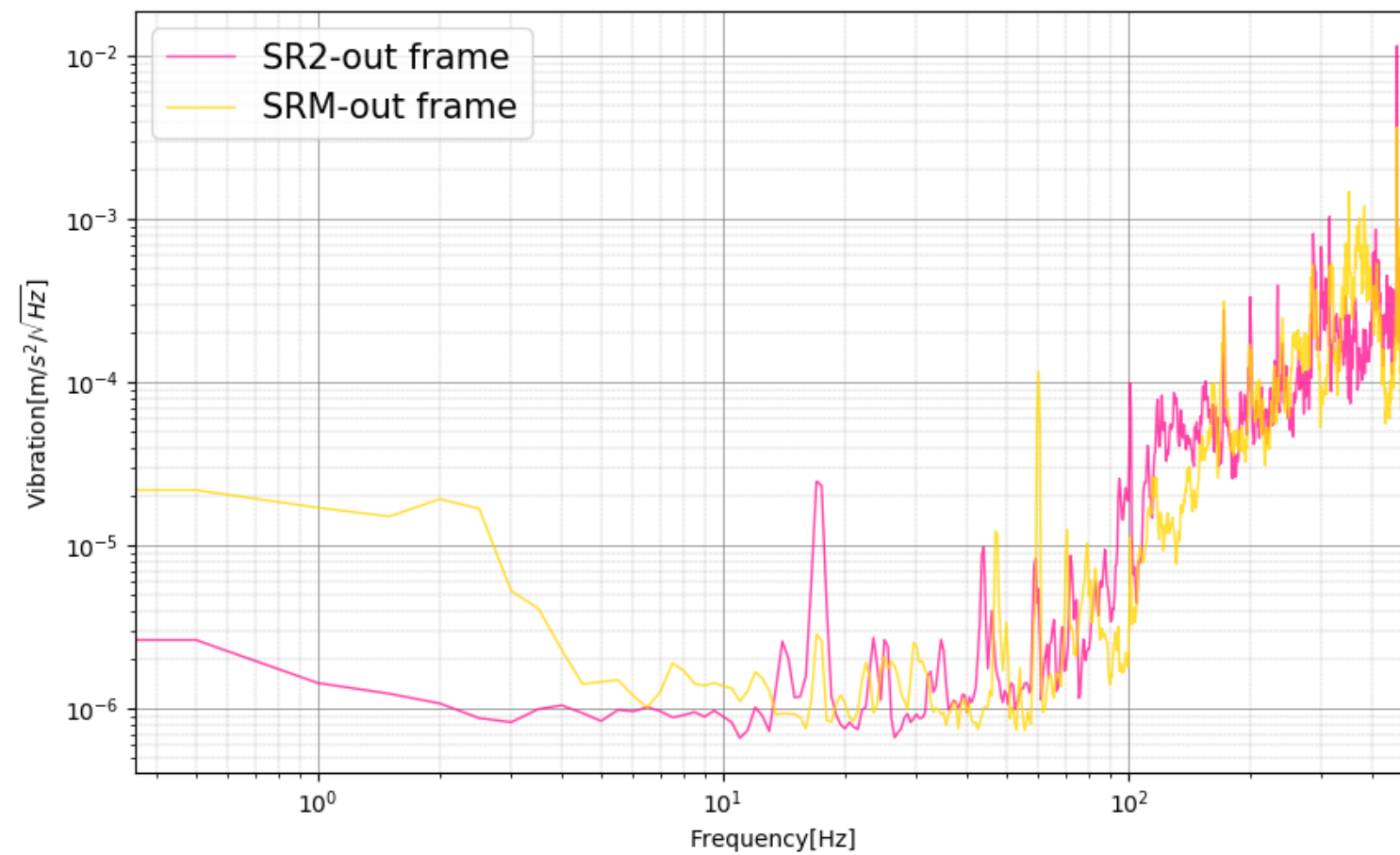**13**, 17, 94.5, 101, 115, **152.5**, 172.5, 199, 261, 282, 313, **460**[Hz]

