# Results of the 2007 BLM hardware tests in LSS5

..And a coast MD request for the 2008

Daniel Kramer for the BLM team

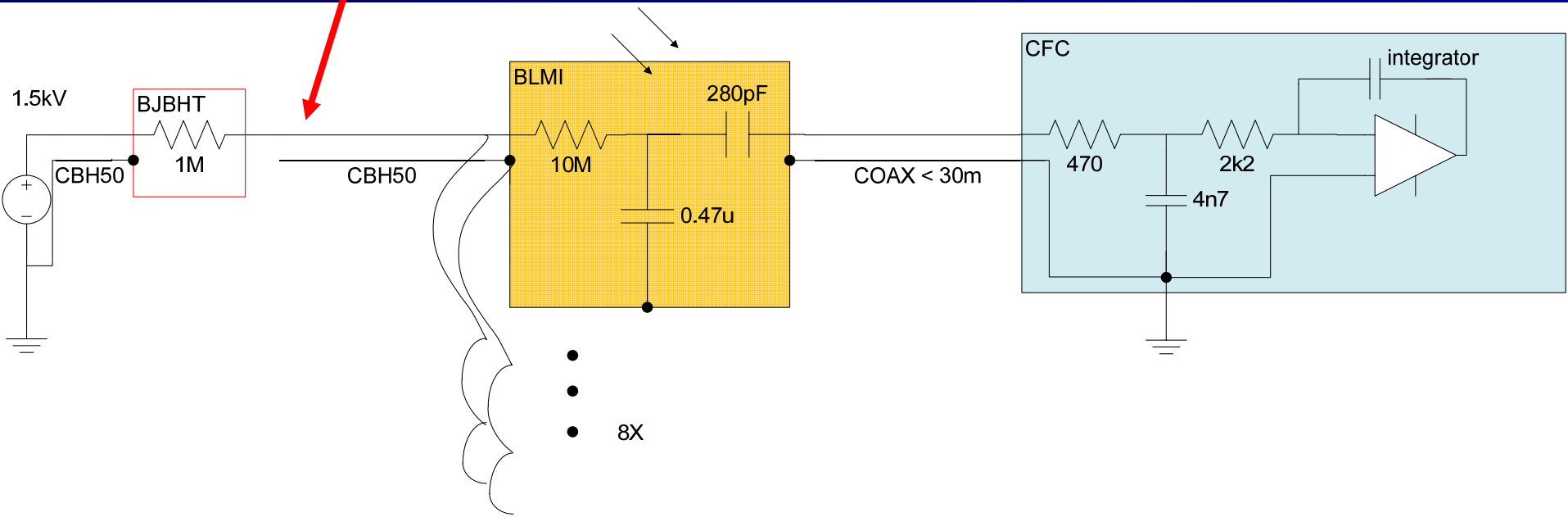
# Standard BLMI ARC installation

HV Power Supply

HV ground cut here

BLMI

Small low pass filter in the CFC input stage




Up to 8 BLMs connected in parallel

