Vibration test

First PD test results

Setup

Thanks to our colleagues from SERMS laboratory (Terni, Italy) we were able to use a Sentek L0315 VIBRATION SYSTEM

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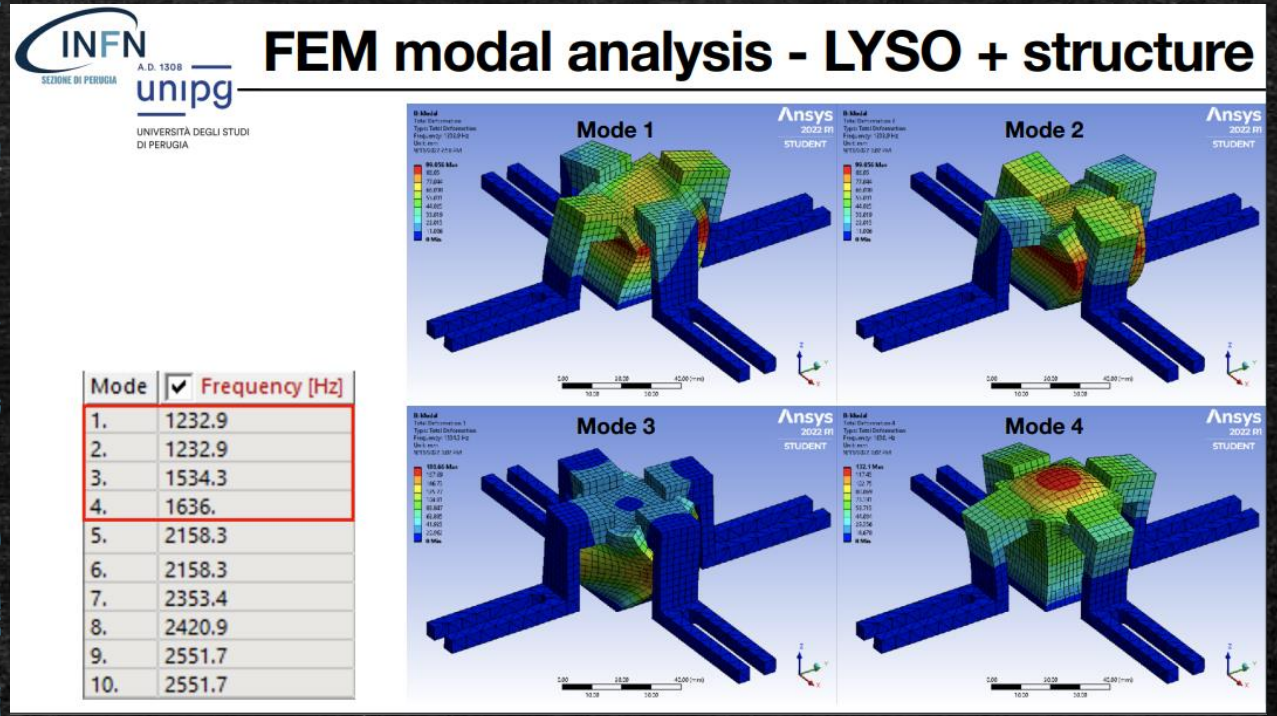
Thanks to our colleagues from SERMS laboratory (Terni, Italy) we were able to use a Sentek L0315 VIBRATION SYSTEM

and develop a reasonable and useful test setup and sequence



Mode	Frequency [Hz]
1.	1232.9
2.	1232.9
3.	1534.3
4.	1636.
5.	2158.3
6.	2158.3
7.	2353.4
8.	2420.9
9.	2551.7
10.	2551.7

Setup

- LYSO cube w/ photodiodes vibration test sequence

SINE SWEEP → **SINE** → **SINE SWEEP** → **RANDOM** → **SINE SWEEP** → **SHOCK** → **SINE SWEEP**

Frequency [Hz]	Level [g]
5-2000	0.5 g

Sweep rate: 2 oct/min

Frequency [Hz]	Level
4-10	22 mm pk-pk
10-17	5.4 g
17-75	19.6 g
75-100	8.4 g

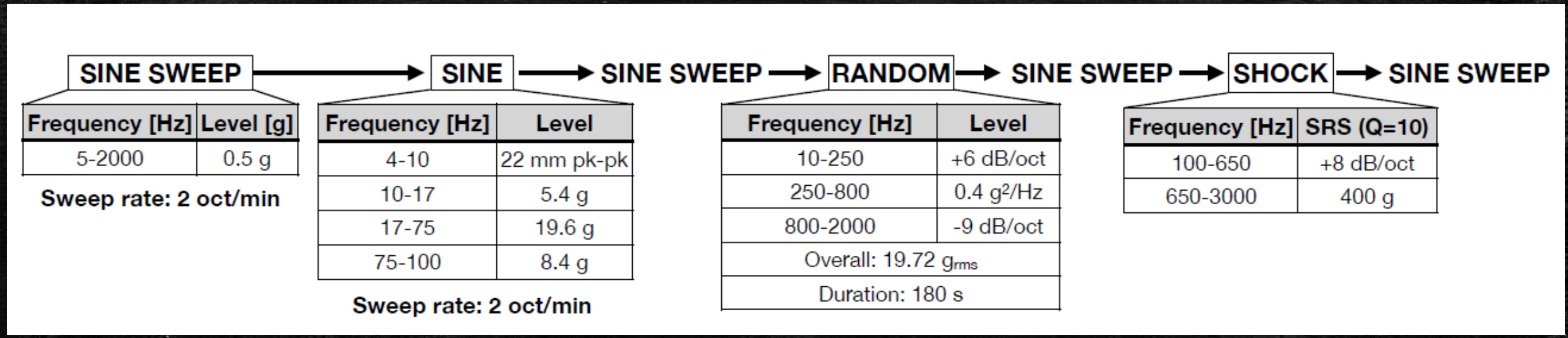
Sweep rate: 2 oct/min

Frequency [Hz]	Level
10-250	+6 dB/oct
250-800	0.4 g^2/Hz
800-2000	-9 dB/oct
Overall: 19.72 g_{rms}	
Duration: 180 s	

Frequency [Hz]	SRS (Q=10)
100-650	+8 dB/oct
650-3000	400 g

Setup

- LYSO cube w/ photodiodes vibration test sequence
- Do we really need this this level of charge for single cube?