comment
60Hz~200Hz is larger SR3 than SR2,SRM.
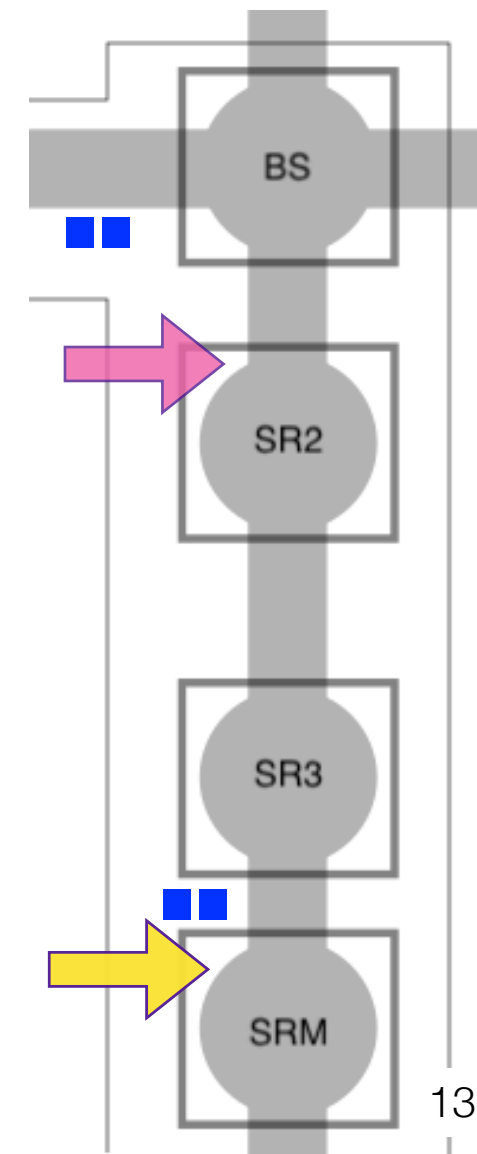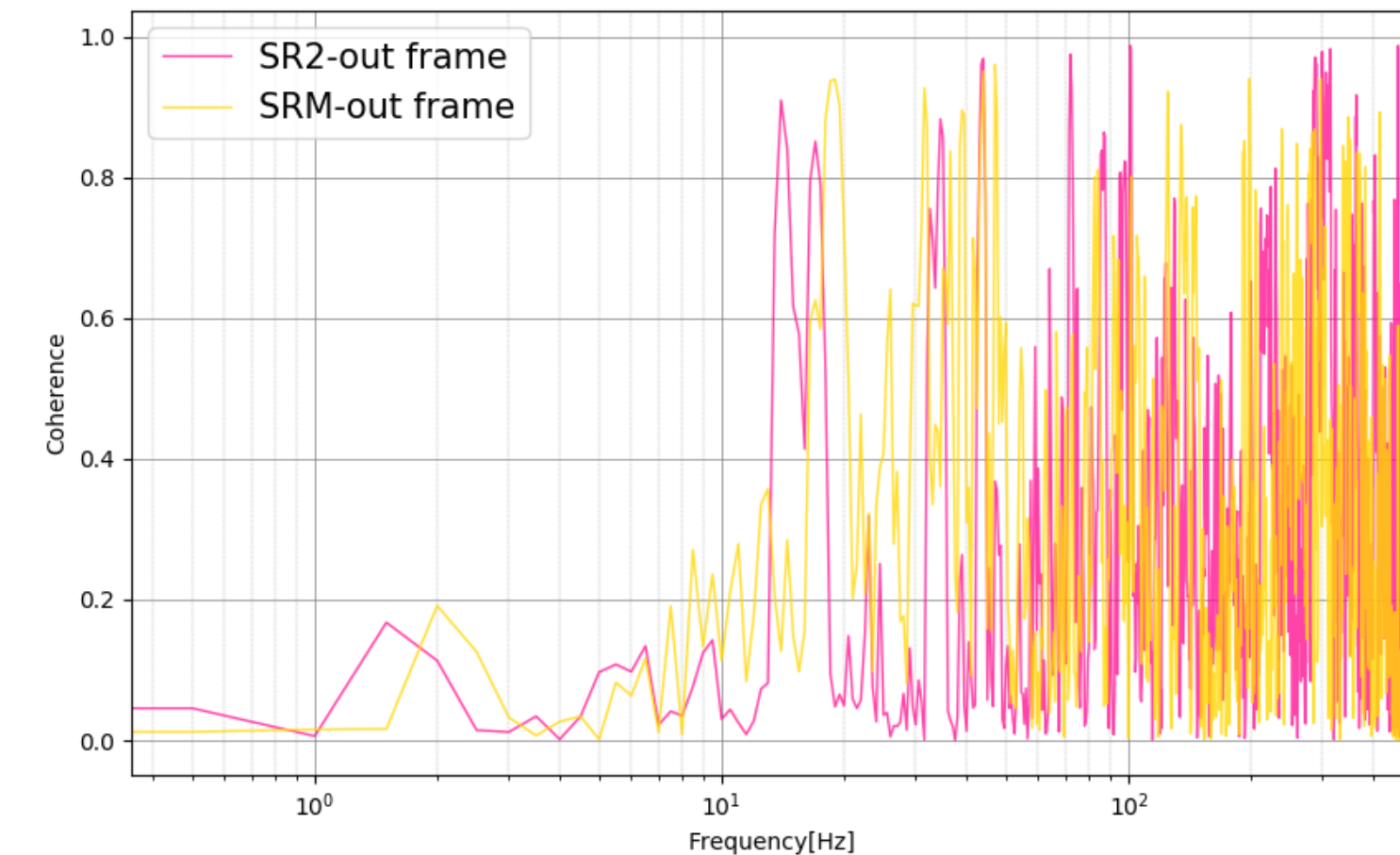