Radio and Plasma Waves

SCM development status

Summary

SCM FM development status

Hard points

- Calibration & “eye” figure

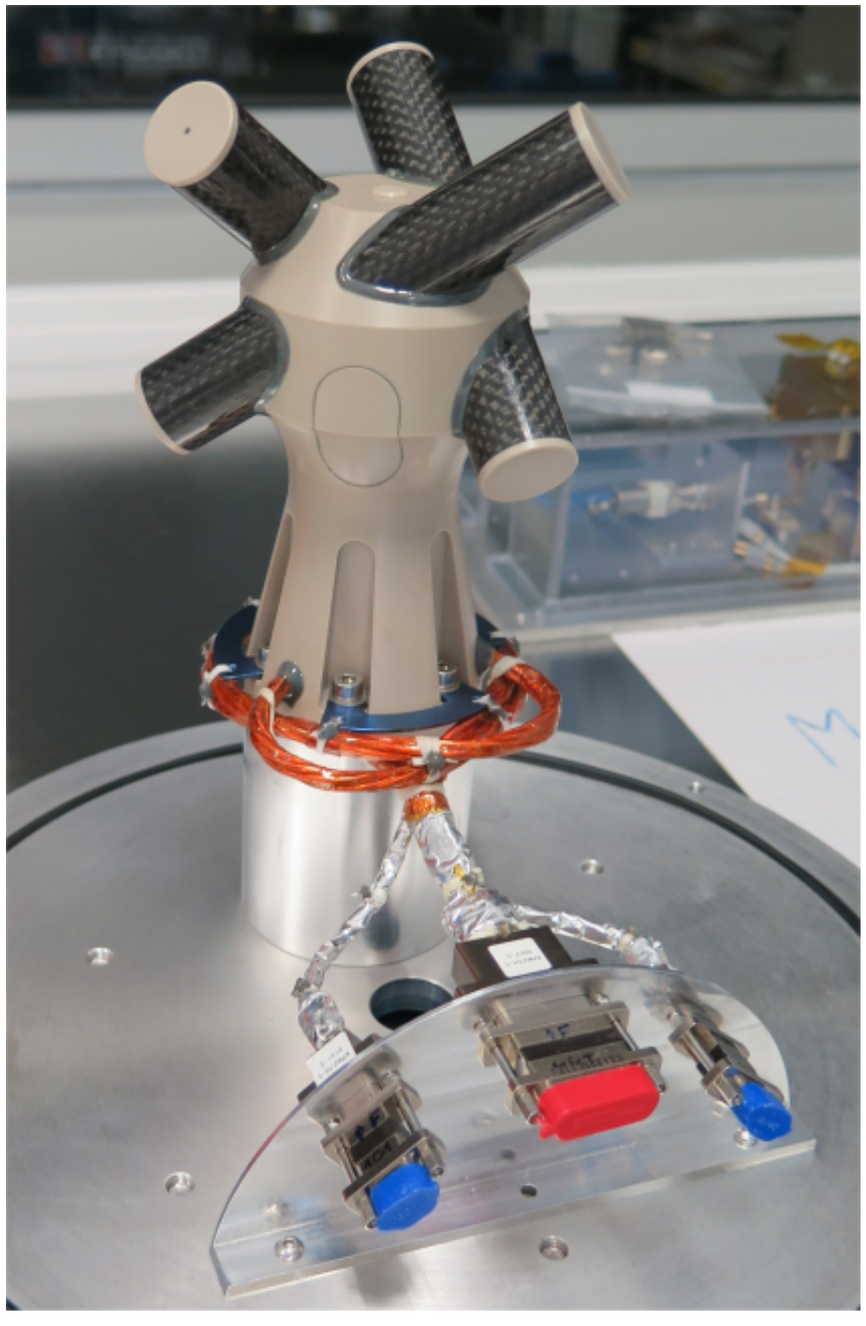
SCM FS development status

Schedule

SCM FM development status

Sensor status

- Flight model finalized and send to Airbus with MEB
- Last operation – replacement of the harness lugs with OAS surface treatment – done on June 13th at CNES
- Pre-handover activities are ongoing at Airbus
- To be started : thermal model correlation and flight temperature prediction update

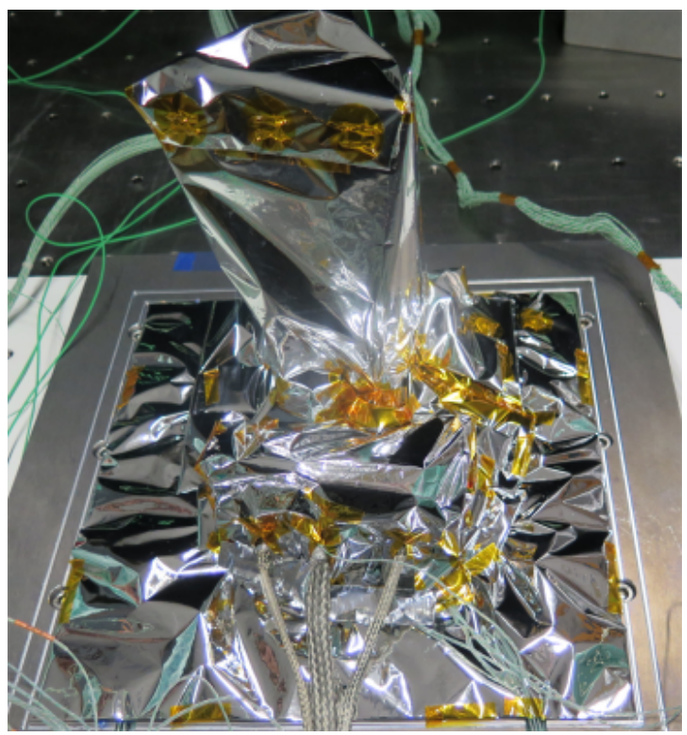


SCM flight Model on storage support

SCM spare development status

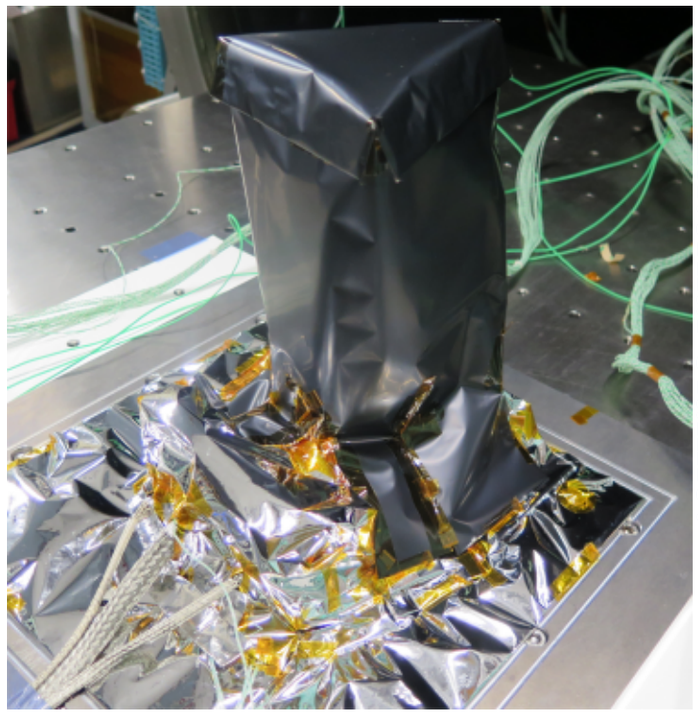
MLI status

- Due to 2 small holes (~50µm) observed after thermal vacuum test, FM blanket will not be delivered to spacecraft
- Spare MLI will be used for flight



Internal blanket

- Manufacturing by Nexeya has started
- Mock up to be send to the spacecraft in June
- Delivery expected for mid July including an additional external blanket (with black kapton)



External blanket

SCM MLI during TVAC test

SCM FS schedule

Manufacturing

- End of sensor manufacturing — August 4th
- Spare MLI delivery — Mid July

Qualification tests

- Vibrations (maintenance of the bench W32) — August 16-17th (facility booked)
- Thermal vacuum — plan to start on August 24st
  on going discussion with LESIA to schedule the test in SIMENON chamber
- Calibration during bake out background
- SCM bake out : — right after thermal vacuum test
- MLI bake out : — to be scheduled Mid-July / August