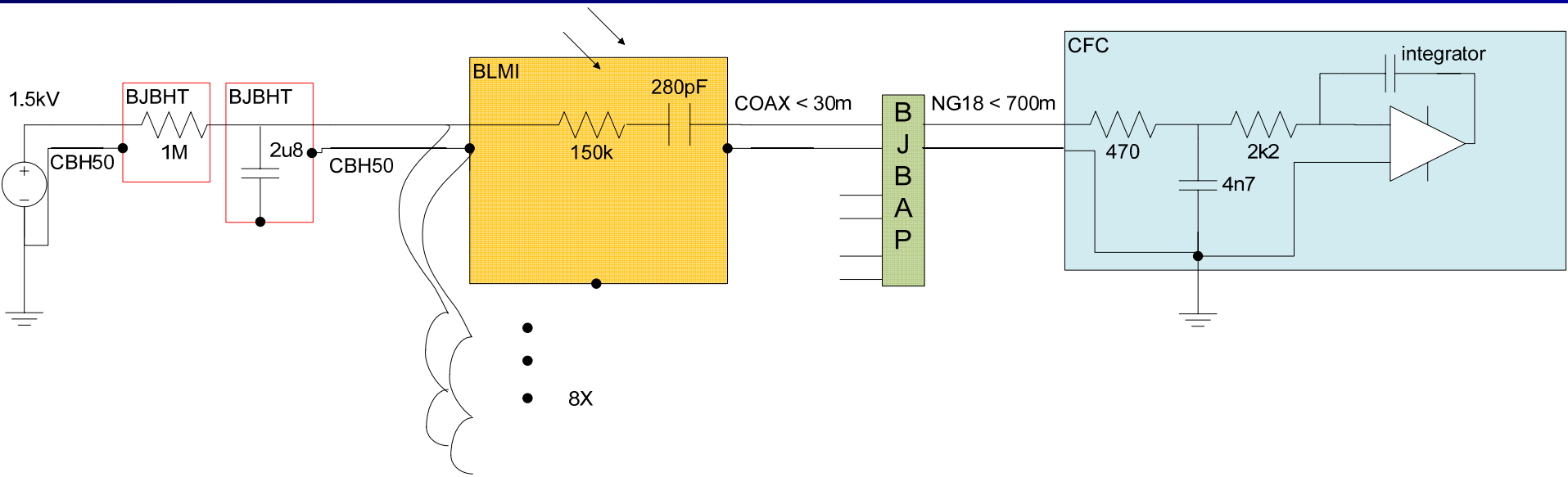
CFC is always close to the quadrupole

# BLMI installation for collimation areas

6 HV capacitors in parallel

HV capacitor removed

8 chambers in 1 NG18 cable (up to 700m)



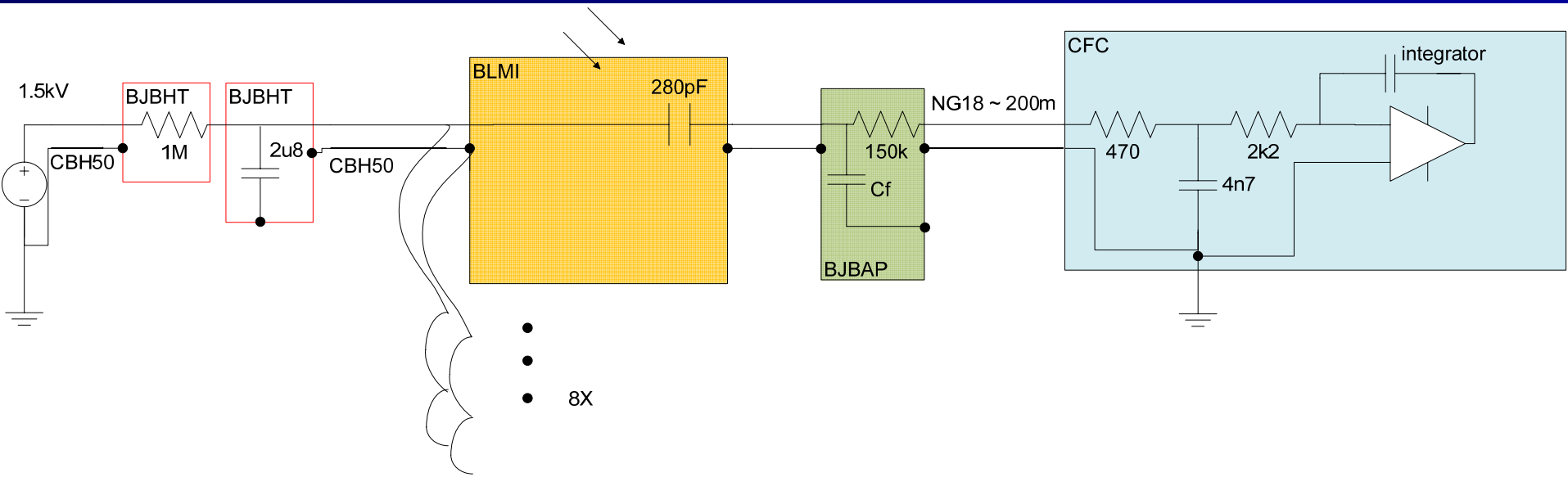

150kΩ for current limitation

280pF = chamber's capacity

# SPS LSS5 Installation – System A

AIM:

- study space charge effects with large doses
- Compare directly BLMI with SEM

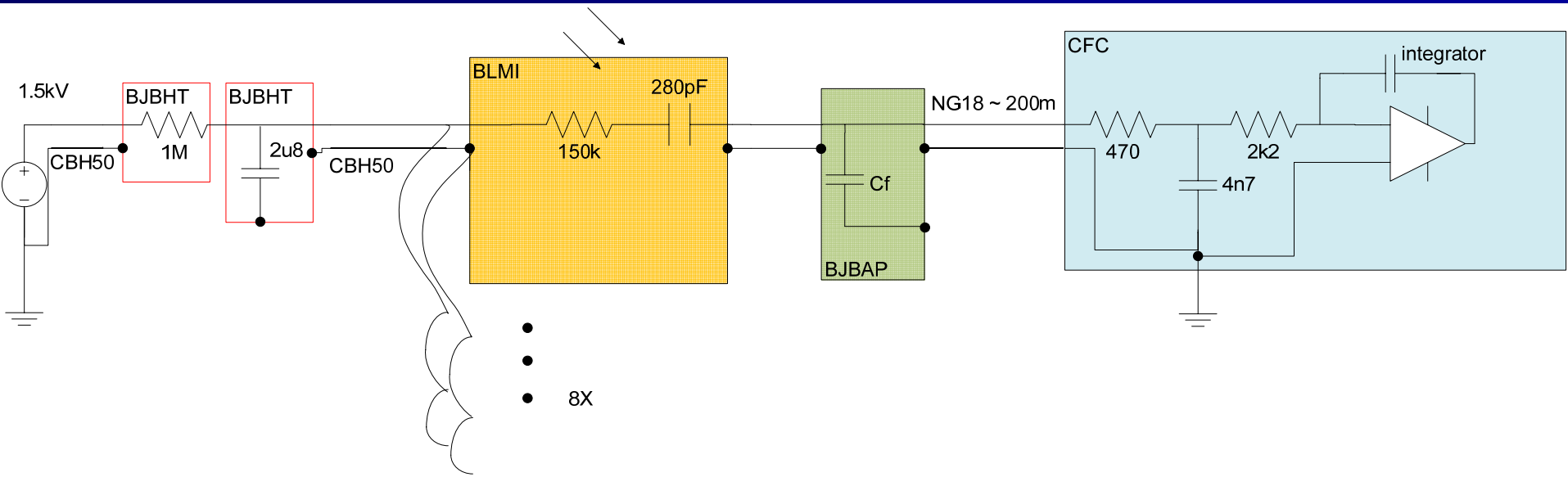



- large capacitor directly on the HV side
- Cf capacitor directly on the signal side
- 150kOhm after Cf -> large time constant

# SPS LSS5 Installation – System B

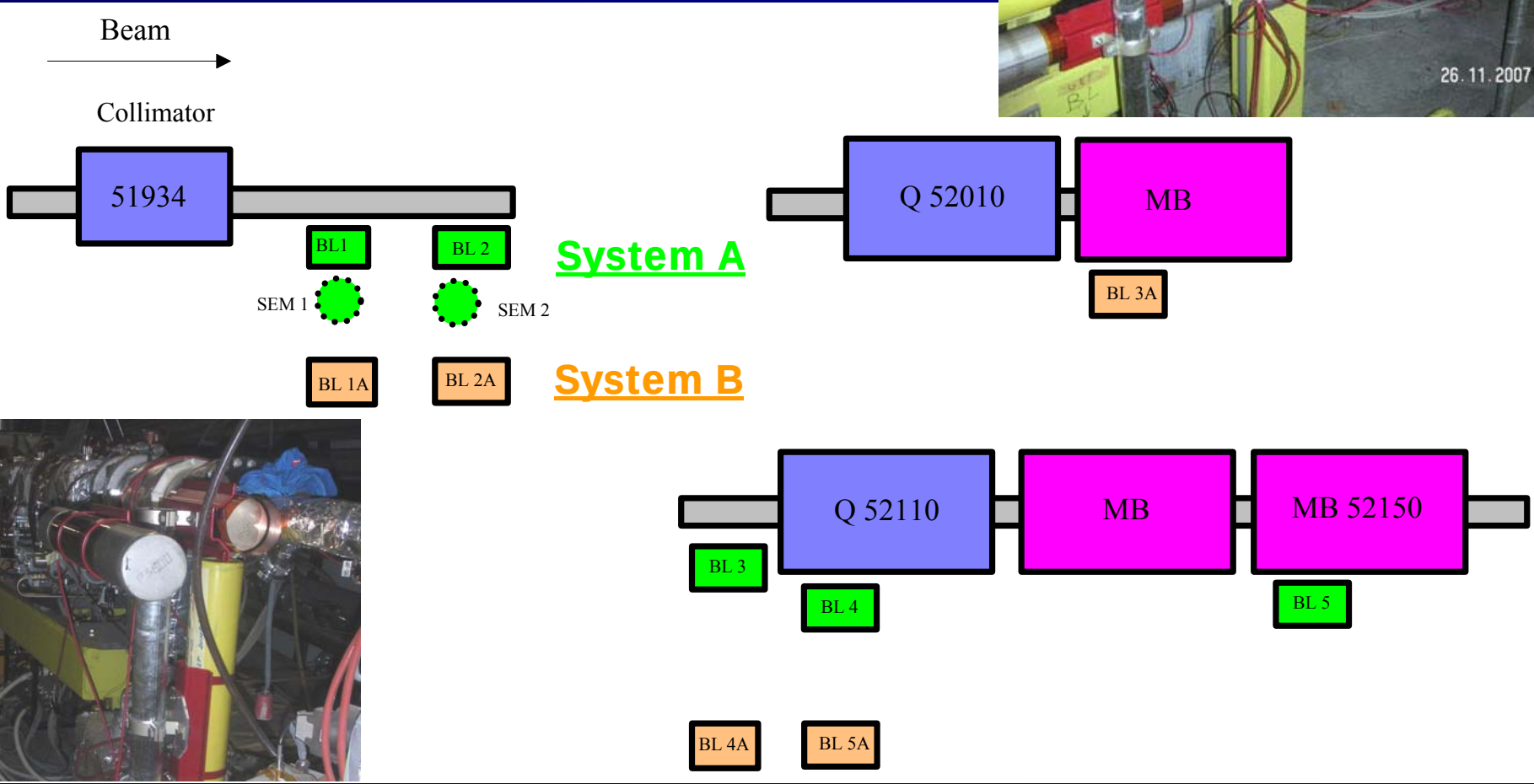
AIM:

- study cable crosstalks with different filters
- verify the peak current limitation by the 150k resistor

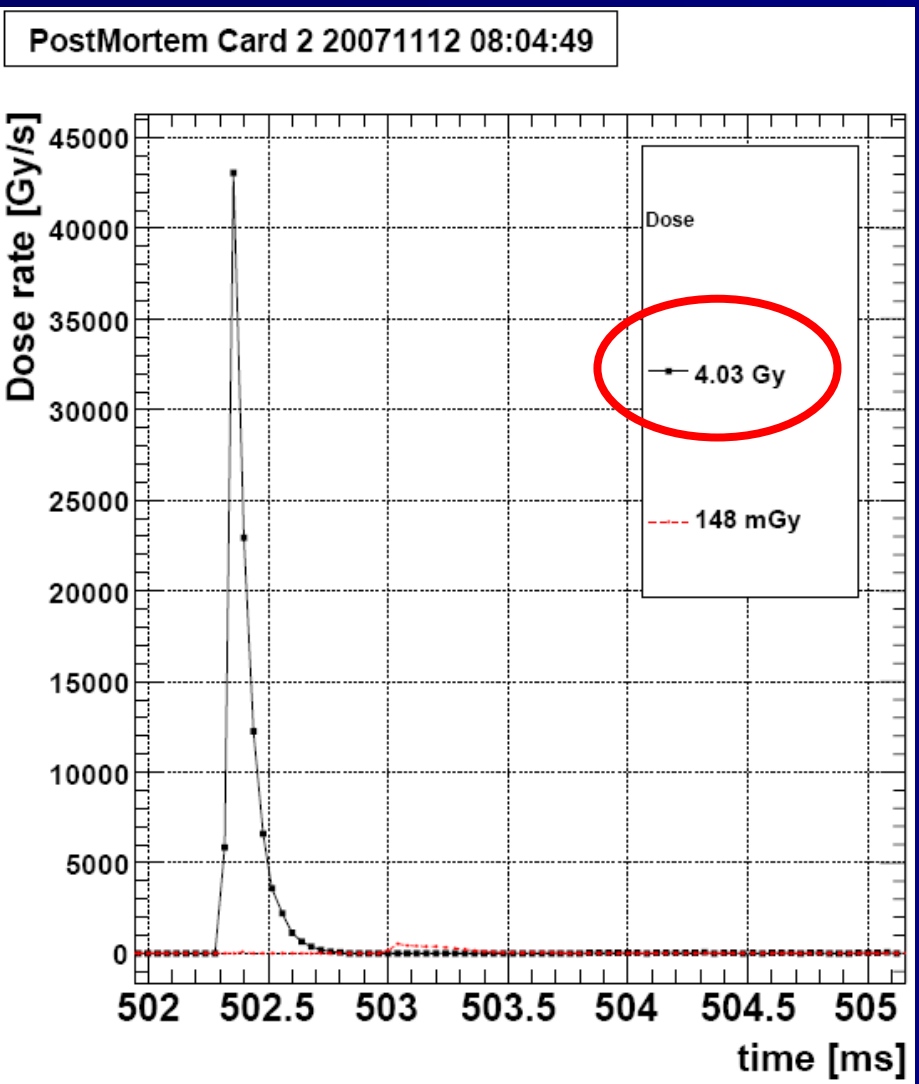


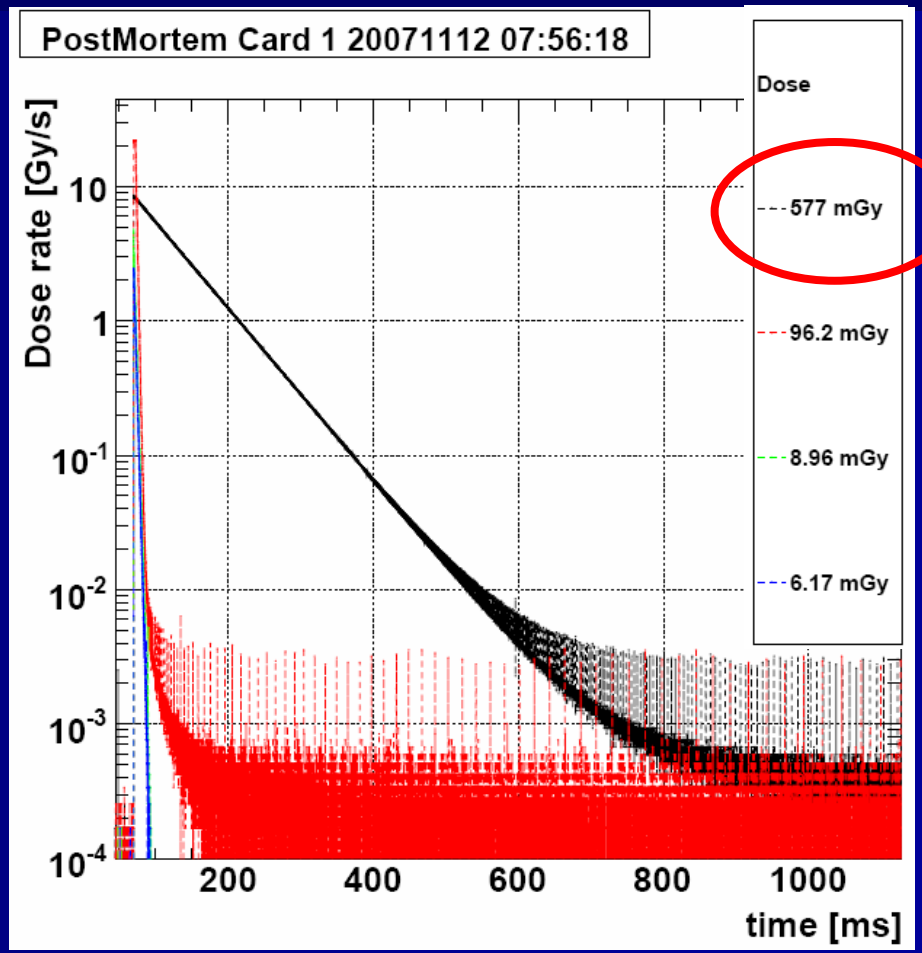

- Cf capacitor directly on the signal side
- 150kOhm on HV side -> current limitation

