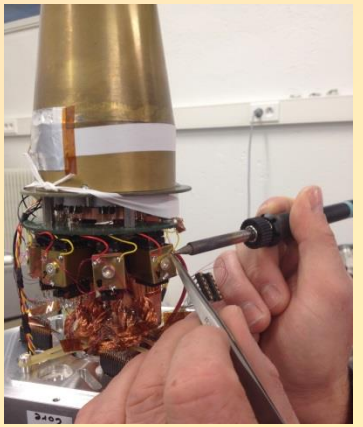
Status report of CATs at IPHC

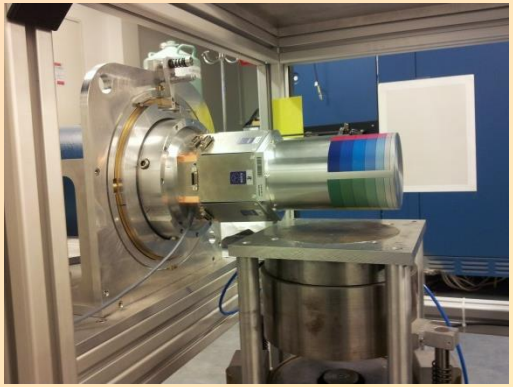
M-H SIGWARD - M FILLIGER - F DIDIERJEAN - G DUCHENE

Test Cryostat :



- 2014: Cryostat delivery and CTT training: integration of capsule A009
  - Cristal cooling problem
  - Noise on the core channel

  ➔ overhaul of our cryostat by CTT



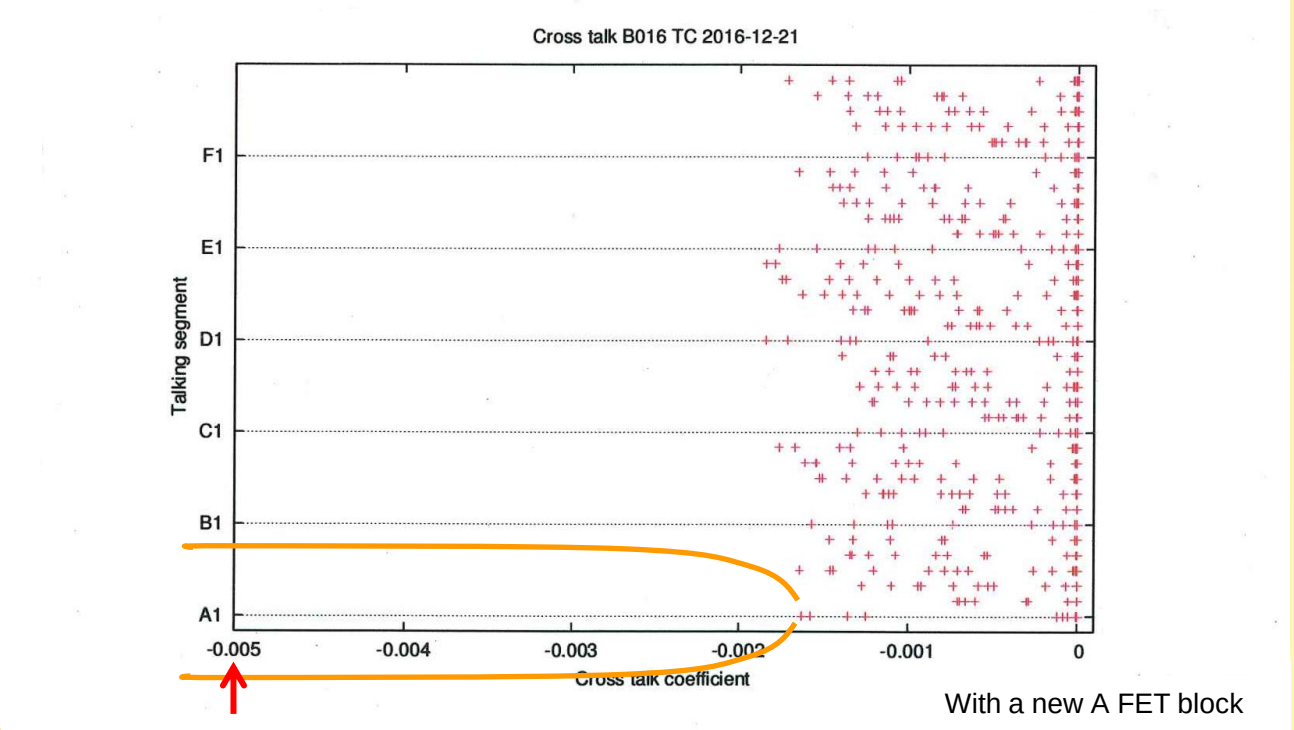
- 2015 : integration of B006 in our cryostat
  - first results on our scanning table (Michaël Ginz PhD)
  - Core noise persists
  - Unfortunate warming - Change of FETs, pre-amp cards …
  - Still searching the noise source