SINE SWEEP

Frequency [Hz]	Level [g]
5-2000	0.5 g

Sweep rate: 2 oct/min

→ **SINE**

Frequency [Hz]	Level
4-10	22 mm pk-pk
10-17	5.4 g
17-75	19.6 g
75-100	8.4 g

Sweep rate: 2 oct/min

→ **SINE SWEEP** → **RANDOM**

Frequency [Hz]	Level
10-250	+6 dB/oct
250-800	0.4 g^2/Hz
800-2000	-9 dB/oct
Overall: 19.72 g_{rms}	
Duration: 180 s	

→ **SINE SWEEP** → **SHOCK**

Frequency [Hz]	SRS (Q=10)
100-650	+8 dB/oct
650-3000	400 g

→ **SINE SWEEP**

Setup

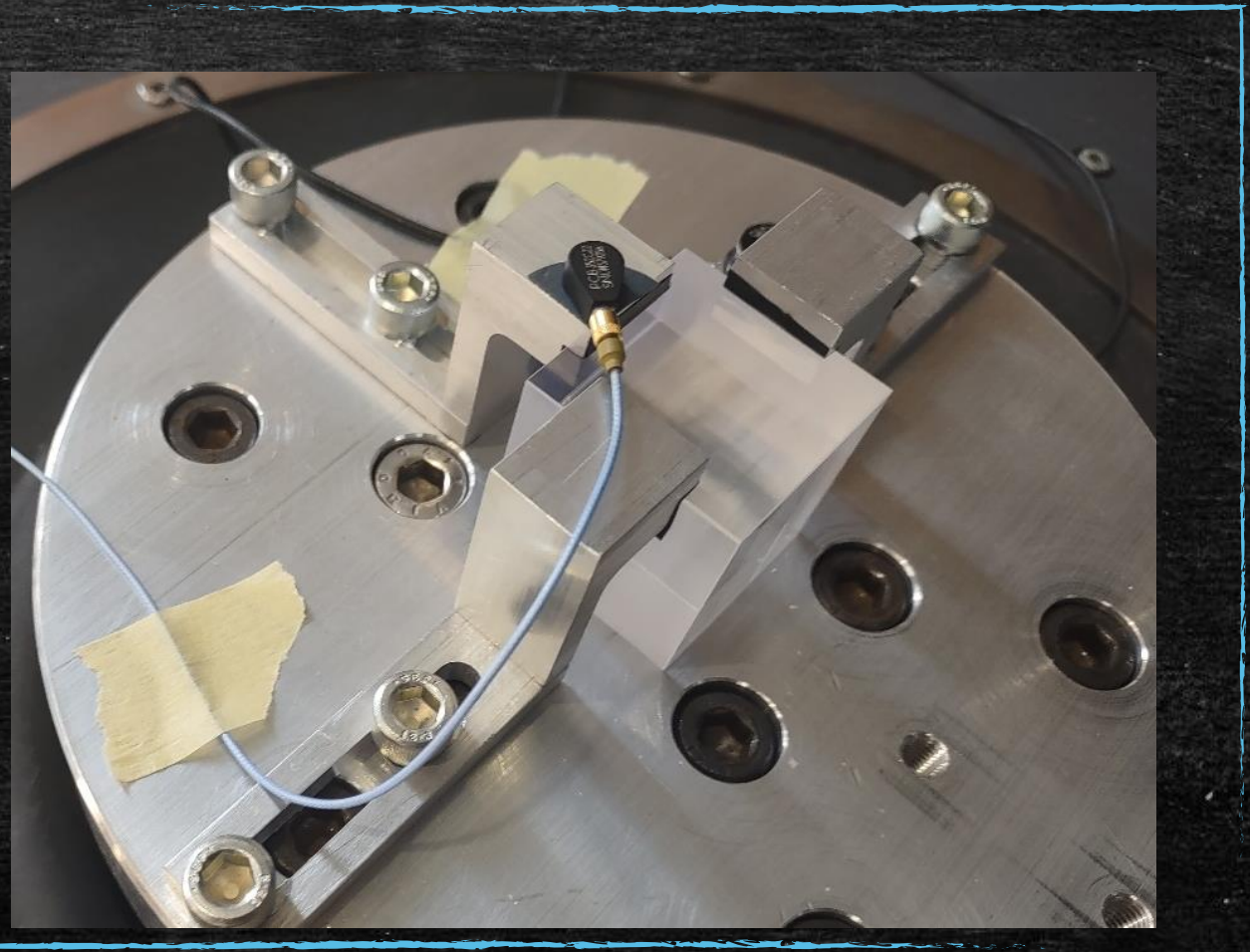
- LYSO witn no PDS
- LYSO with 5 PDs glued with DC 3145
- LYSO with 5 PDs glued with DC 734
- The old large PDs were used for this test
- The glue thikness is about 50 um
- Gluing process as uniform as possible
- A visual controll was performed for all PDs