# BLM installation in LSS5 of SPS

# Beam dump on Closed Jaws
# SEM to BLMI comparison 1.3 $10^{13}p^{+}$

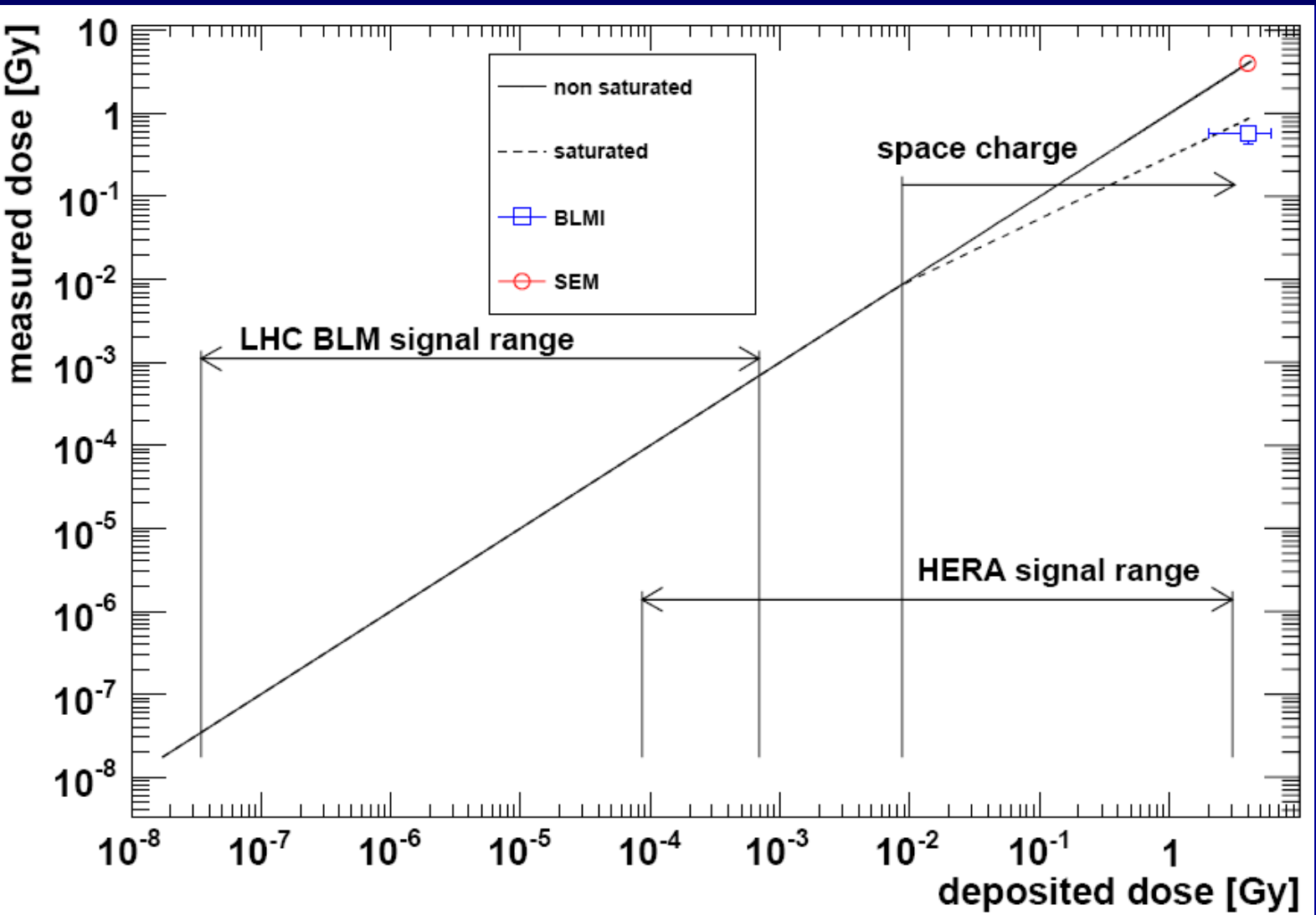



Black line – signal not clipped

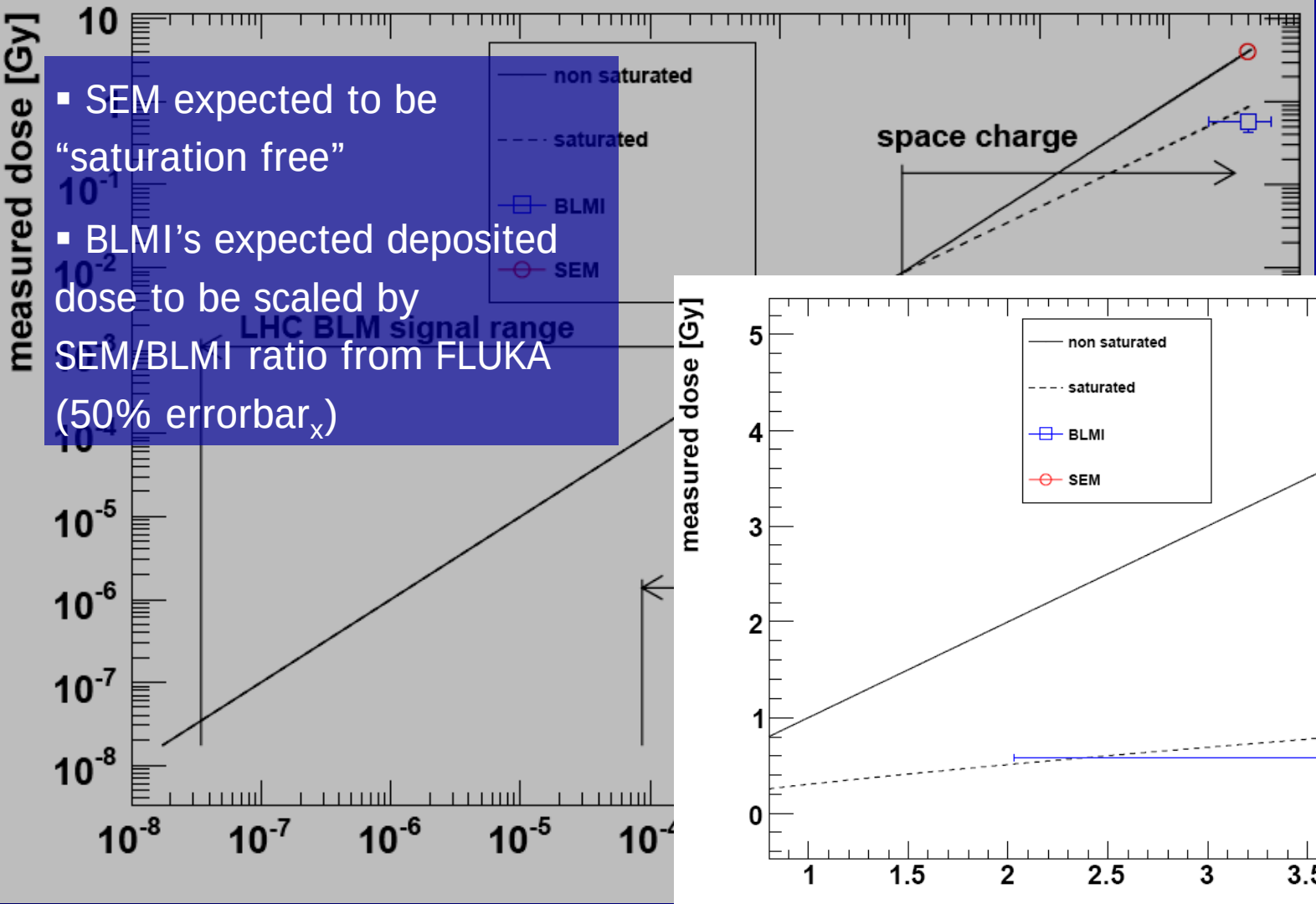
$5*\tau\_filter = 350ms$

# BLMI Space charge effect estimation ("signal saturation")



# BLMI Space charge effect