  ➔ No CAT

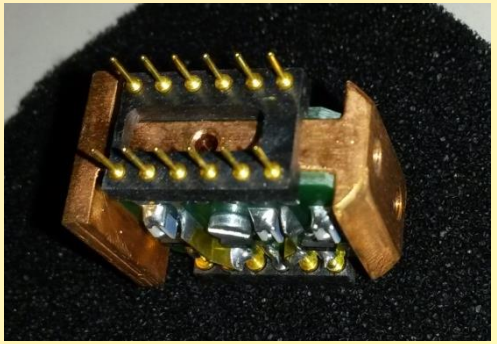
- Give-back of B006 to be mounted in ATC11

- Late 2015 : return of the cryostat to IKP for refurbishment

Main changes and improvements on our test cryostat



- Late 2016 :
  - Replacement of the HV Core board
  - Working on grounding and crosstalk



Training at IKP Köln (3 weeks - February to April 2017)

Purpose: Mounting and testing a capsule in our test cryostat at IKP
(capsules dismounted from ATC1 and annealed)
before returning to IPHC for CAT validation

- Mounting and testing C003 ✗

  ➔ leakage current: didn't survive the annealing

- Mounting and testing A008 ✔
  (Capsule already tested by Saclay after annealing → good comparison basis)

  ➔ 20th of April: Cryostat with A008 returned to IPHC for CAT

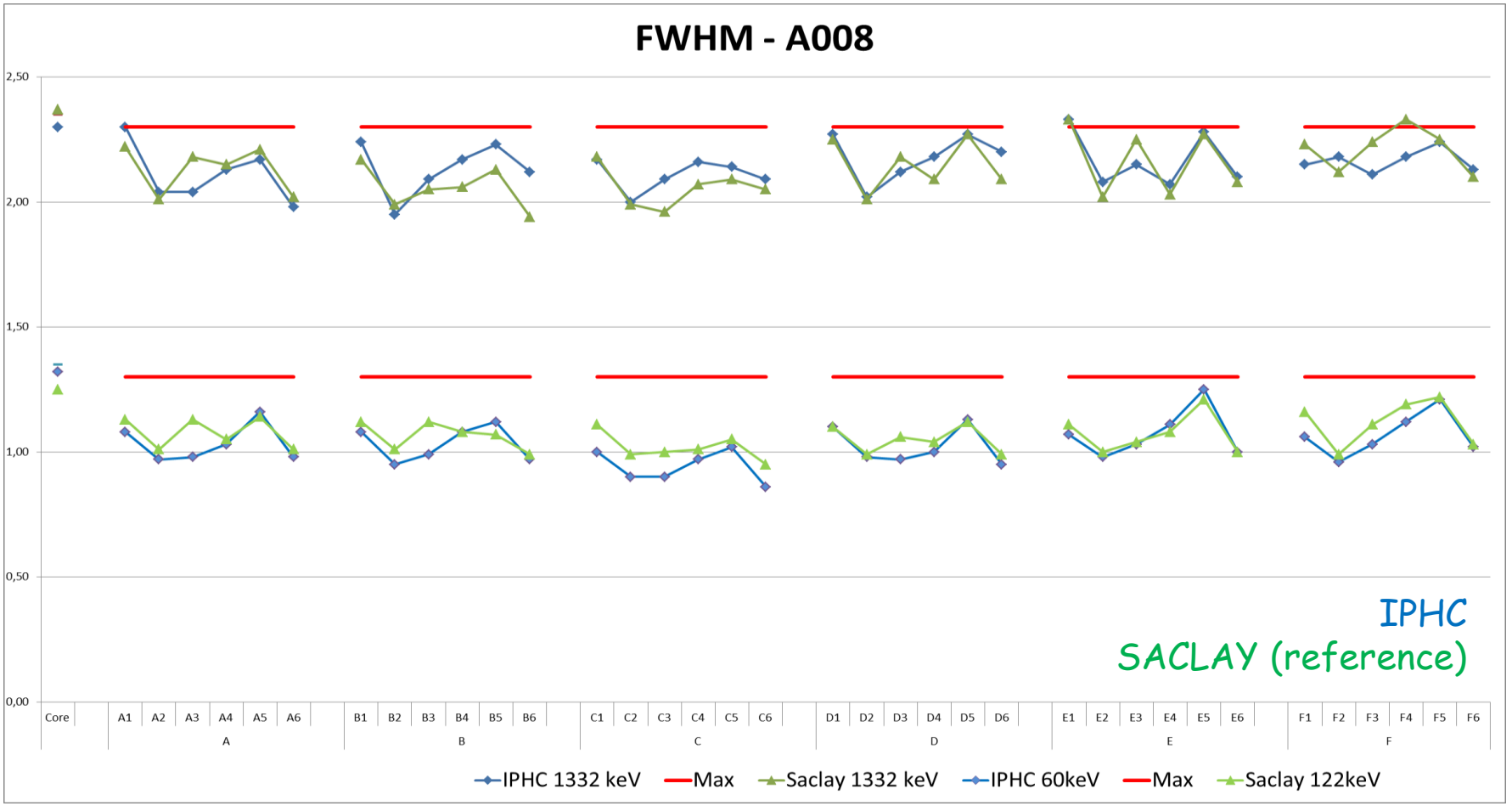
CAT A008 at IPHC (May 2017)