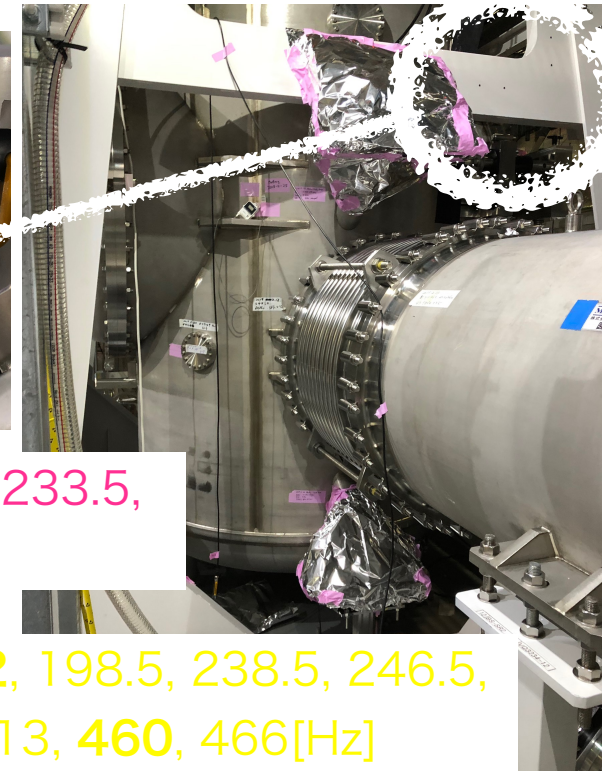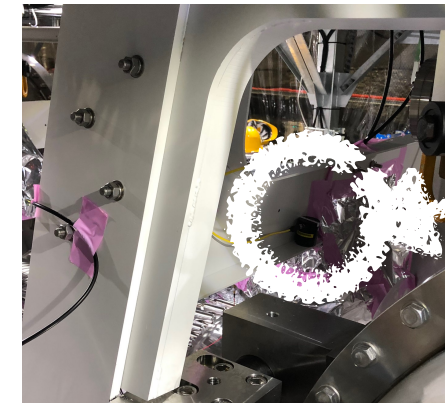But after 200Hz , it's reversed.