SCM Calibration overview

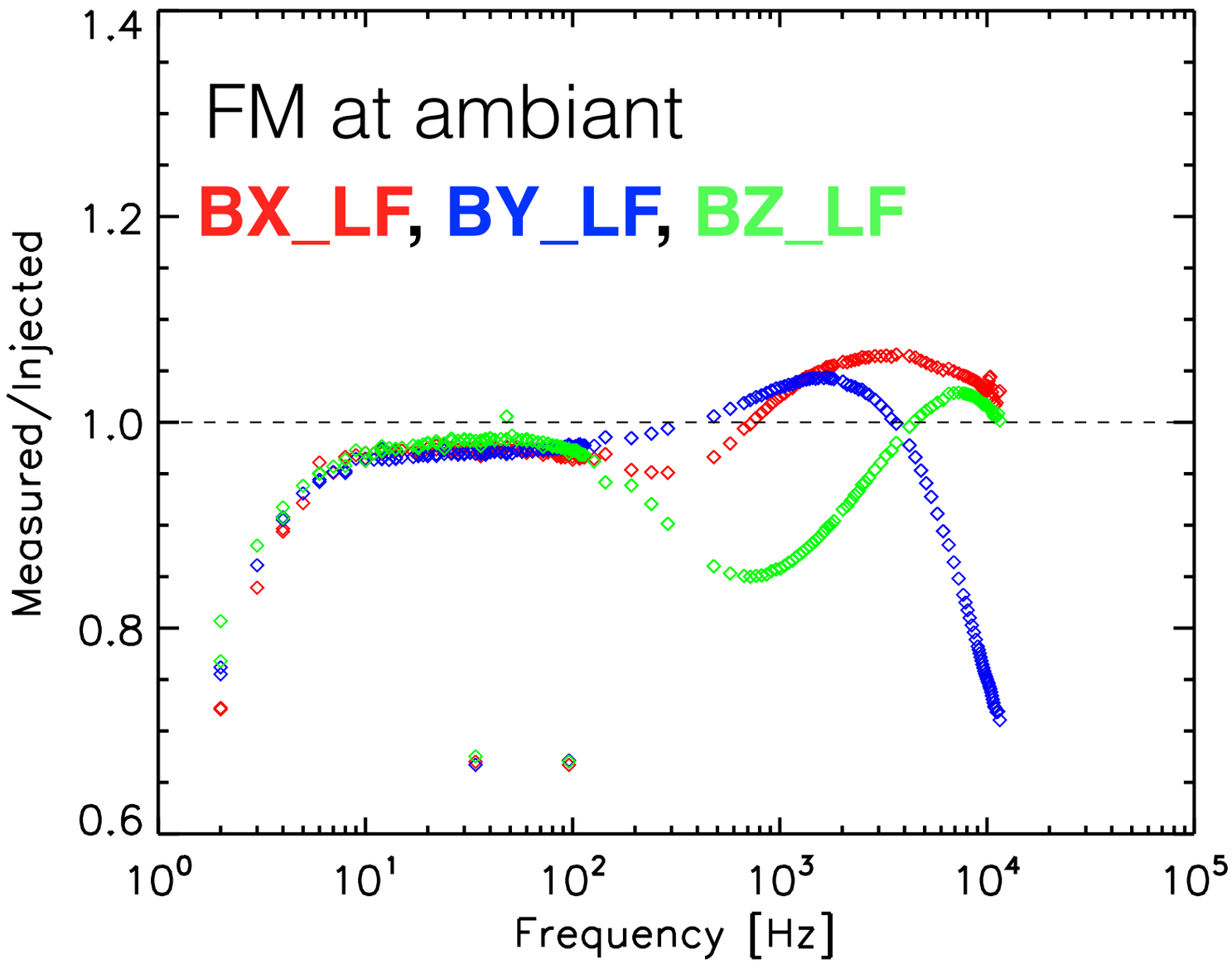
SCM Team: JY Brochot, G. Cassam Chenail, G. Jannet, V. Krasnoselskikh, M. Kretzschmar

RPW Team Meeting, Stockolm, 20 June 2017

The problem

The « Eye »

- Gain variations of 10-20% observed during thermal test at LESIA (LFR WF).



The problem

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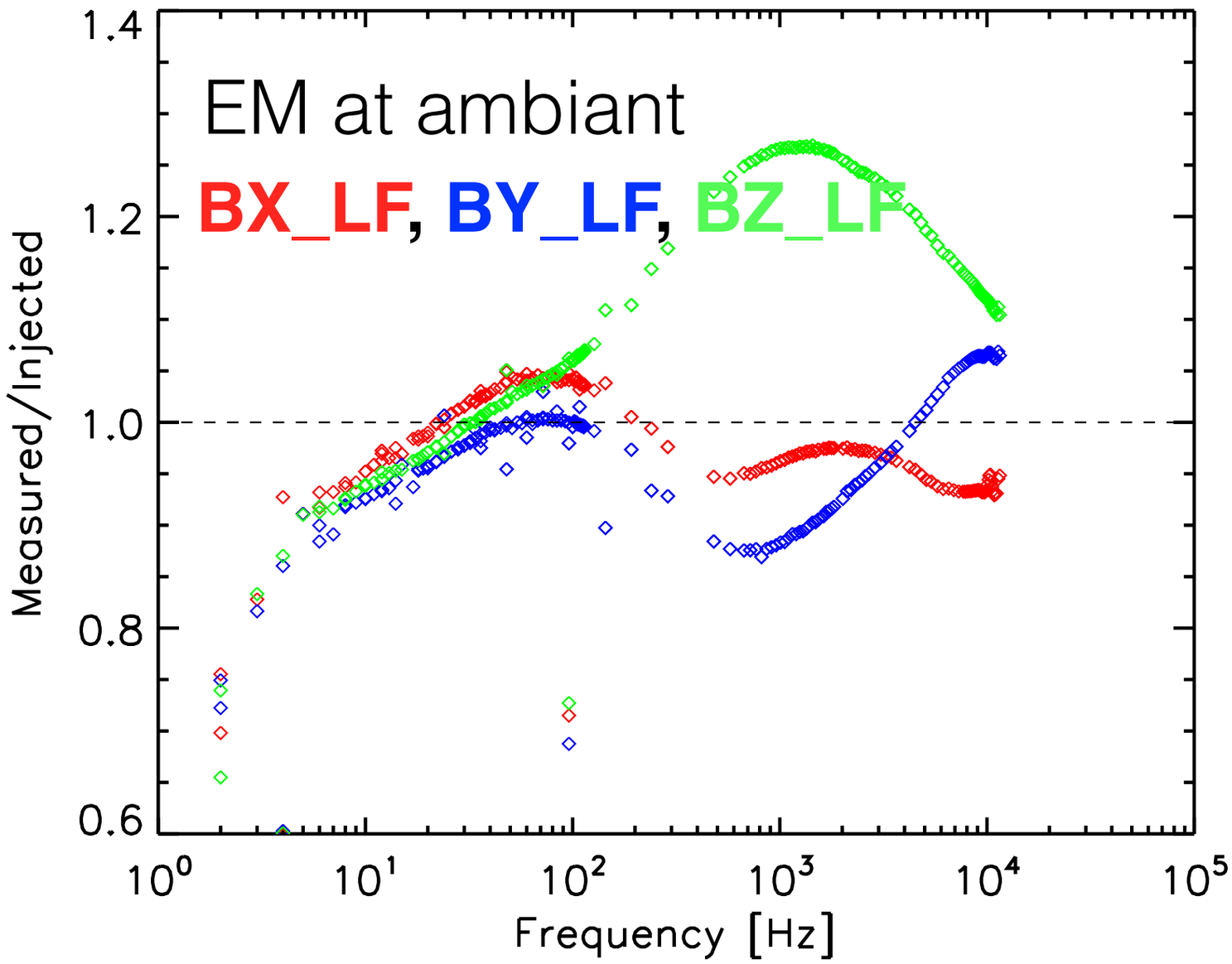
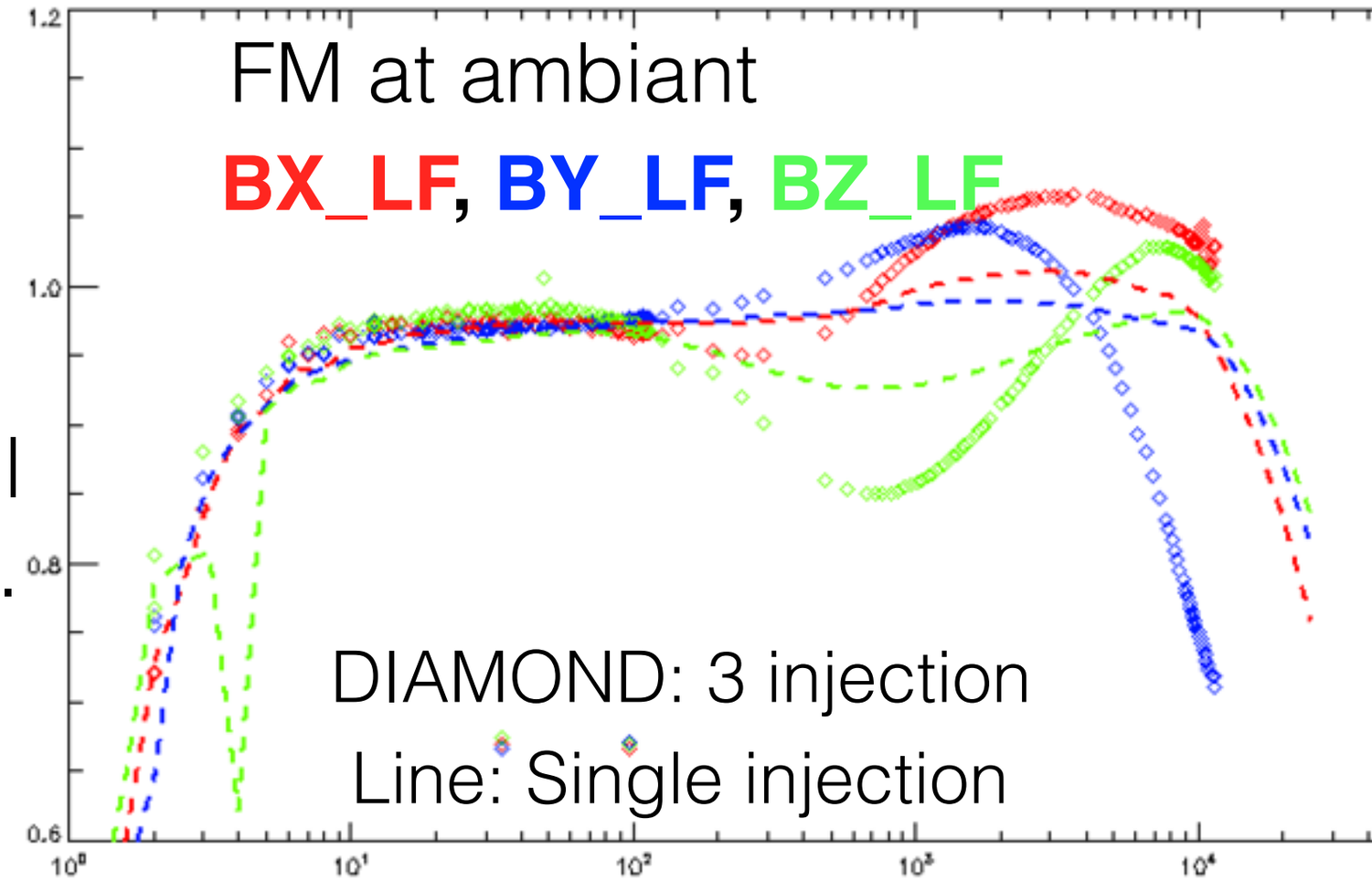
- Variations on EM as well but with different shape.