No PDs

LYSO with no PD was tested first

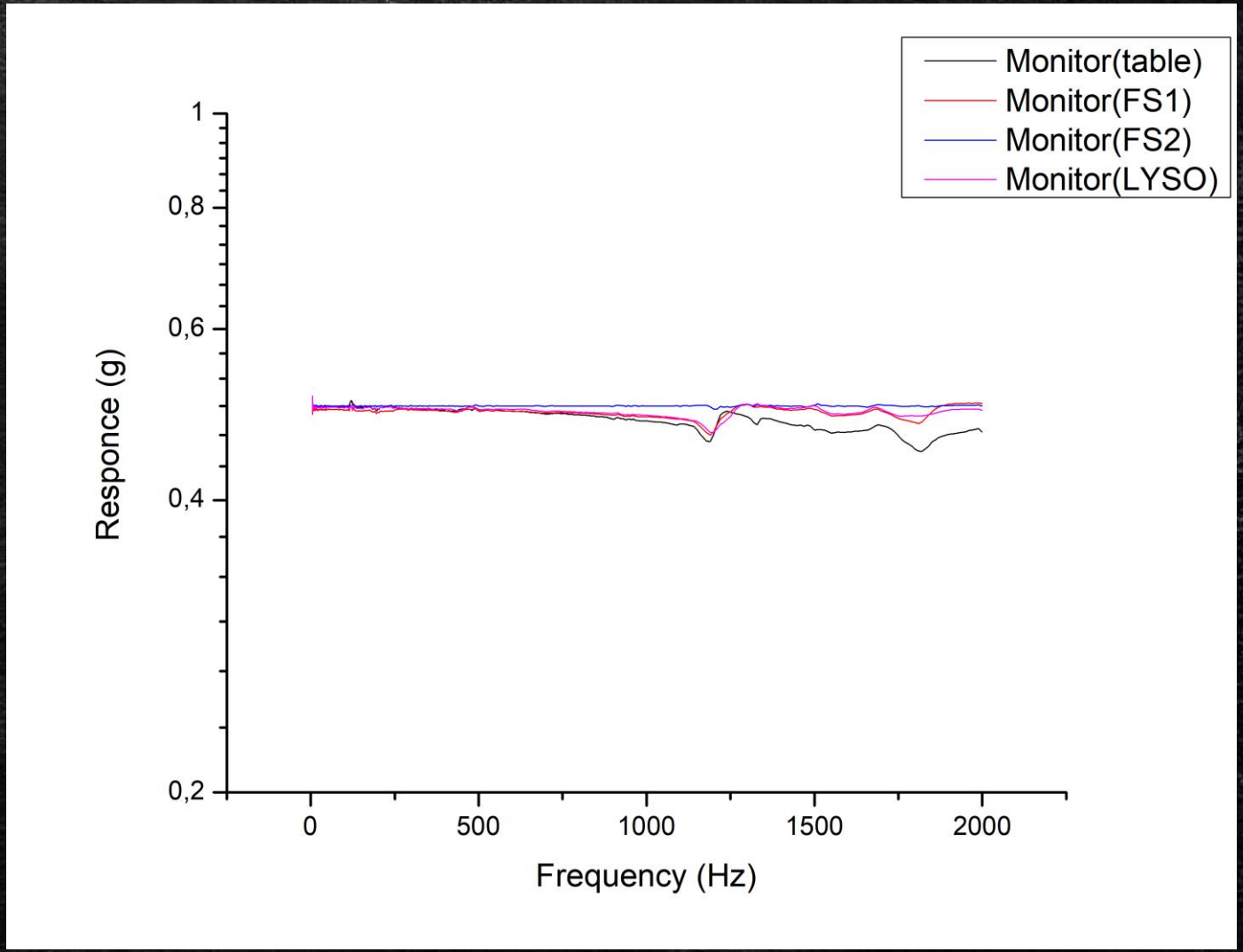
Acceleration monitors:

- 1 for vibration table
- 2 for fixation parts
- 1 for top of the crystal



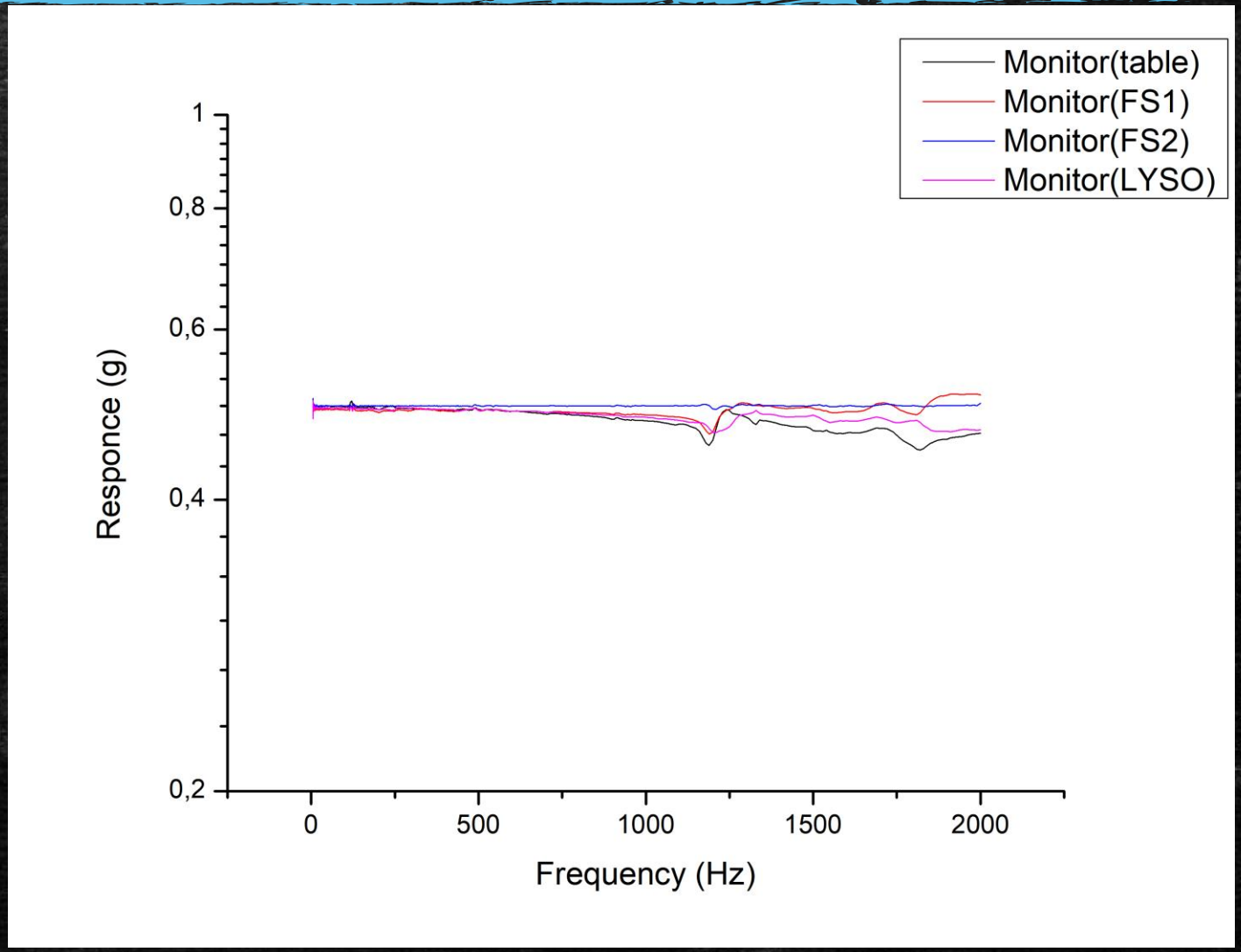
No PDs

- Reference measurement. Sine sweep only was performed to study the crystal response