out frame near the oplev receiver table

17, 24, 44, 95, **101**, **172**, 233.5, **286**, 314, 408, **460**[Hz]

17, **94.5**, **101**, 117.5, **172**, 198.5, 238.5, 246.5, **286.5**, 317, 350, 365.5, 413, **460**, 466[Hz]
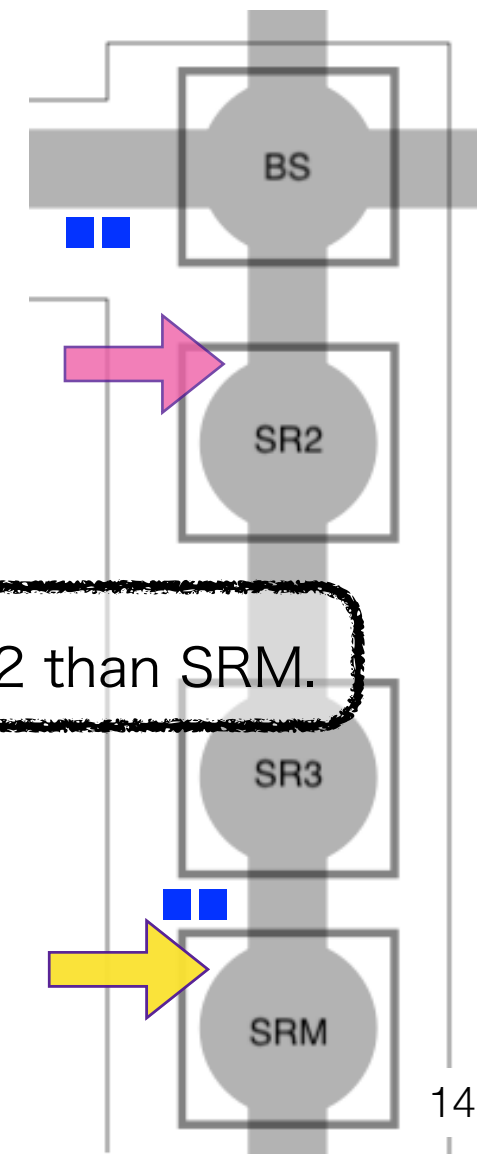
the oplev receiver table
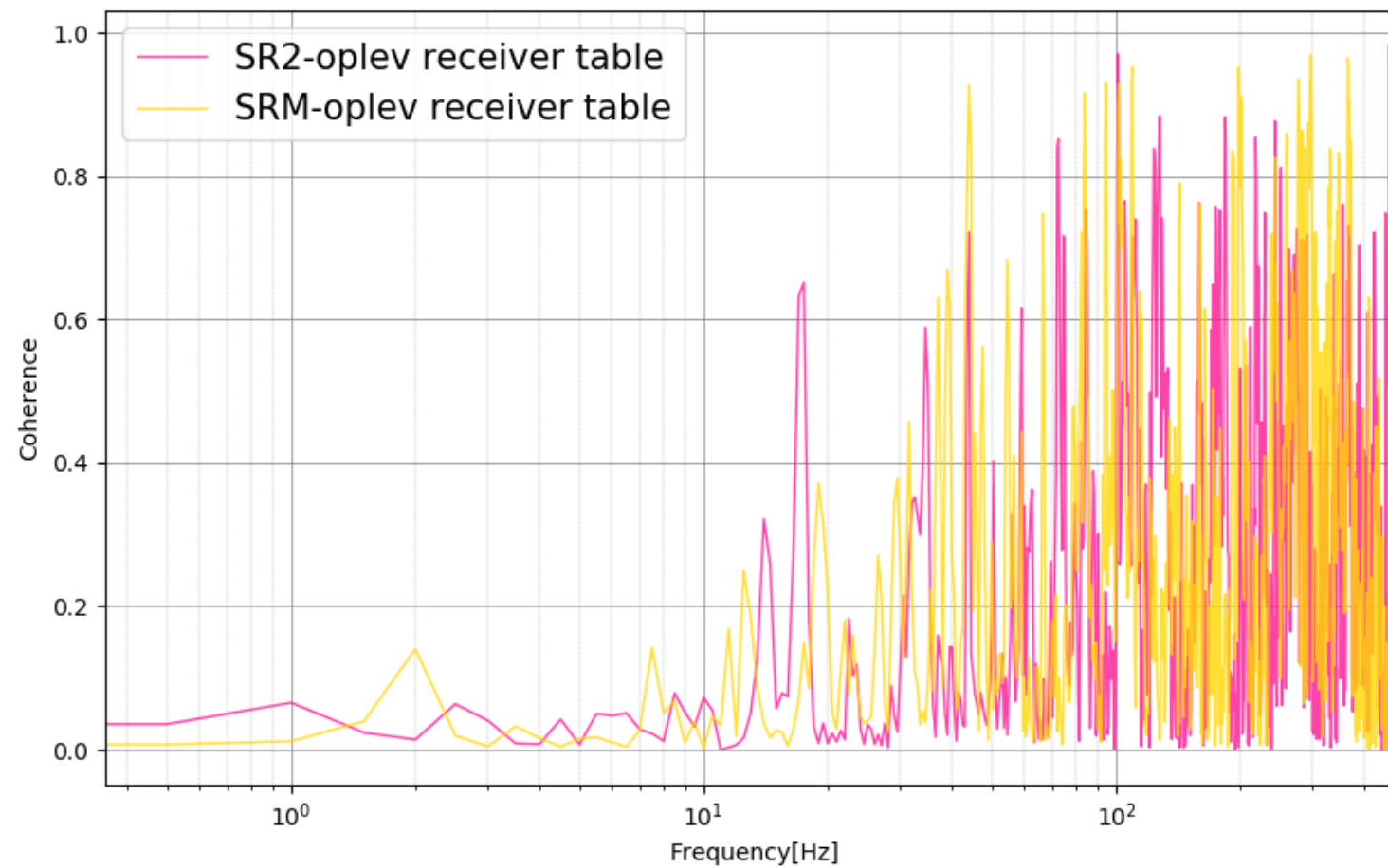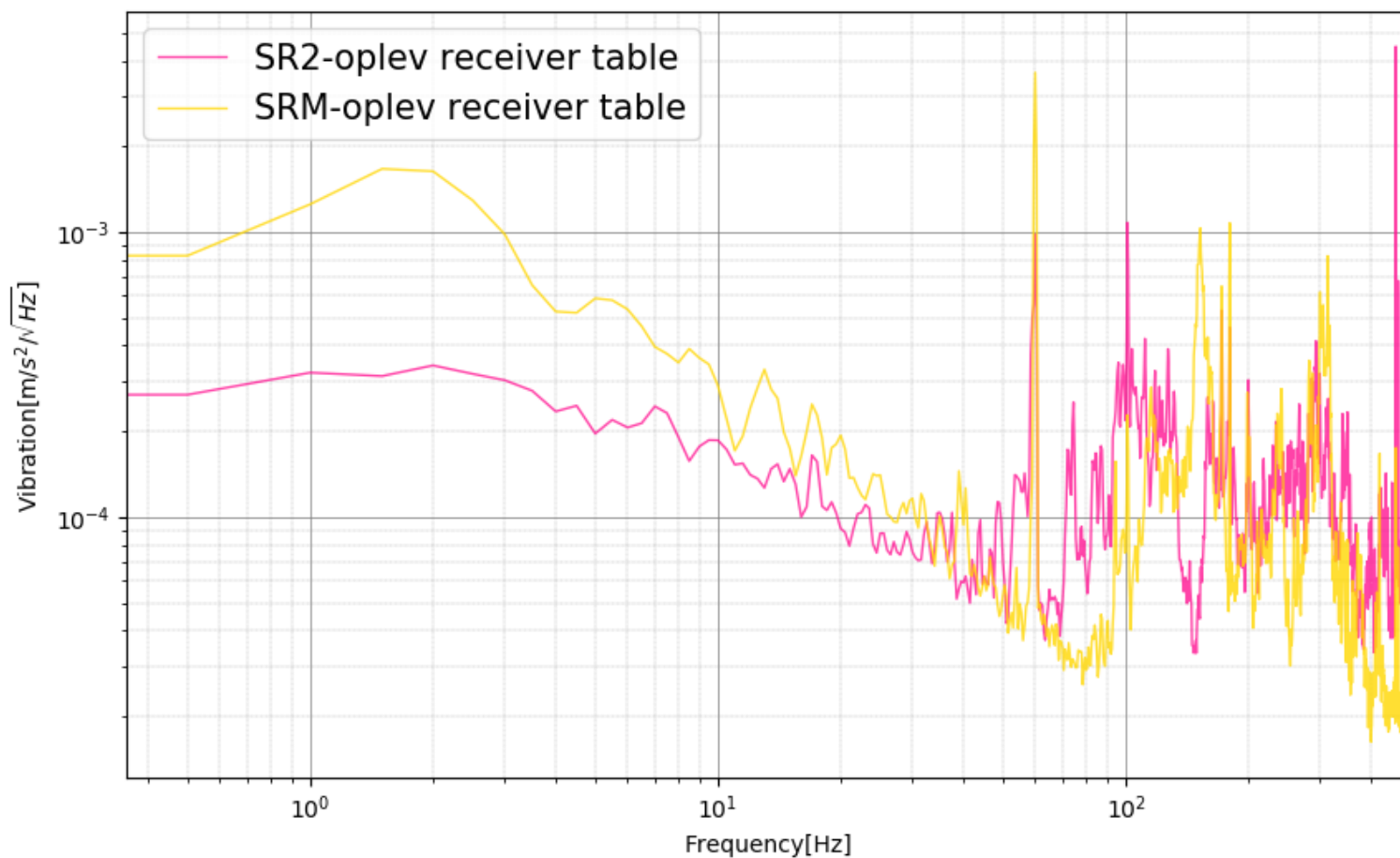
17, 74.5, 87, 96, **101**, 111.5, **118**, 127, **172**, 293, **460**, **466.5**[Hz]