- Check of all offsets during the voltage increasing ✔
- Energy-resolution measurement at 59.5 keV (^{241}Am) ✔

→ our electronics chain is validated

- Energy-resolution measurement at 1332.5 keV (^{60}Co) ✔
- Relative efficiency measurement (76,5%) ✔

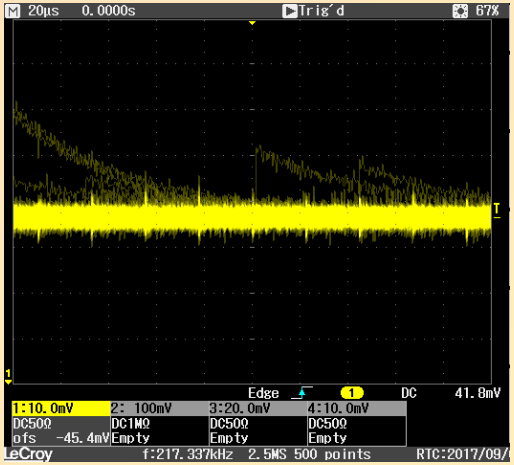
CAT A008 at IPHC (May 2017)

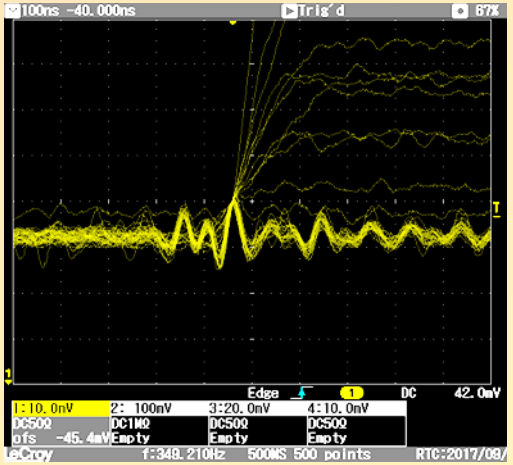


→ Validation of the IPHC lab for CAT tests (AMB, May 2017)

BUT

- Some high-energy resolution measurements needed to be performed several times to get correct results!
- Core energy resolution improved from 2.4 to 2.25 keV (depending on day / night measurement)
- Noise appeared on the signal (generally at the end of the week!)