The problem

The « Eye »

- Gain variations of 10-20% observed during thermal test at LESIA (LFR WF).
- Variations on EM as well but with different shape.
- Do not depend on temperature.
- Most well seen when simultaneous injection on the 3 antenna
- **Initials suspect**: SCM EGSE (caps)



Investigations (I)

Internal test on EM

- Compare simultaneous injection with caps vs single injection (with caps or no) on SCM only.

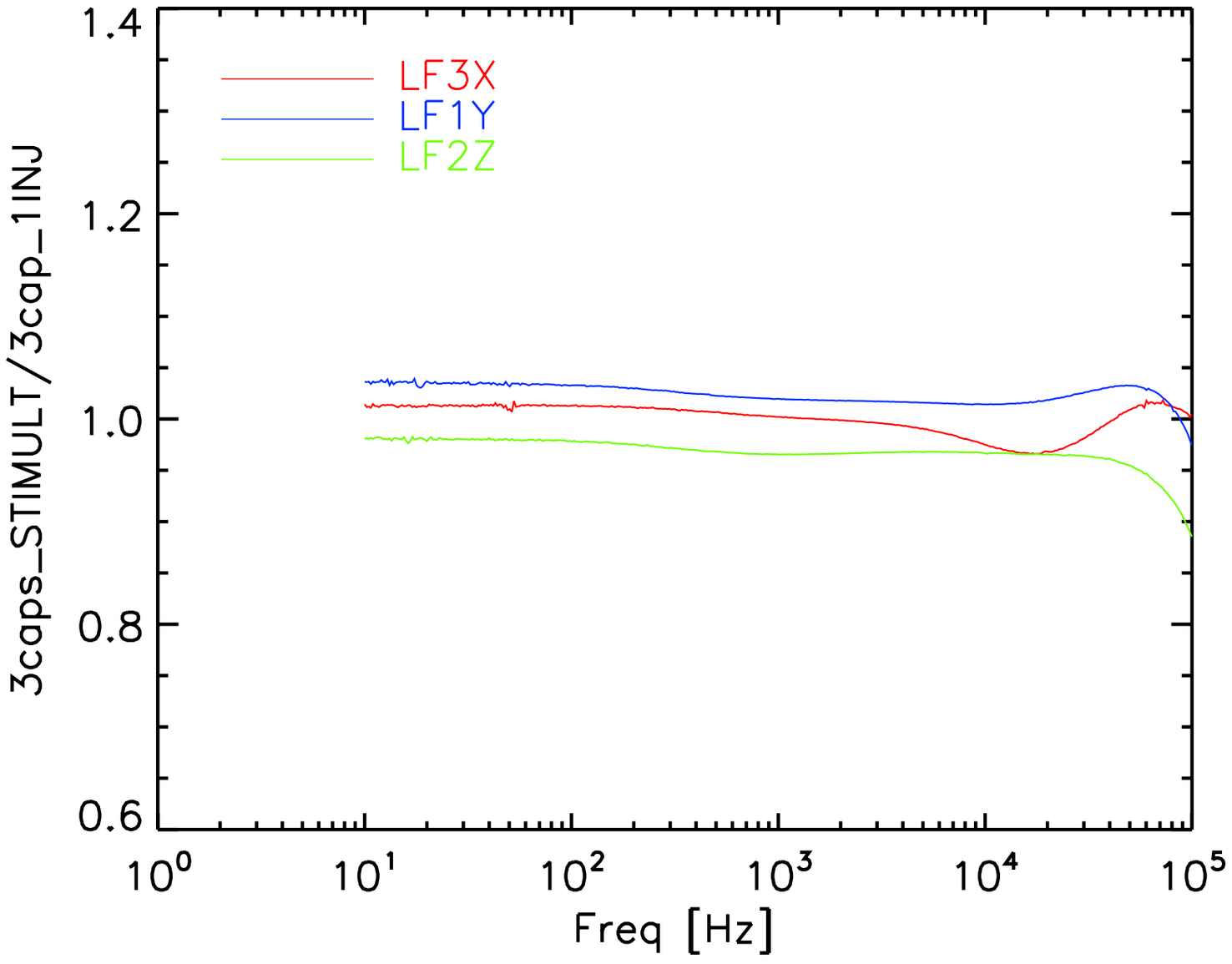
- No noticeable difference

- « Eye » cannot be reproduced with SCM alone

- Observed on FM as well.

EM+CAPS, @ LPC2E

3CH injection, 3CAPS / 1CH injection, 3CAP

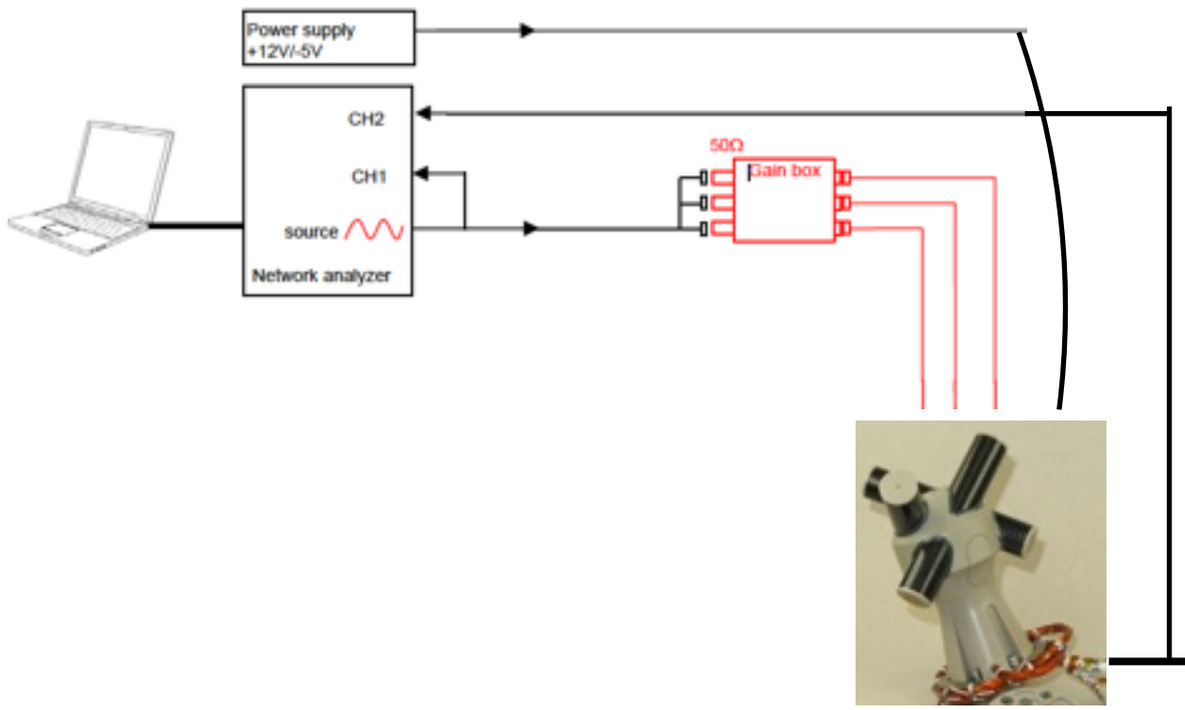


Investigations (II)

Internal test on EM

- Same comparison but with LFR EM 1.