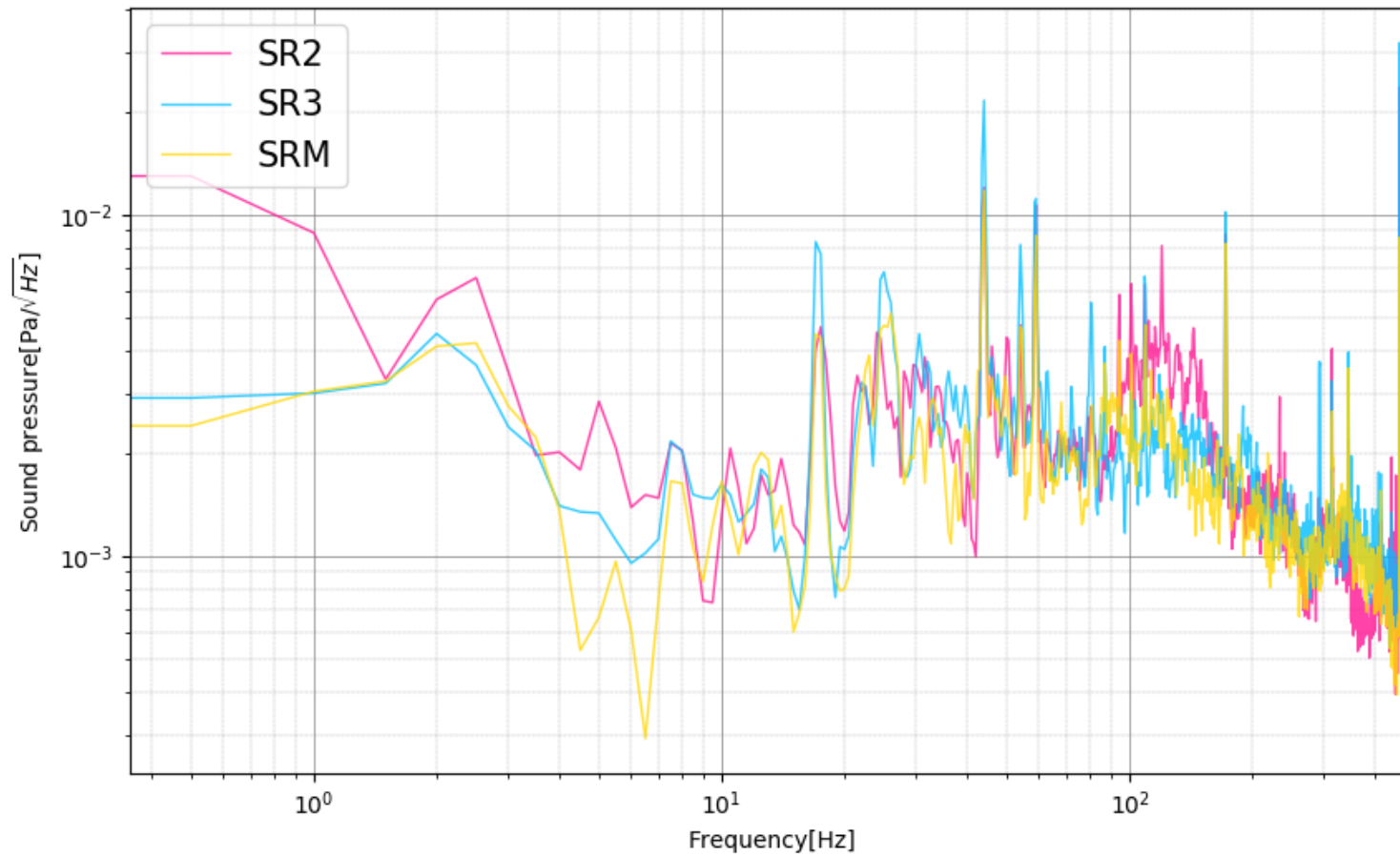44, 94.5, **101**, 115, **172**, 198.5, 282.5, 313, 365.5, 408, **460**, **466**[Hz]