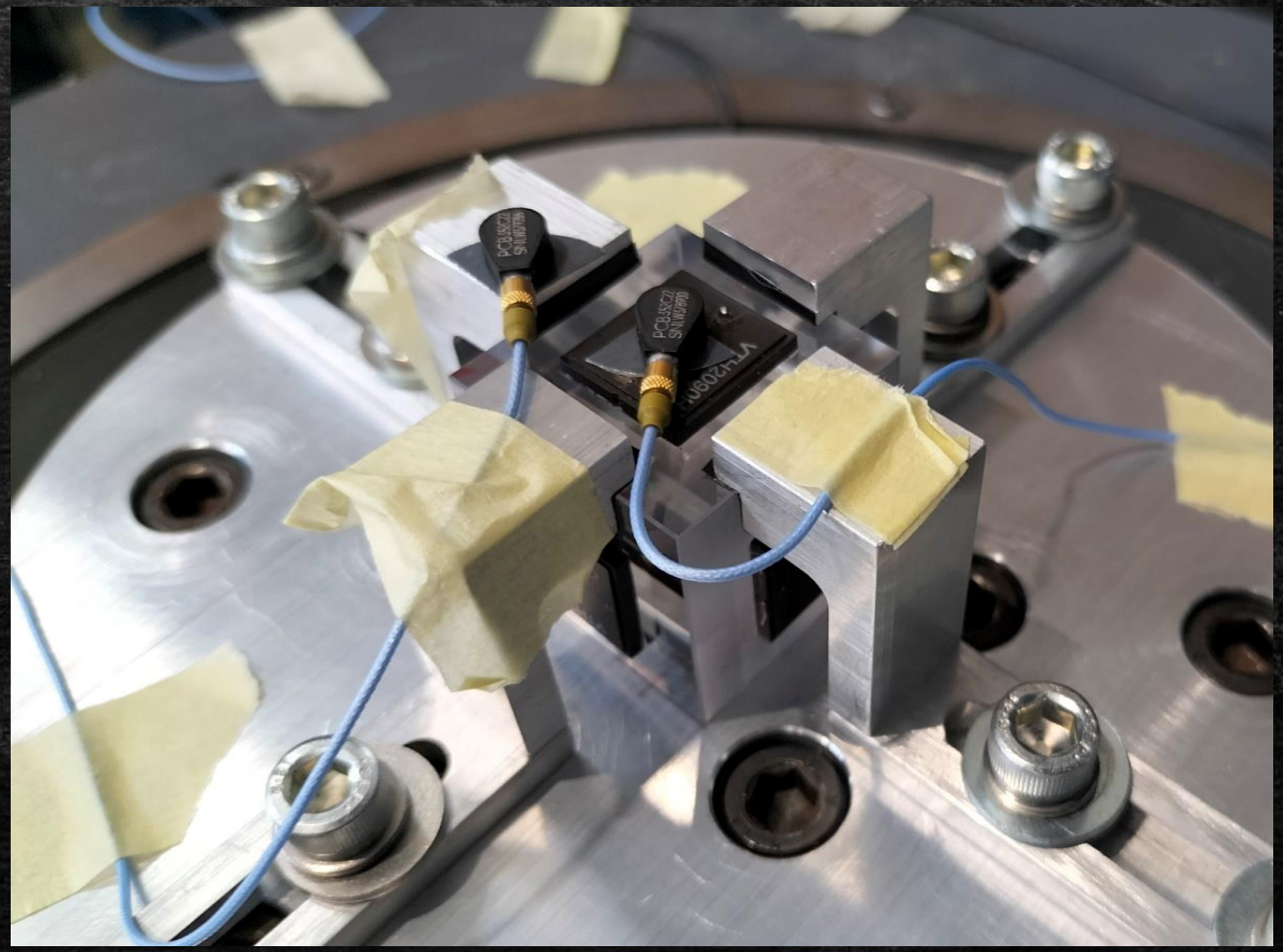
DC3145

- First test with a monitor placed to the top of the crystal and no monitor for PD



DC3145

- First test with a monitor placed to the top of the crystal and no monitor for PD
- Second test with monitor placed on the top PD