EM+CAPS+LFR, 3CH injection / EM only, 1CH injection



(working)

Investigations (II)

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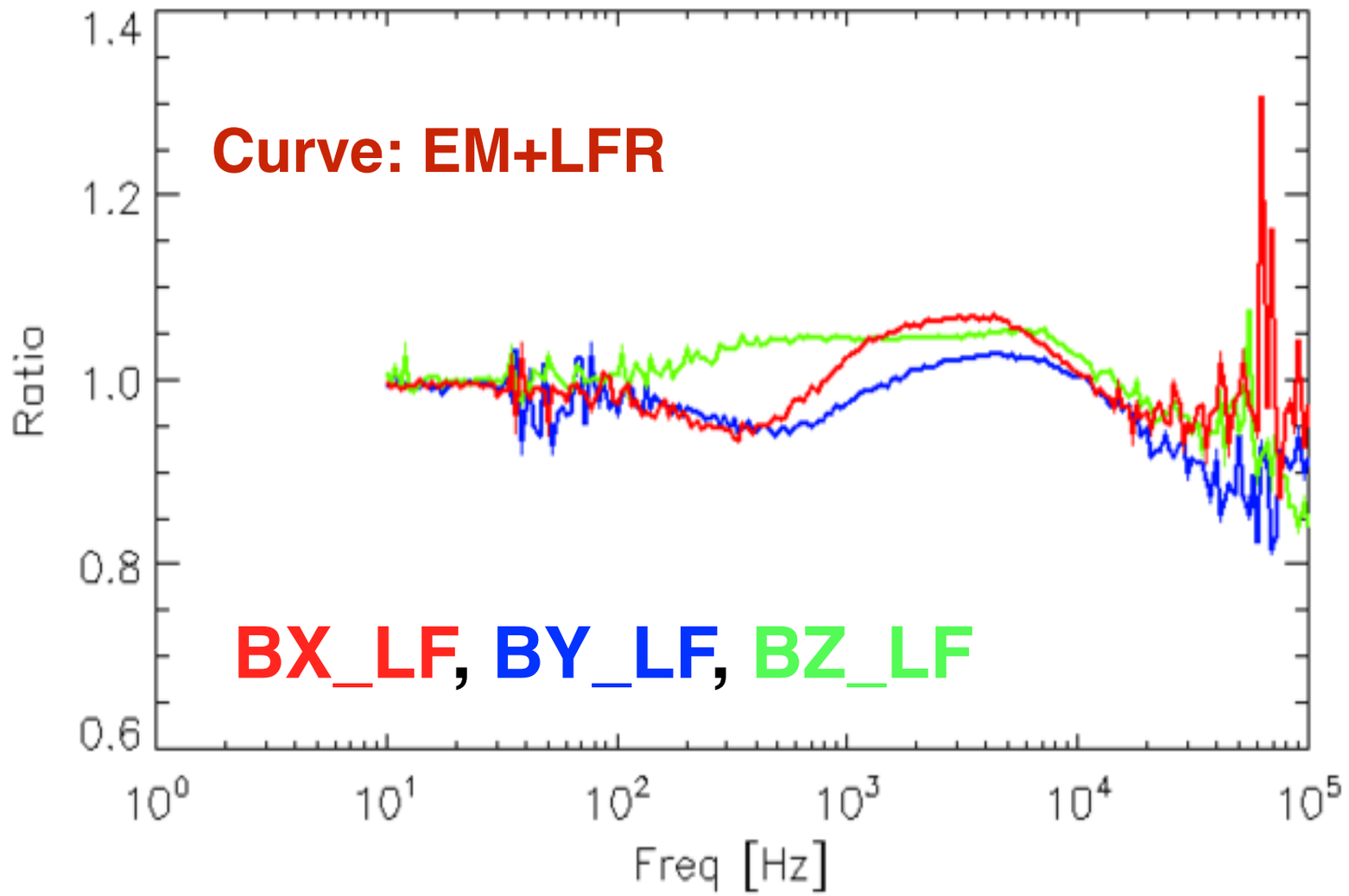
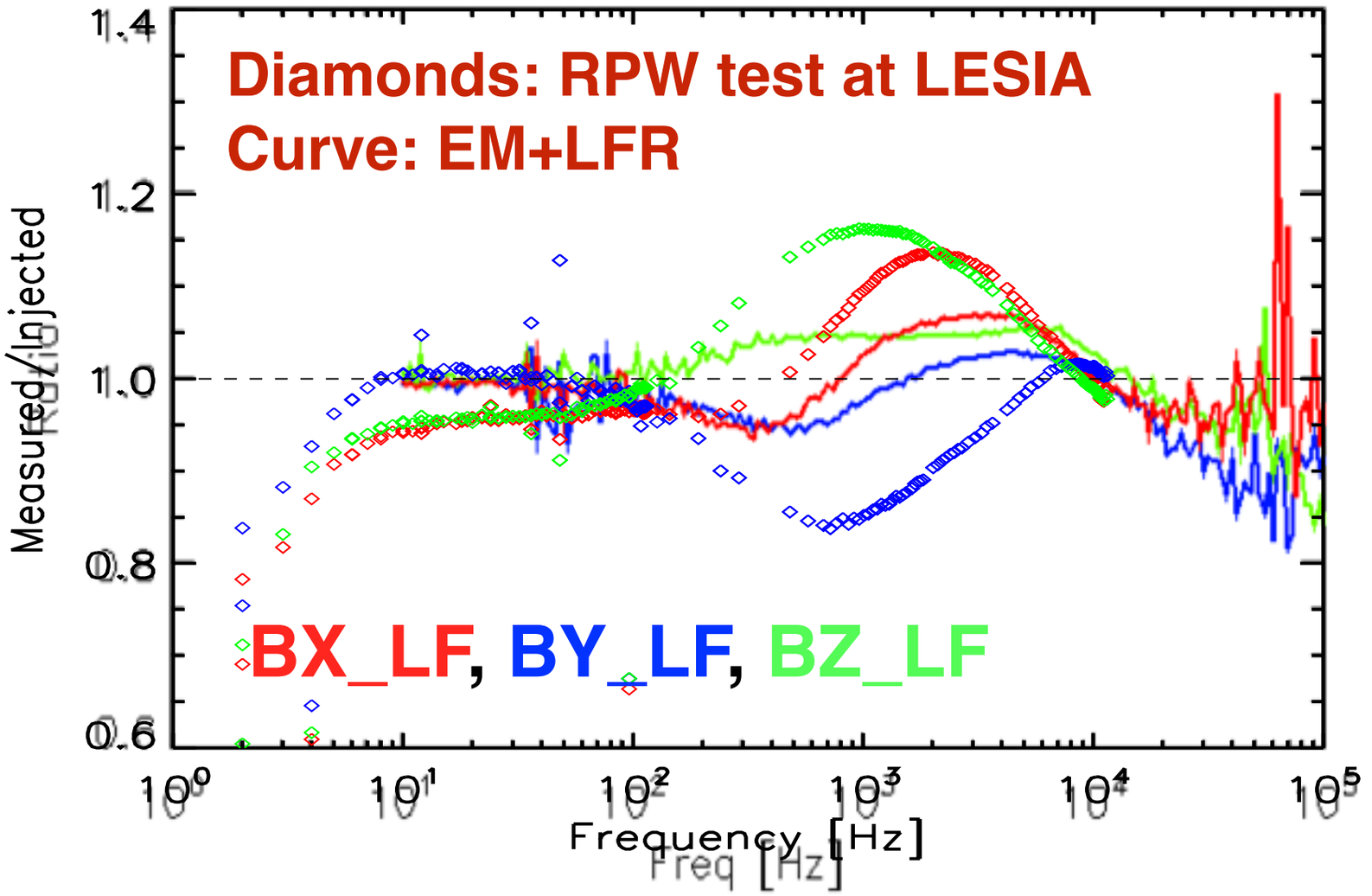