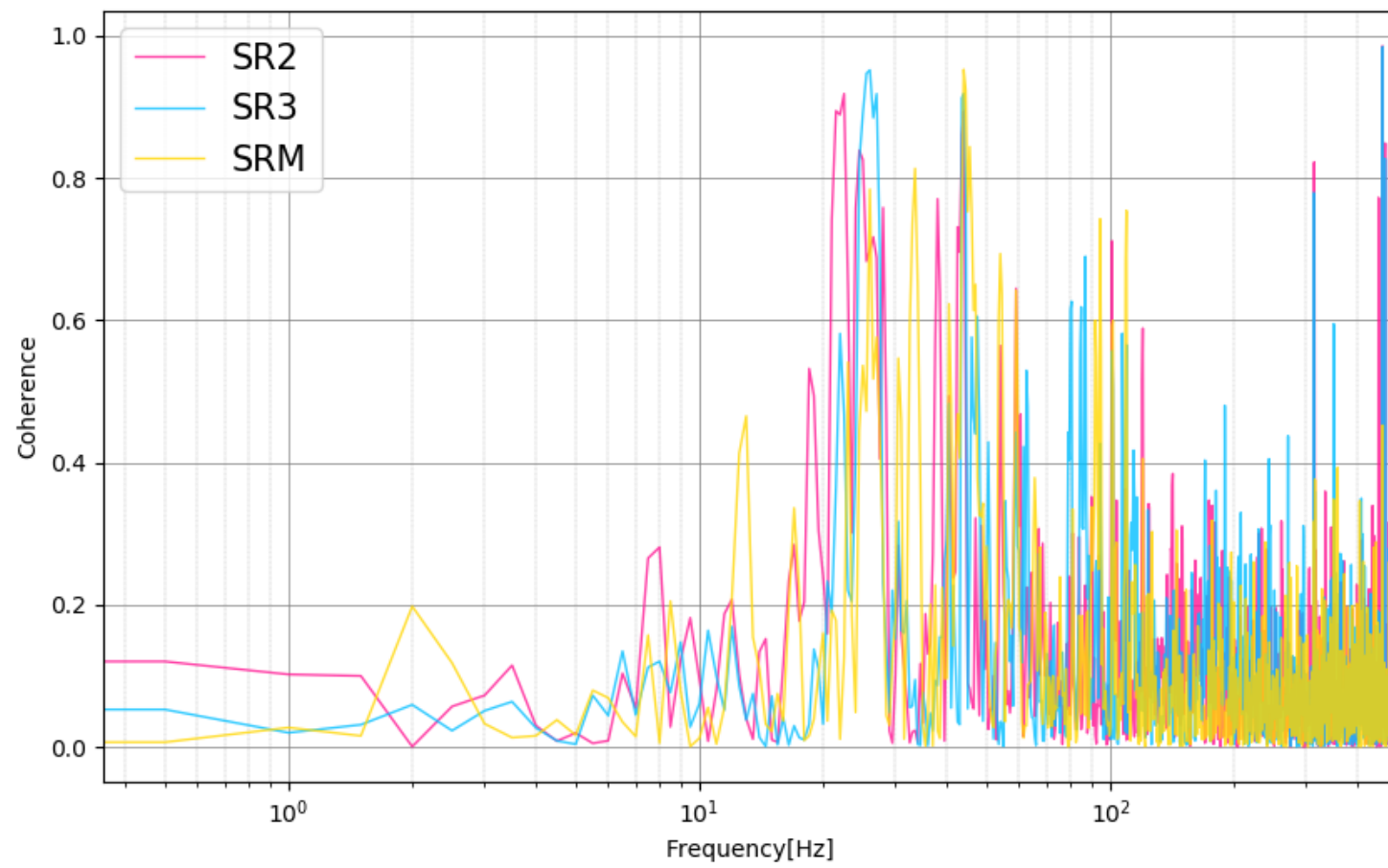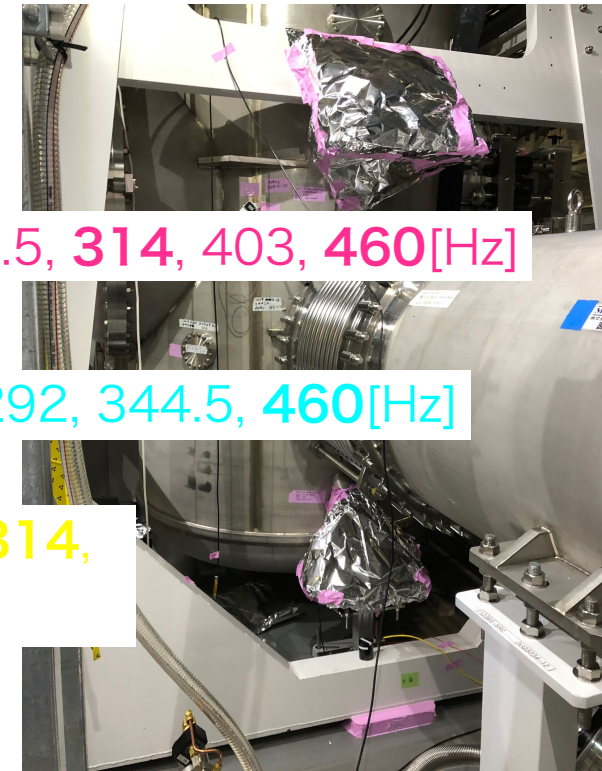
comment
70Hz~150Hz is larger SR2 than SRM.