DC3145

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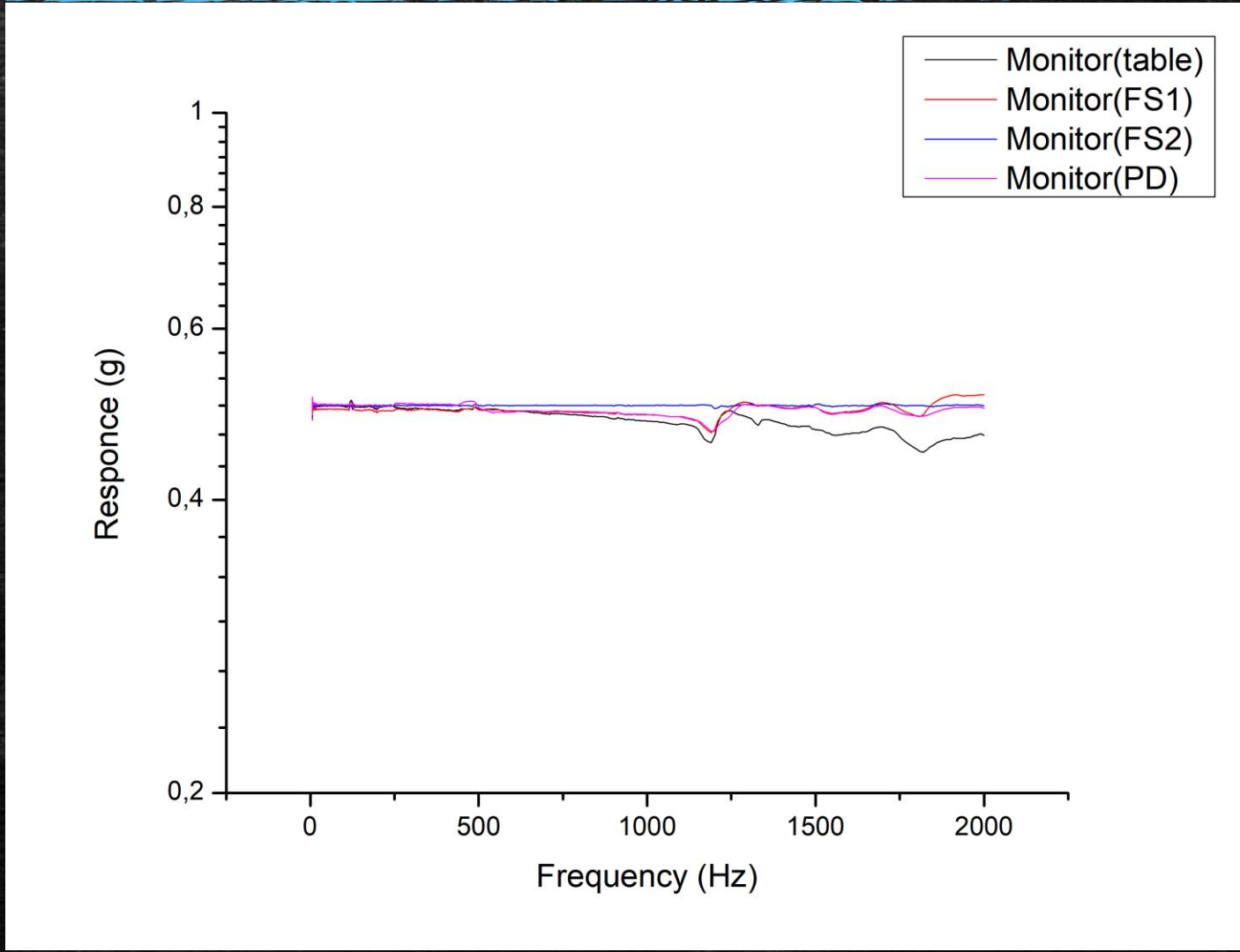
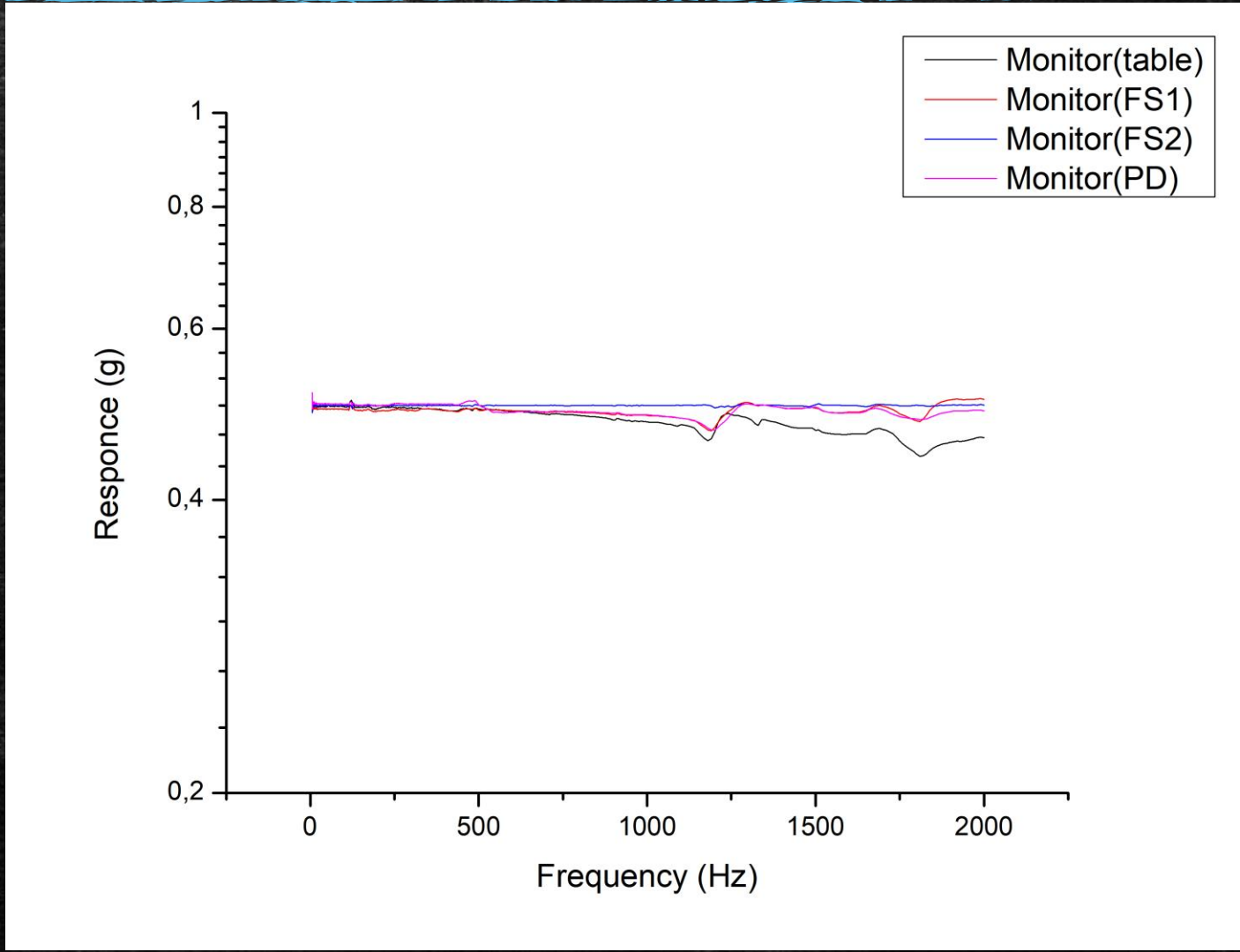
- Second test with monitor placed on the top PD