Investigations (II)

Internal test on EM

- Same comparison but with LFR EM 1.
- Eye is reproduced but with smaller amplitude.
- Variations appears at SCM output when LFR is connected.
- **Impedance Problem ?**

EM+CAPS+LFR, 3CH injection / EM only, 1CH injection

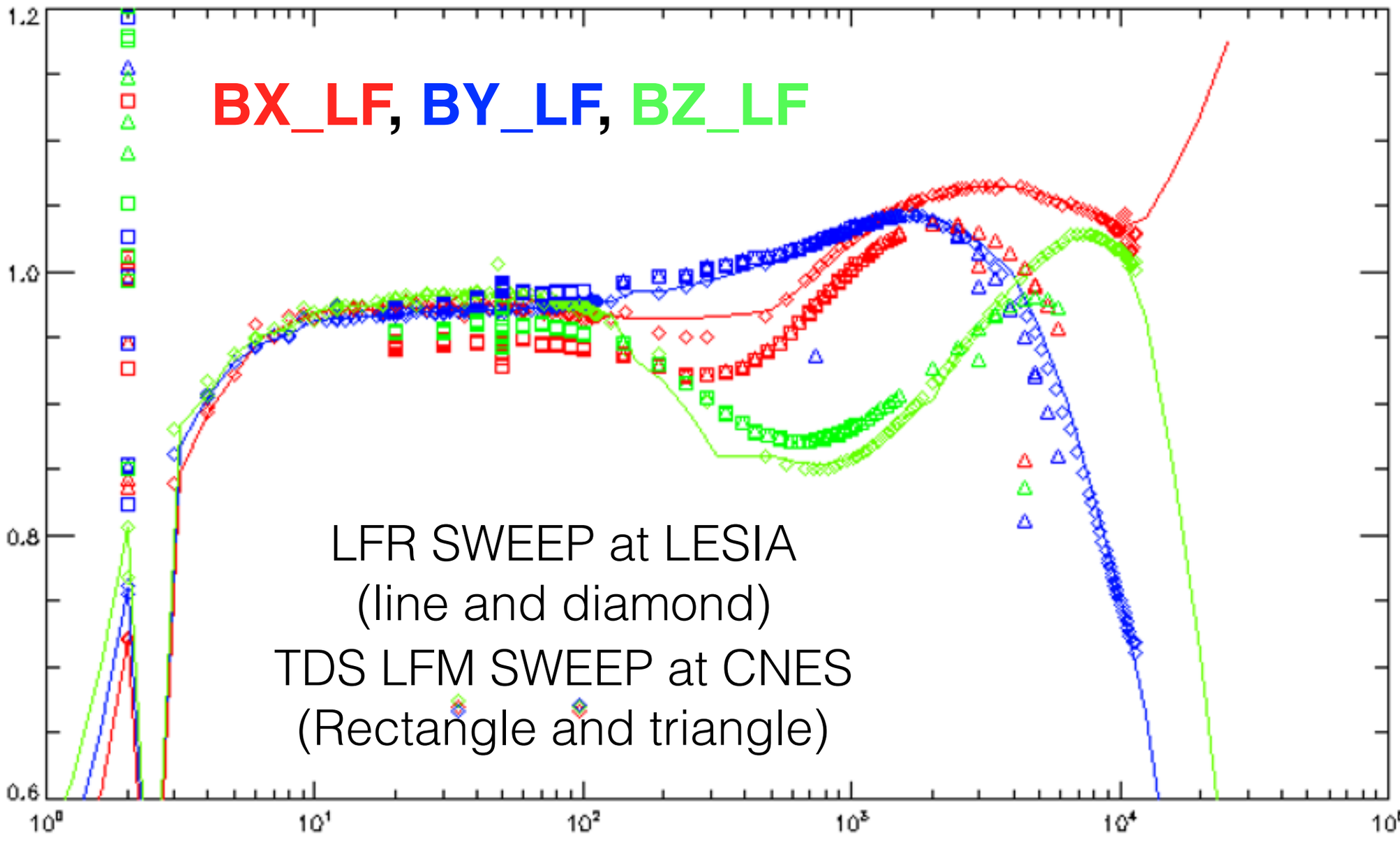


Delta cal at CNES

TDS LFM

- Same variations are observed with TDS in LFM mode.

➡ Can't blame small mu-metal box or caps.



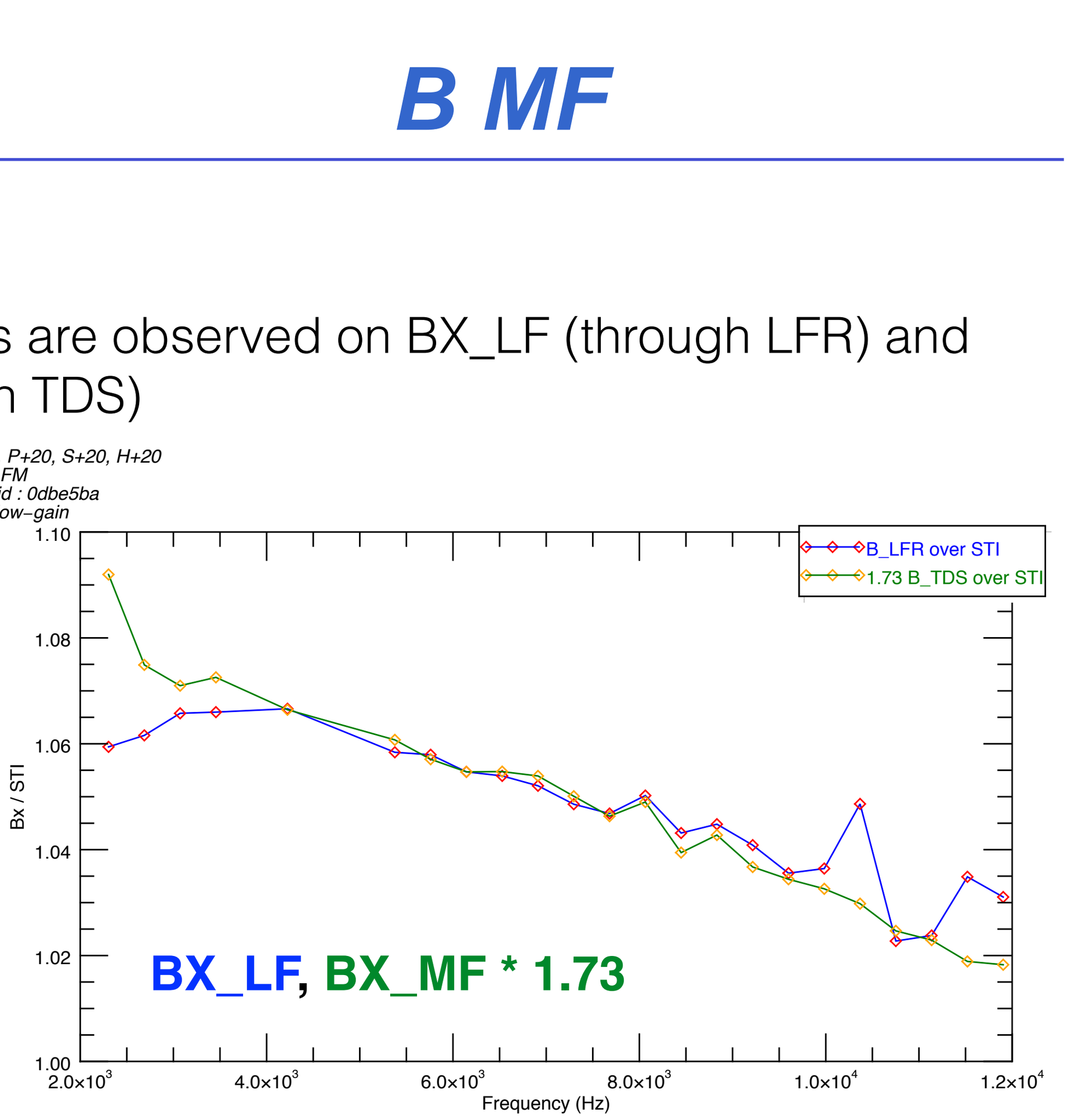
B MF

TDS

- Same variations are observed on BX_LF (through LFR) and BX_MF (through TDS)