14

sound

17.5, 24, **44**, **172.5**, 233.5, **314**, 403, **460**[Hz]

17, **44**, 80.5, 109, **172**, 292, 344.5, **460**[Hz]

17, 26, 94.5, 101, **172**, **314**, 344.5, **460**, 466.5[Hz]

comment
70Hz~200Hz is larger SR2 than SRM.

BS

SR2

SR3

SRM

15
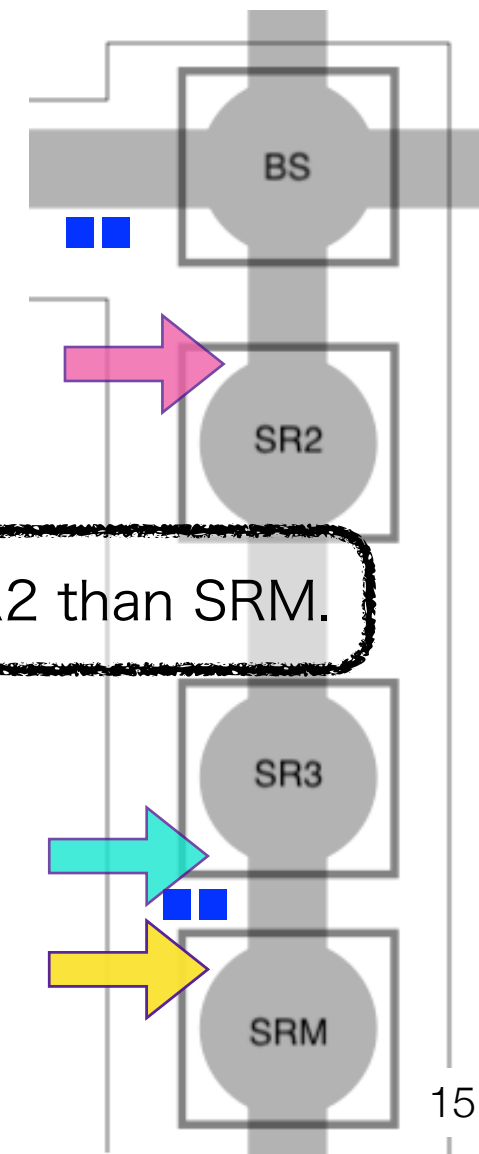
comment

- The noise floor is almost the same each SR chamber.(order and shape)
- The noise source of 172Hz is near by SRM.
- Vibration and sound noise is larger SR2 than SRM around 70Hz~200Hz.