→ The whole environment is incriminated

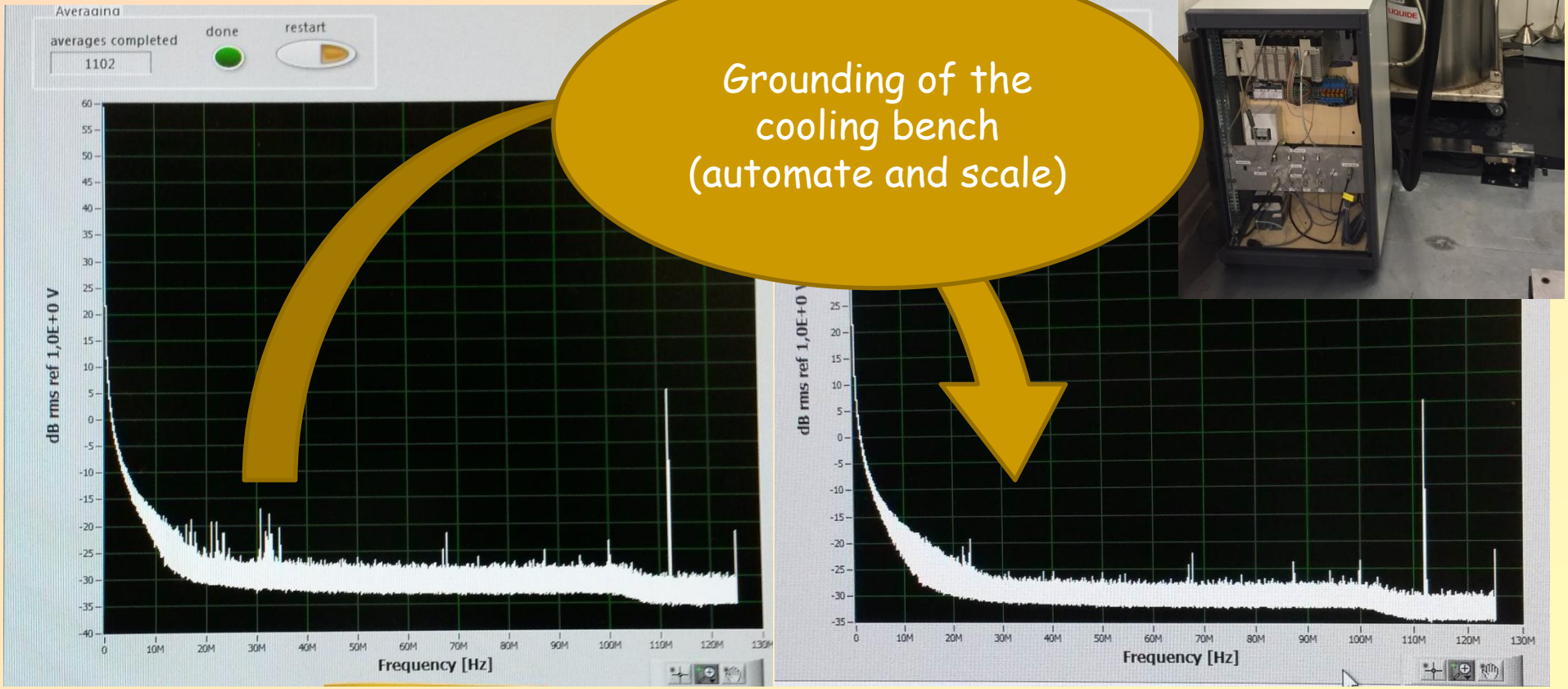
Noise hunting

- Test with other HV, LV and main amplifier…
- Change of location
  (tests in the SMA lab in another building)
- Set in a Faraday cage
- Shutting down of the wireless and the pumps …
- Verification of a possible correlation with CYRCE firing (cyclotron) …

→ No substantial improvements observed,
The degradation of the resolution seems to be random ...