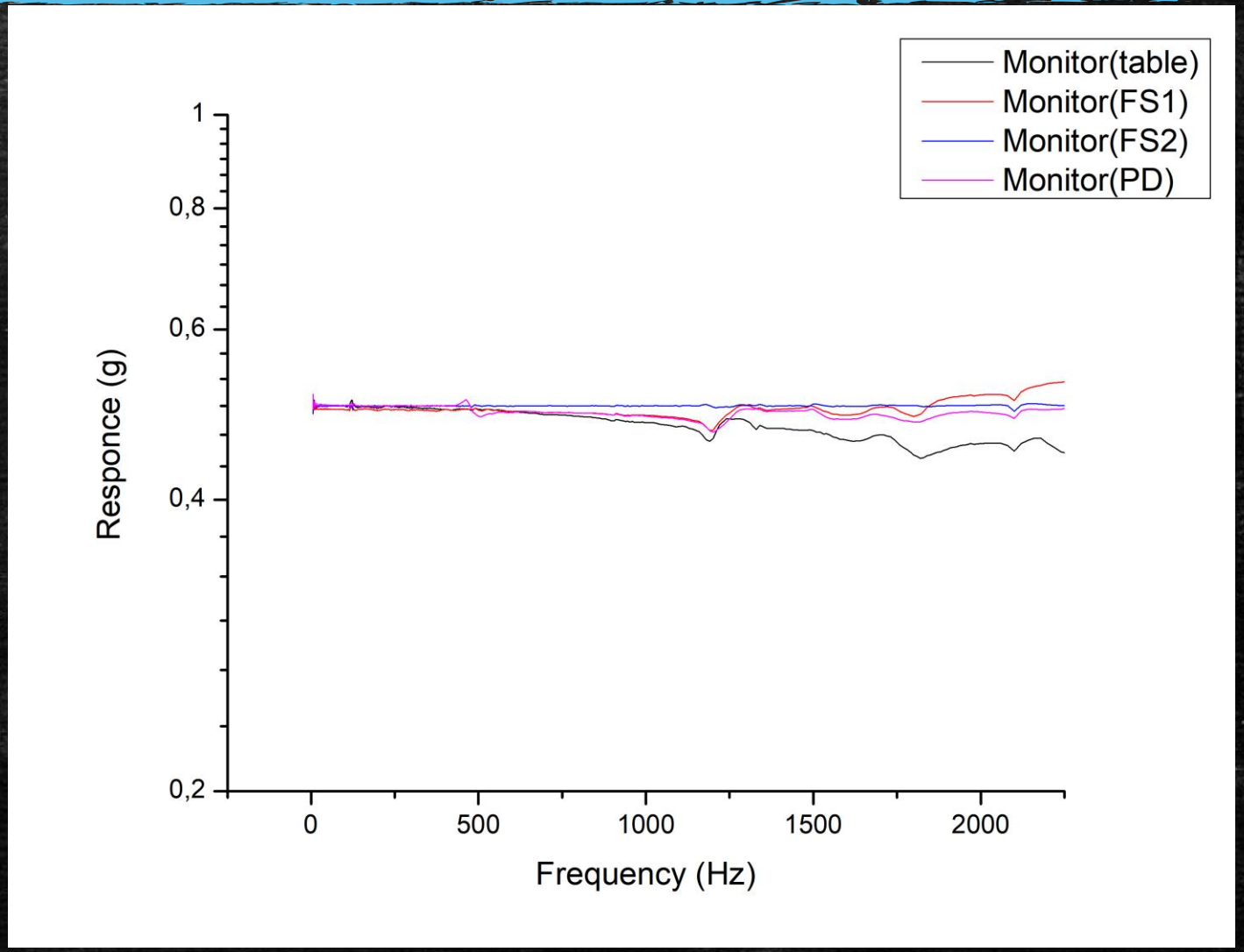
DC3145

- First test with a monitor placed to the top of the crystal and no monitor for PD
- Second test with monitor placed on the top PD
- … test sequence
- Final sine sweep test



DC734

- The same sequence was applied for LYSO with PDs glued using DC 734
- Results are the same
- Once we have performed the sweep test up to 4 kHz