estimation ("signal saturation")

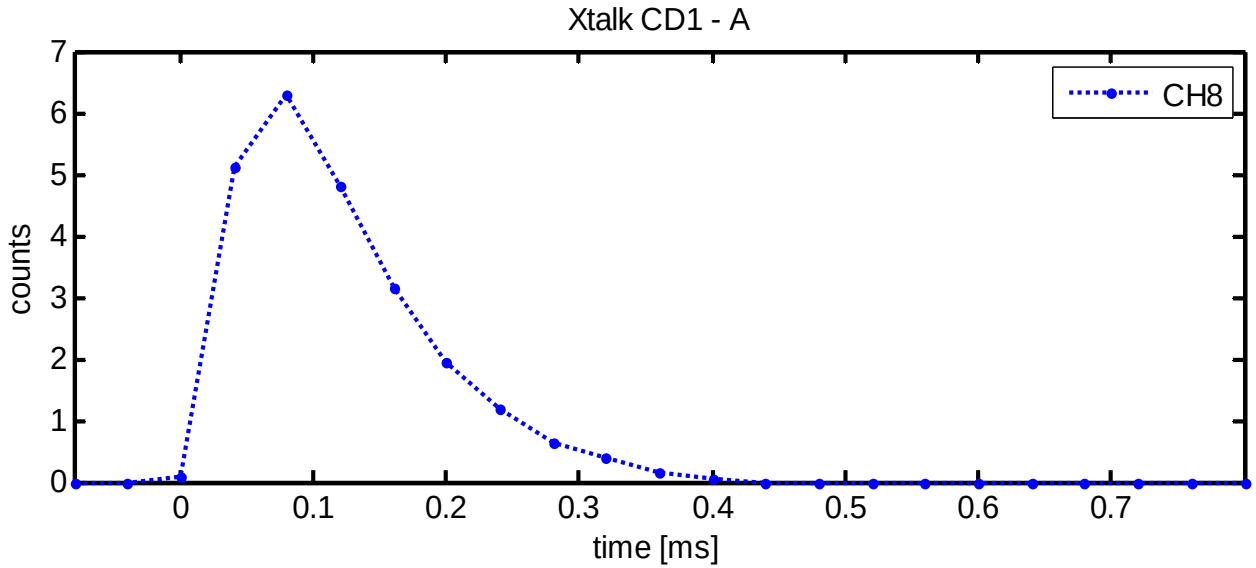
- SEM expected to be "saturation free"
- BLMI's expected deposited dose to be scaled by SEM/BLMI ratio from FLUKA (50% errorbar$_x$)

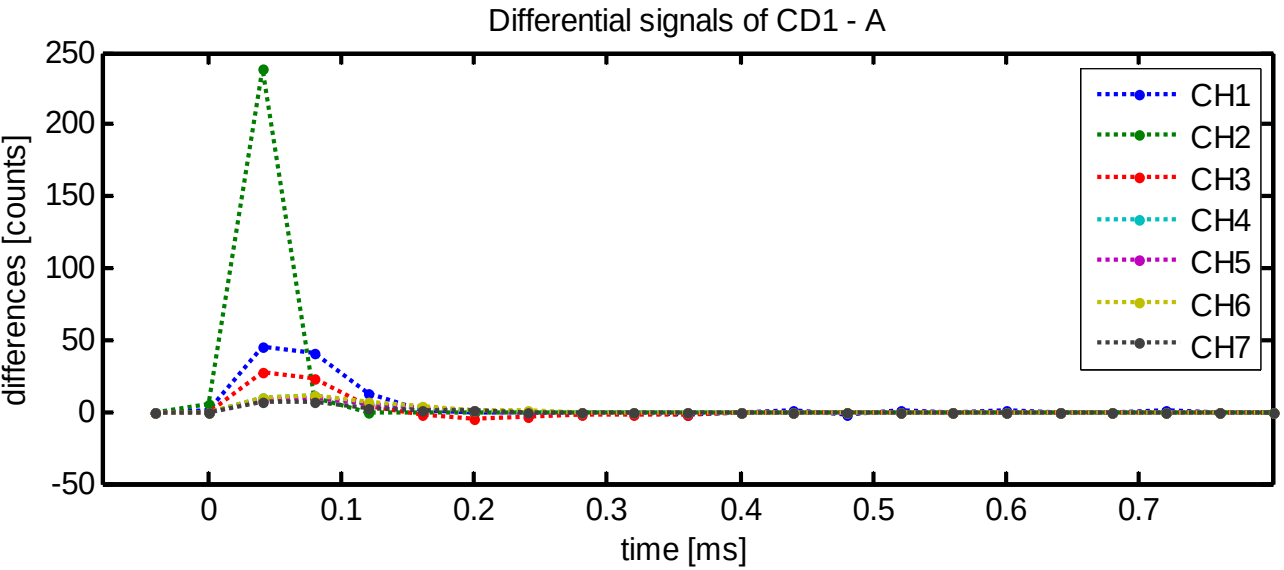


# 150kOhm resistor limitation (between HV capacitor & IC)

- Limits the peak current on the chamber input to 1500 / 150k = 10mA
- Fast loss has only the Chamber charge available 280pF * 1500V = 0.4 uC
  - Corresponds to ~ 7 mGy total loss
  - Corresponds to ~ 180 Gy/s (PM limit = 22 Gy/s..)
- Slows down the signal collection
- DC current limited to 1500 / 1M = 1.5 mA
  - Corresponds to ~ 26 Gy/s (total in max 8 chambers)