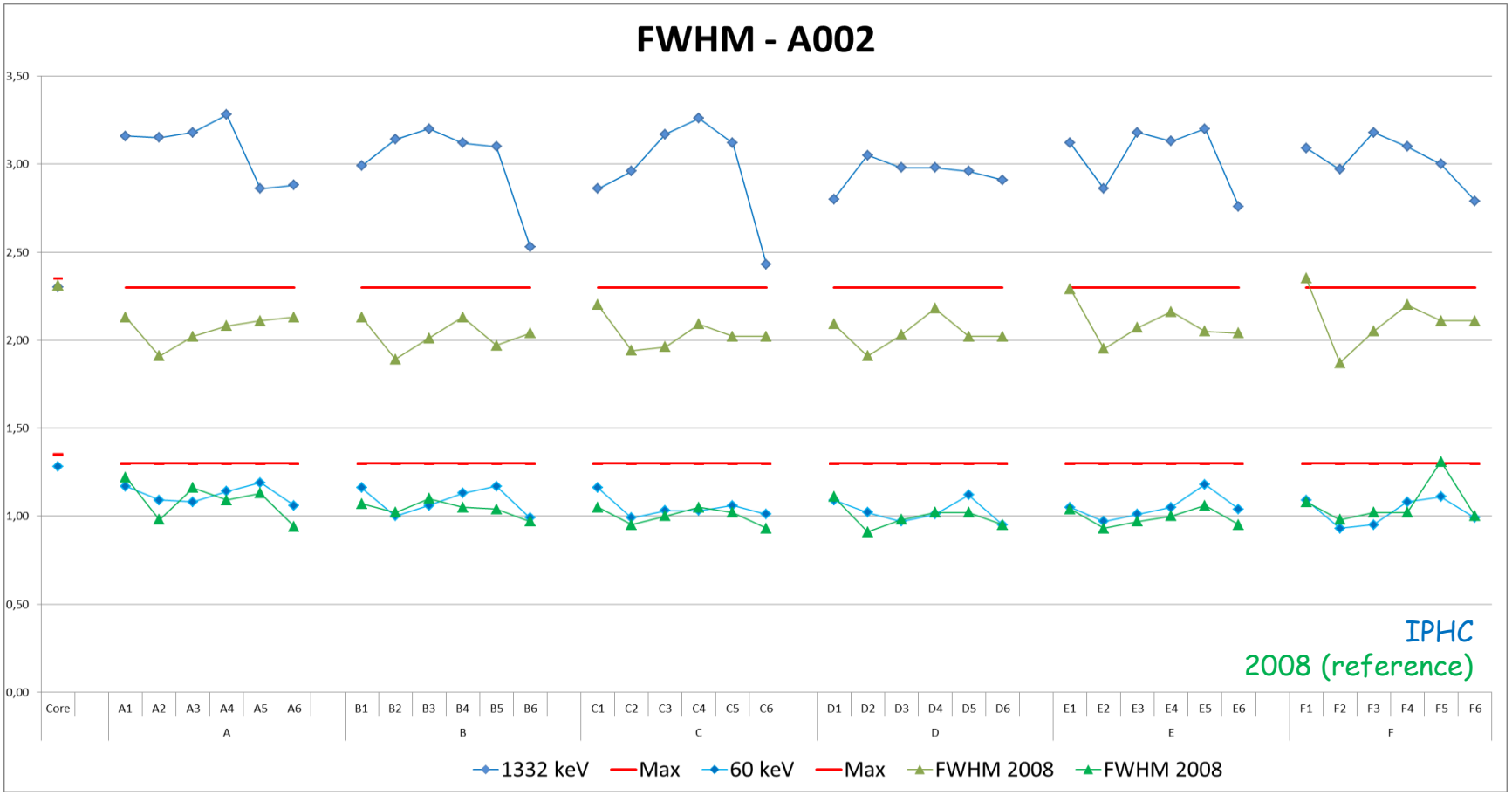
Noise hunting

Frequency analysis:



→ interconnection of all electrical grounds of the building

CAT A002 (July 2017)



→ The detector survived the annealing
but the segments didn't recover a good energy resolution

To do list

- Continuing to work on noise reduction and renew progressively our electronics
  - HV module most suspected to introduce noise :
    ➔ New HV module ordered (ISEG with current measurement)
  - New NIM crates to be ordered
- Back to work on A008
  - 2D and 3D scans of the crystal
  - Crosstalk measurements
  - Working on a fast CAT with 16-channel analog main amplifier modules (Mesytec)
- Other CATs (AGATA and DEGAS)

Thanks !

FWHM - 60 keV - A008