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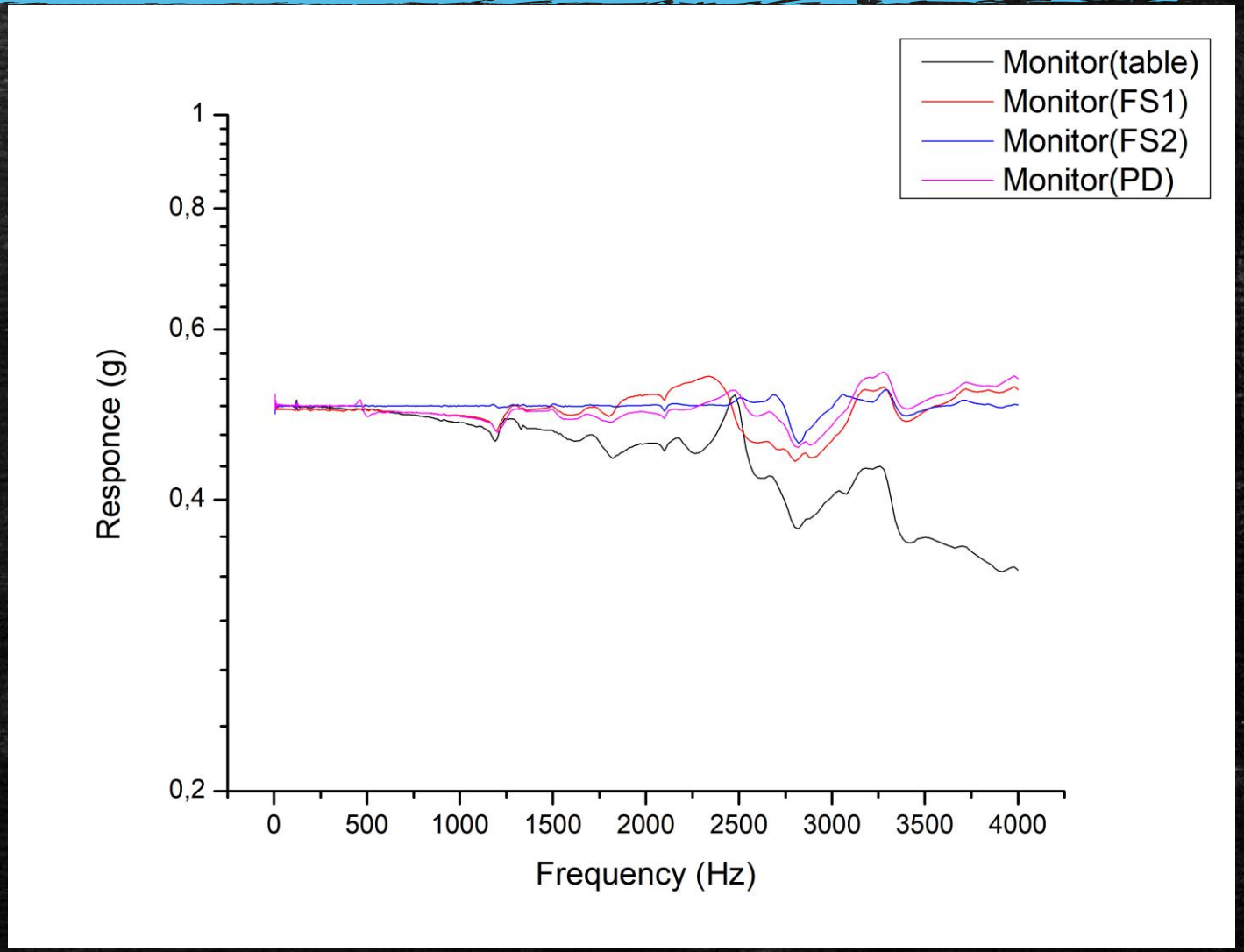
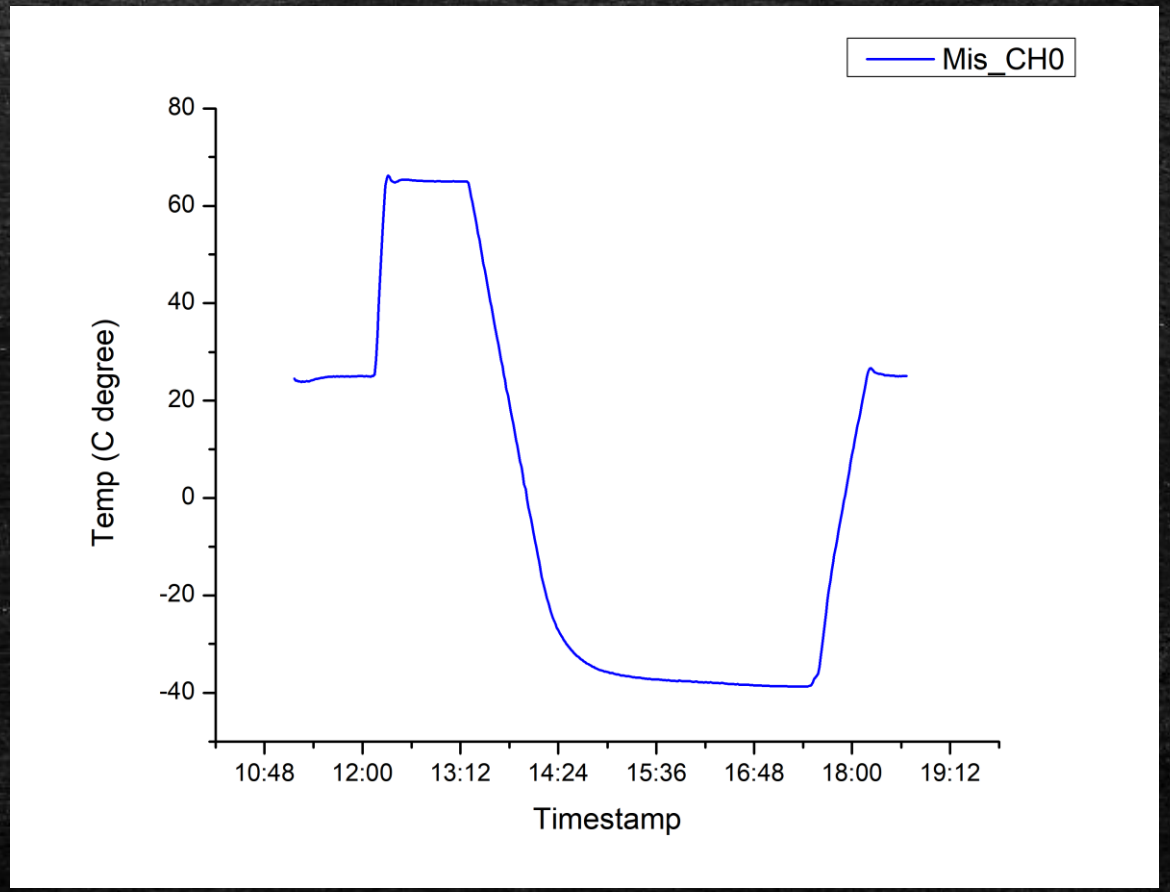


After vibration test

- visual controll for all PDs
- A thermal cycle: 25C 65C -40c 25C
- Vacuum test 1mBar for 120 min



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- visual controll for all PDs
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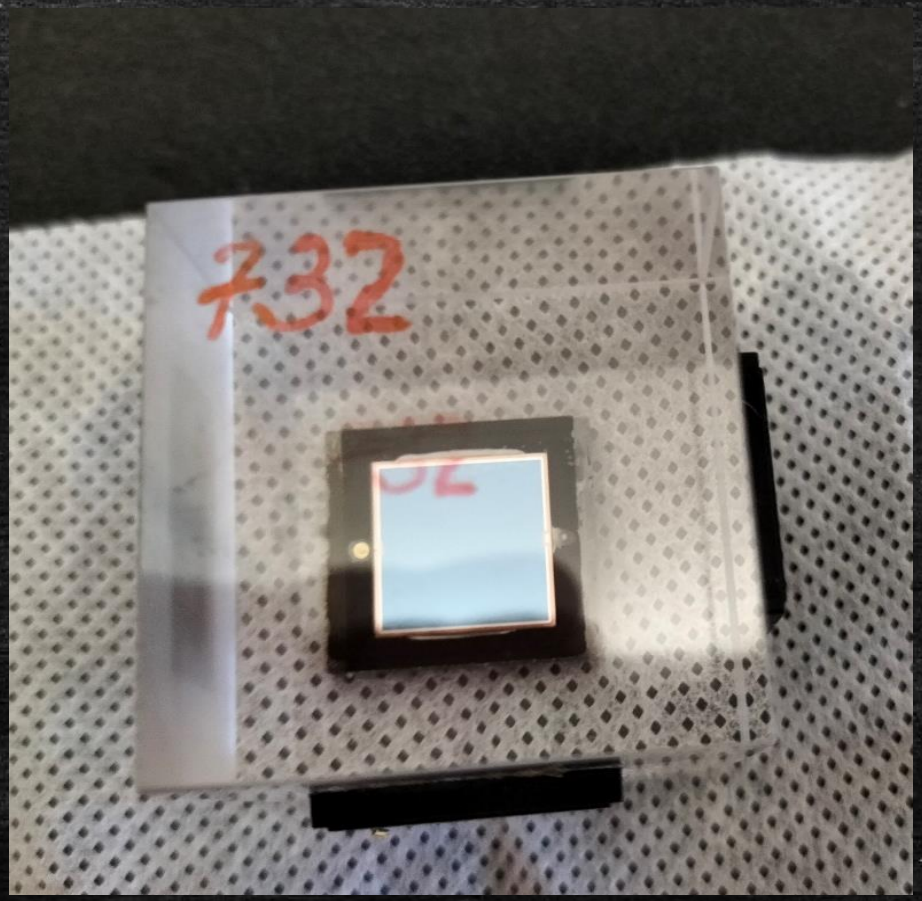
- Final visual control