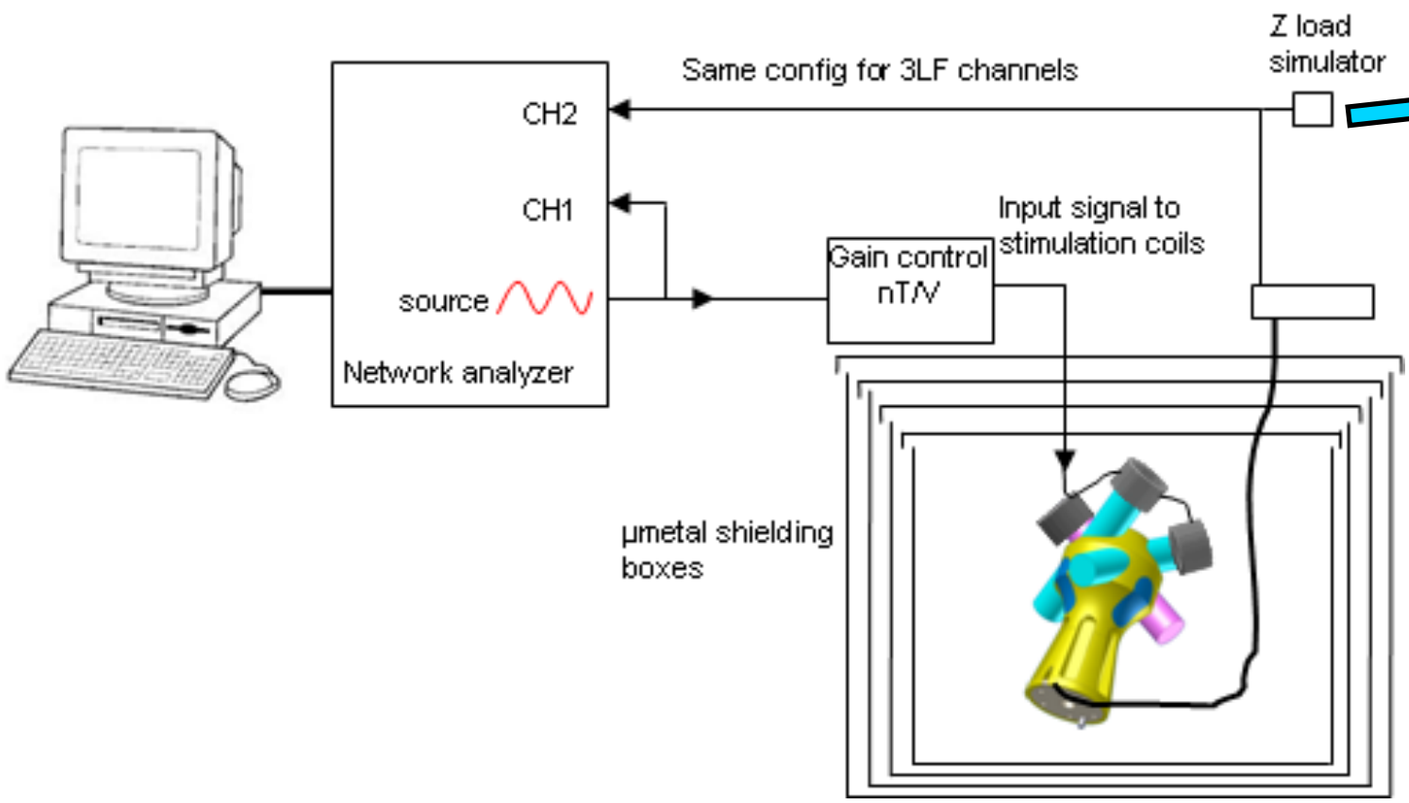
- Ratio of ~1.8 unexplained

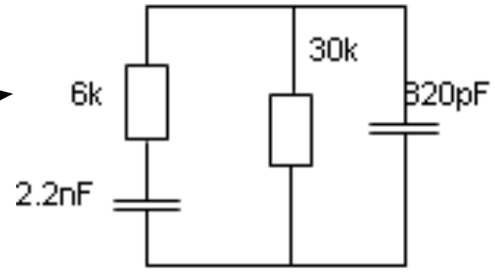
- To be discuss with TDS

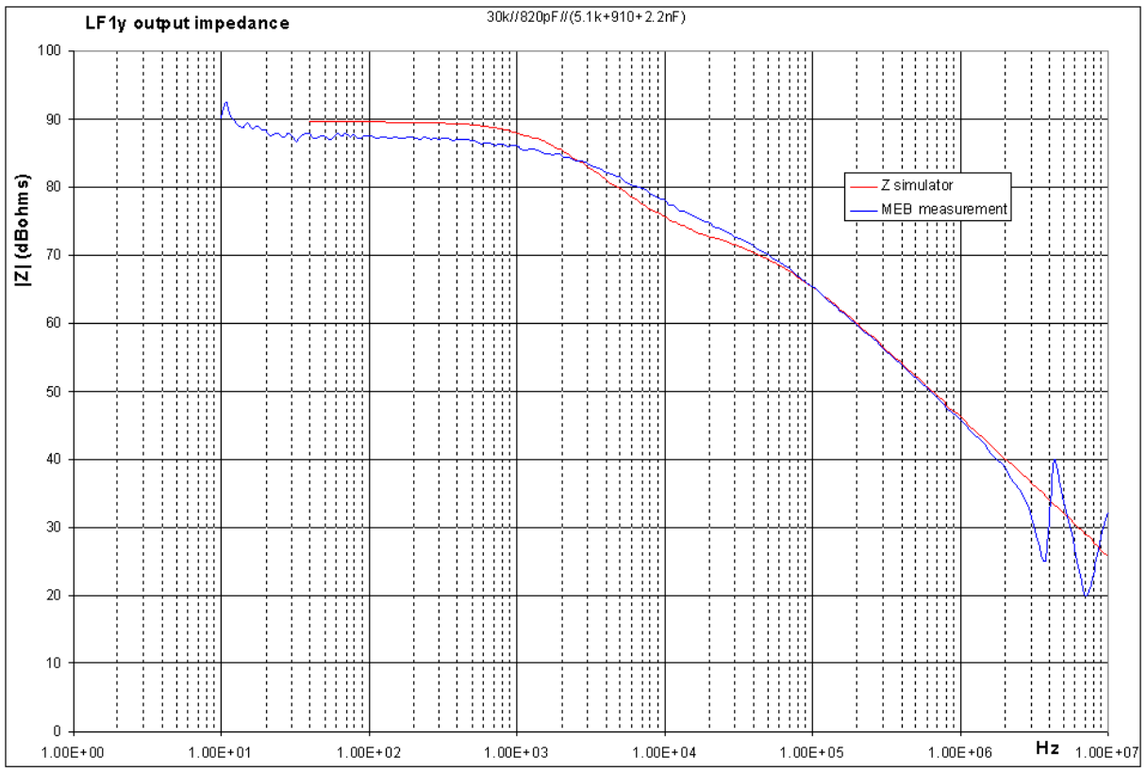


"Eye figure" investigations

- Hypothesis : Impact of LFR/TDS input impedance on SCM signals
- Measurements with SCM EM loaded by LFR+TDS input impedances measured on MEB FM using stimuli caps same as with the tests done at LESIA during RPW calibration