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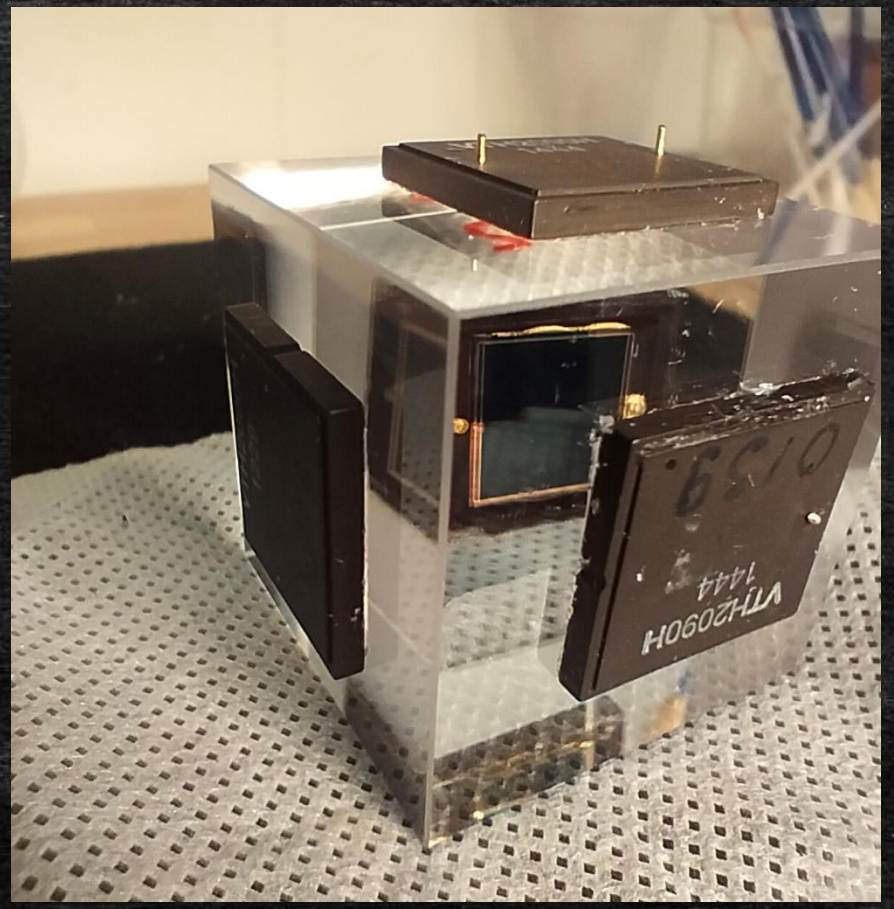

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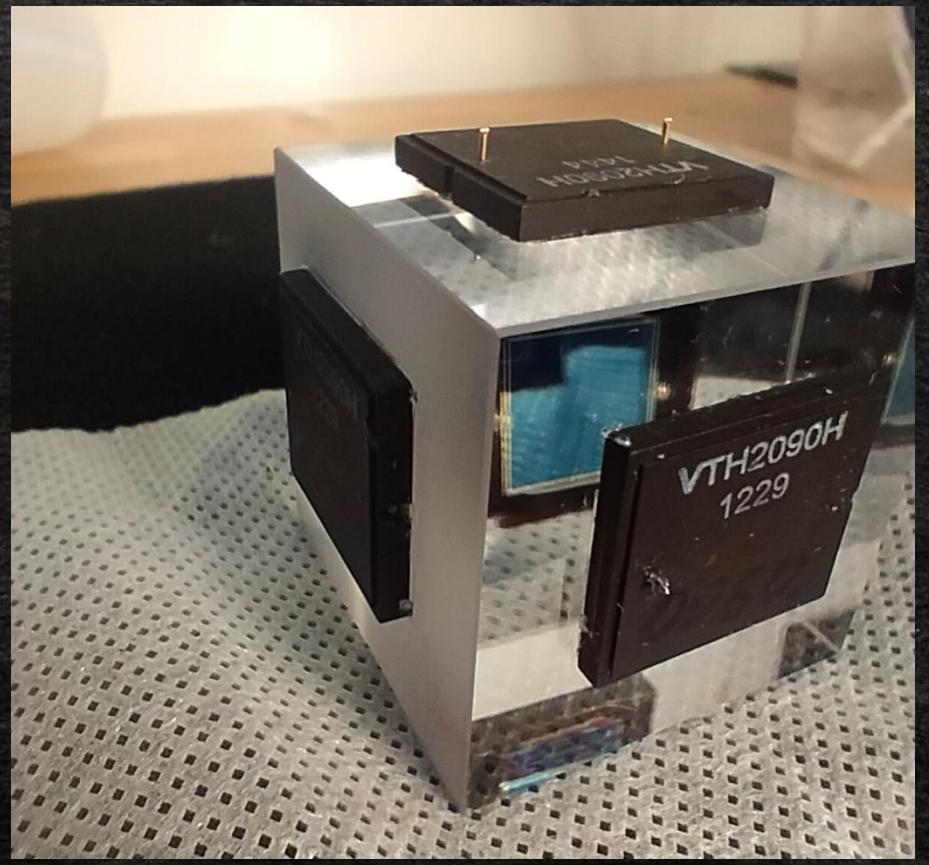

Conclusions

- Preliminary test
- It is not a final version of PD
- We are not sure about silicon glue (probably we will not use tested ones)
- Very promissig results
- SERMS laboratory is very useful facility
- We need more tests soon (final version of PD and space-qualified silicon are arriving)