Impedance seen by SCM (measured on MEB FM) compared to impedance simulator

SCM FM development status

“Eye figure” investigations

- Hypothesis : Impact of LFR/TDS input impedance on SCM signals
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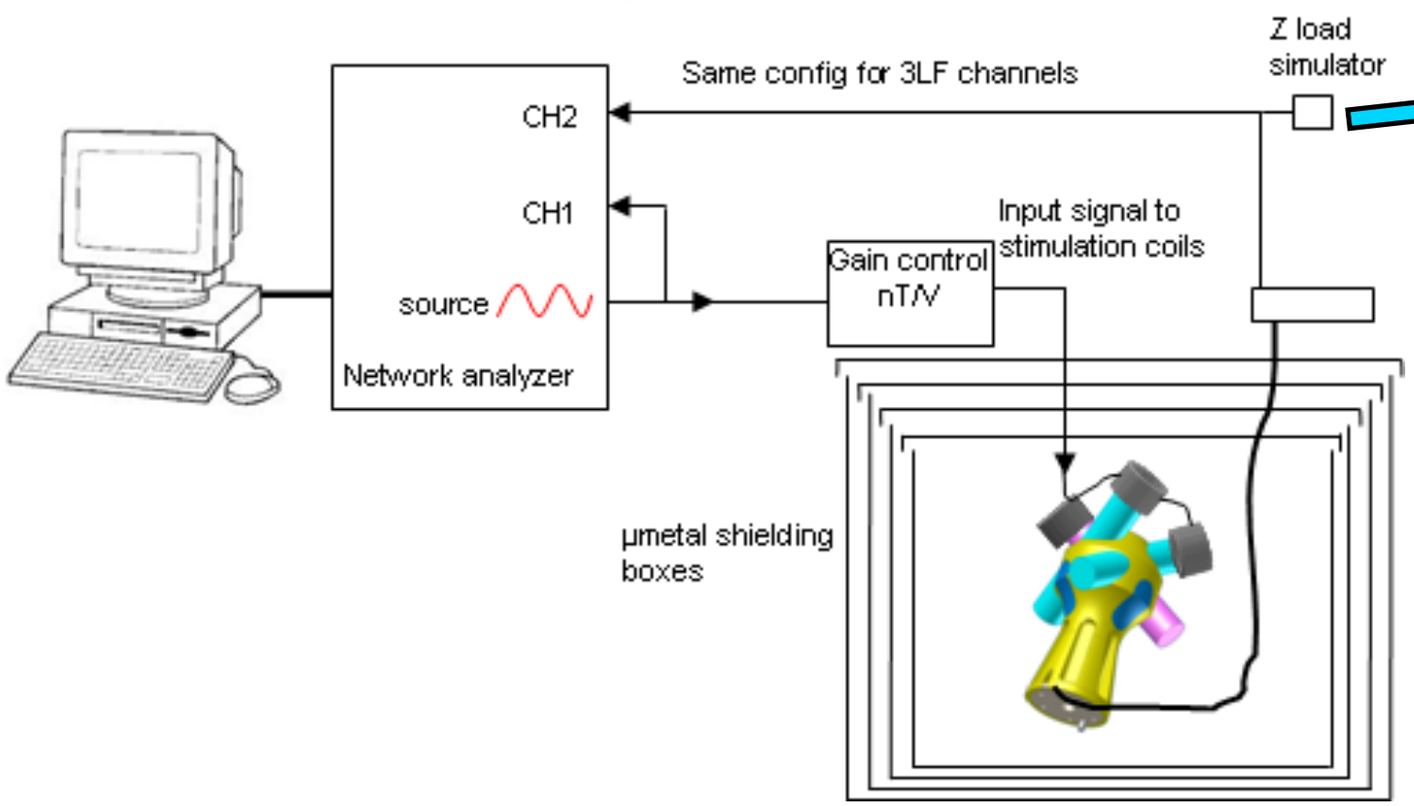
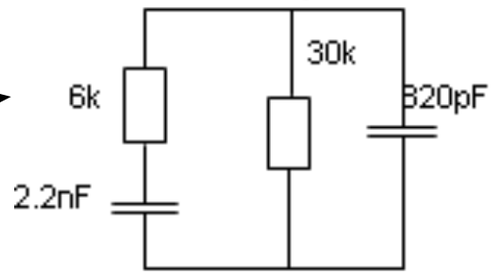
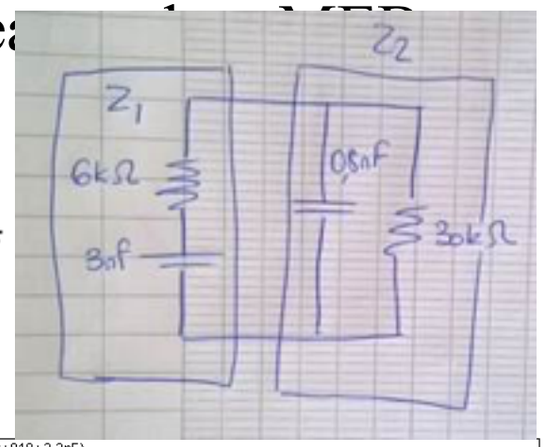
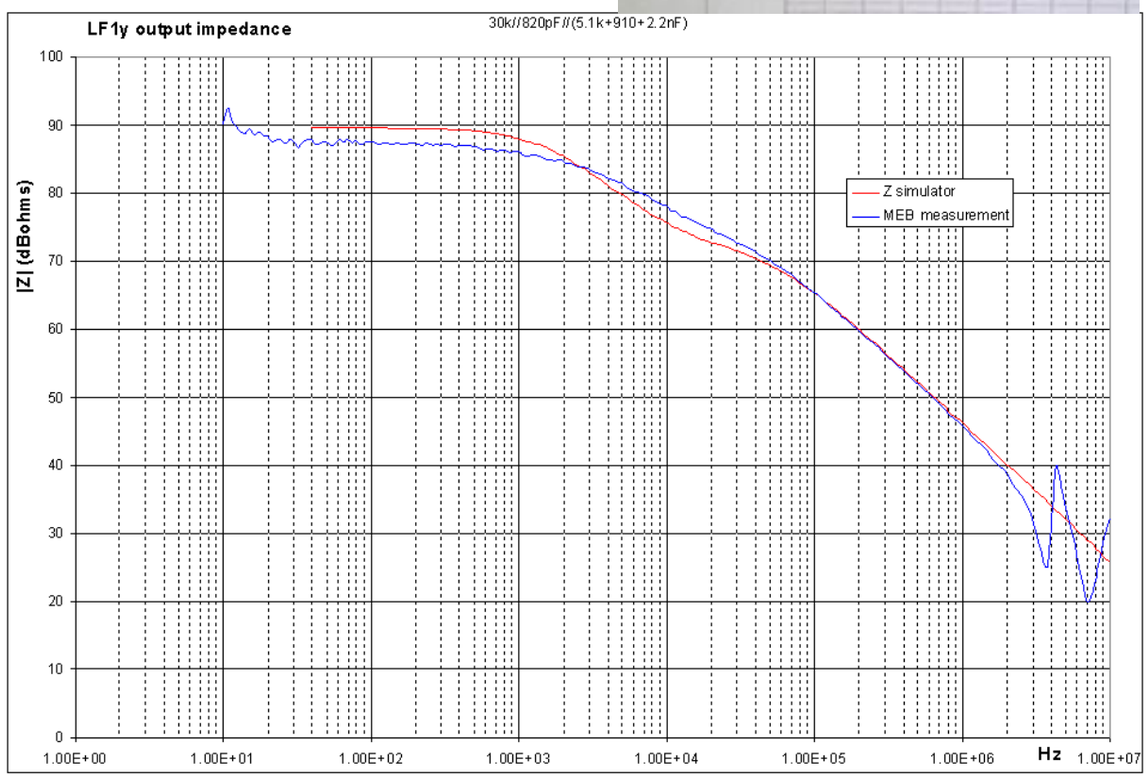






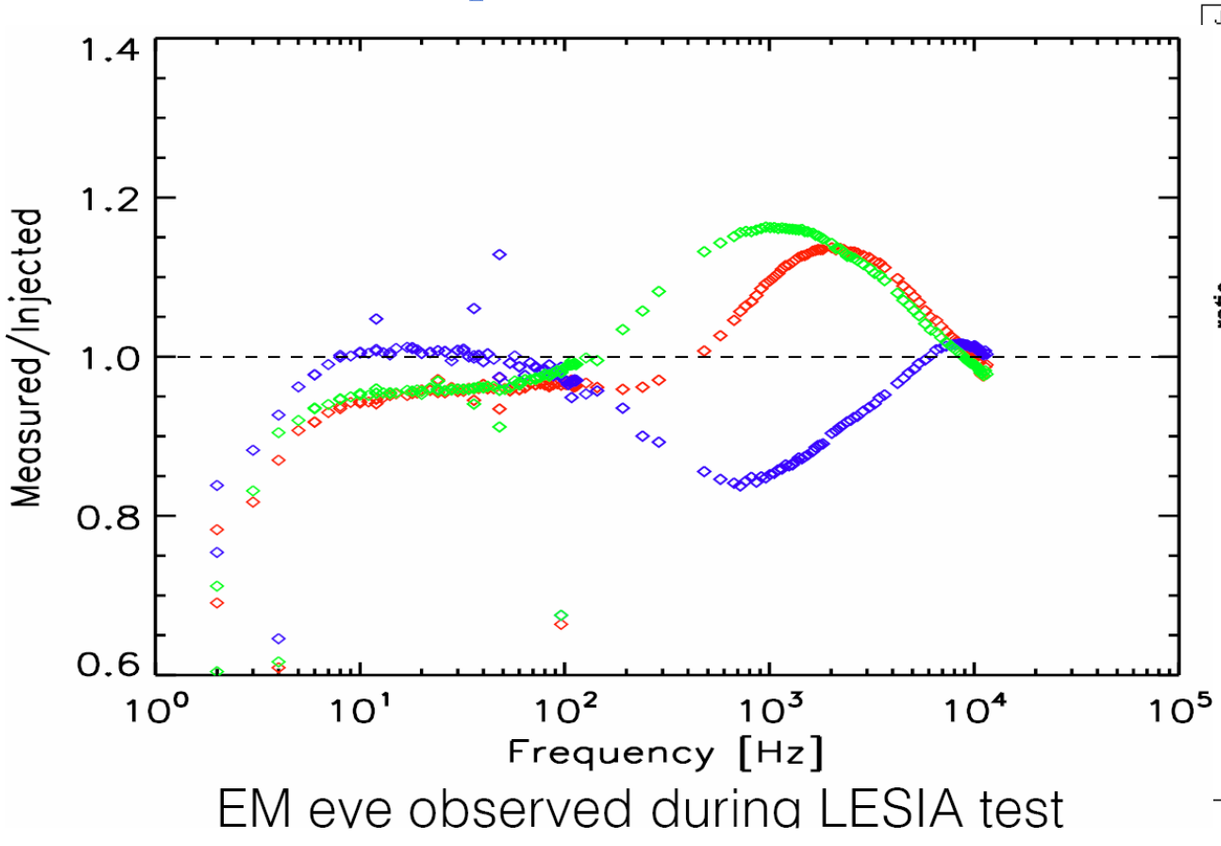


Impedance seen by SCM (measured on MEB FM) compared to impedance simulator

“Eye figure” investigations

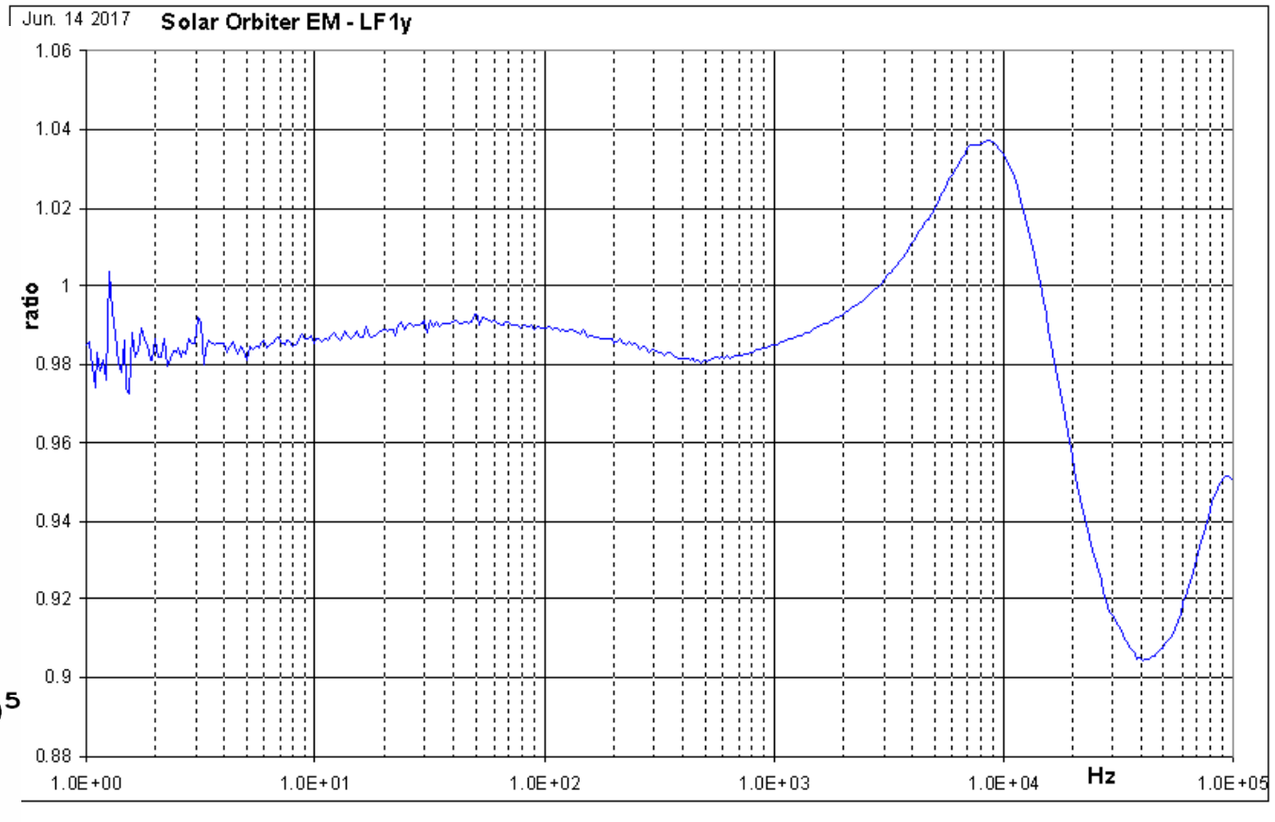
- Preliminary results : ratio of -2% / +6% between SCM loaded case and SCM unloaded compared to -15% / +20% on

RPW calibration measurement with SCM EM
Ratio measured / expected



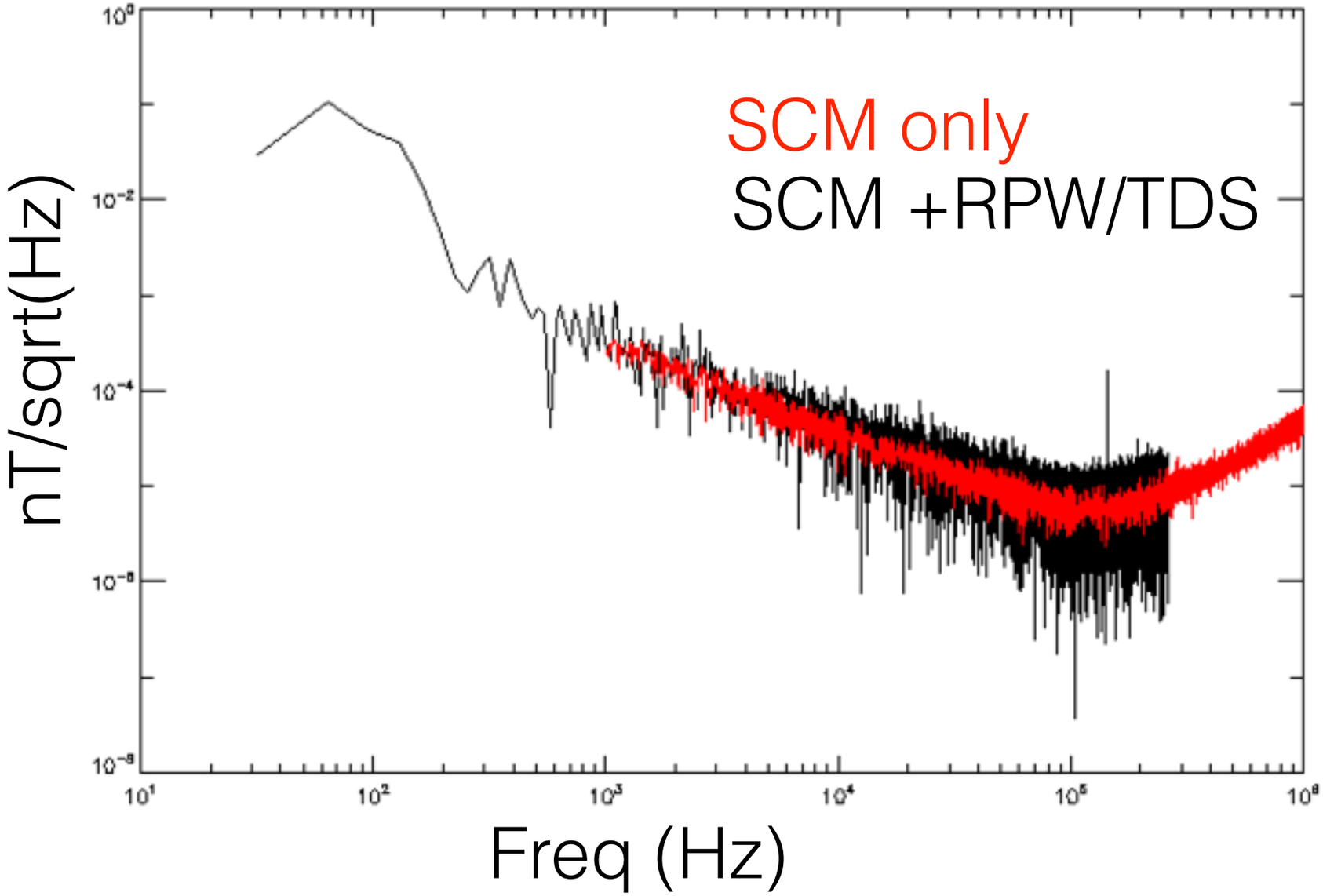
EM eve observed during LESIA test

RPW calibration measurement
Ratio loaded / unloaded



- Ongoing investigation : refine the impedance to fit the measured curve better ….

Delta cal: noise



➡ MF SCM noise floor is conserved by RPW.

Conclusion

- Gain shows unexpected variations (~20% max) with frequency.

- These variations appears when SCM is at least connected to LFR (test to be done with MEB EM ?)
  - not seen by SCM alone
  - not caused by the use of caps.

- These variations are also observed on TDS

- The variations do not vary significantly with temperature

Conclusion

- Work is ongoing to
  - Identify the origin of the problem (ideas and contribution welcome)
  - Define a calibration scheme that allows to correct for these effects.
  - Delta cal tests. Data looks ok (= as good and comparable to LESIA tests)