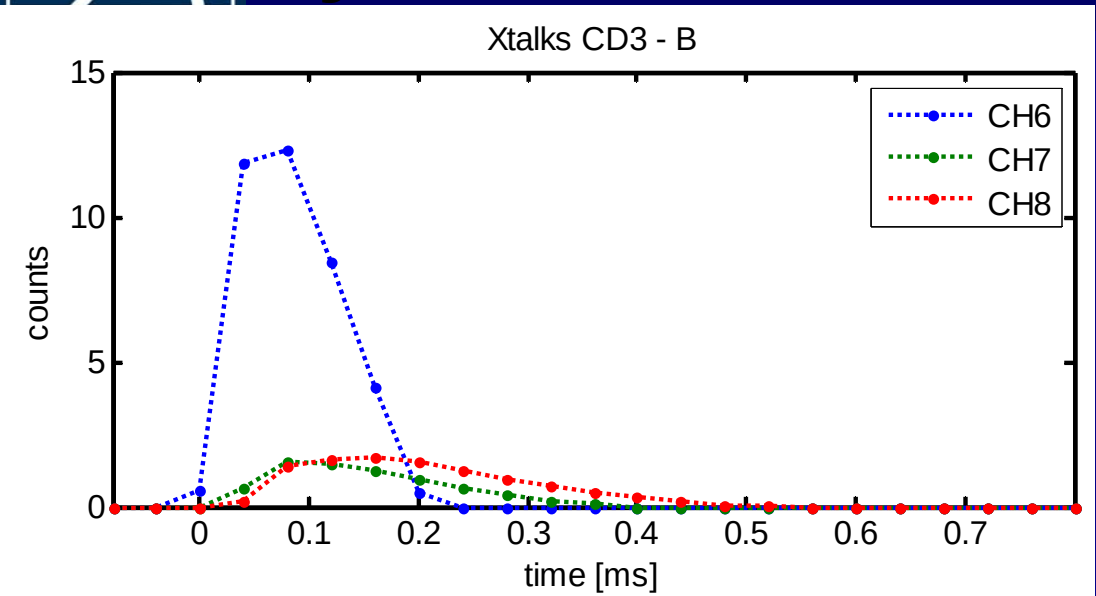
# Cable crosstalks study System A

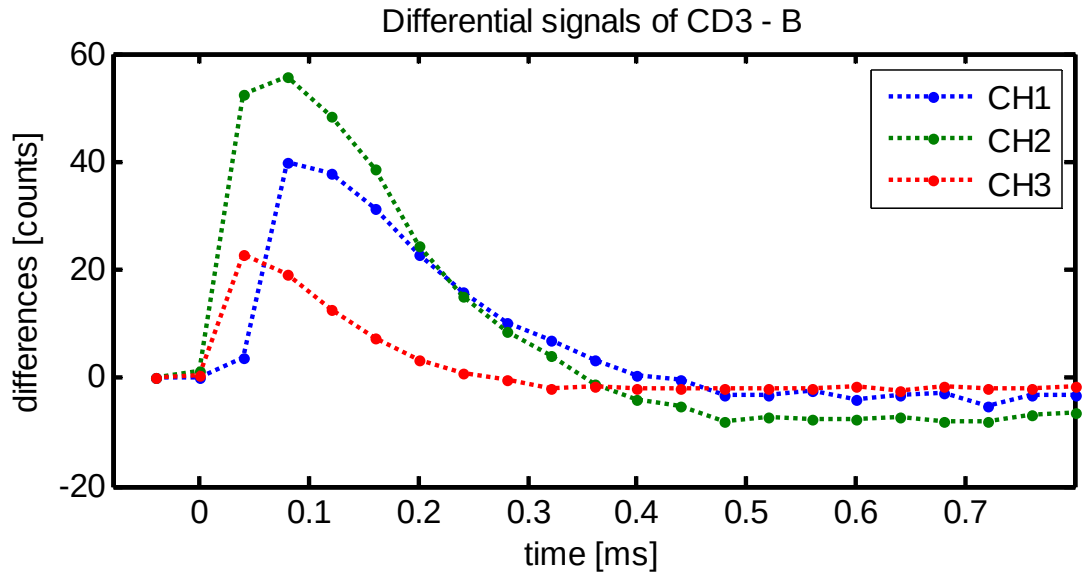



- Ch 8 unconnected
- Ch 2 saturated
- Xtalk should be proportional to the signal derivation
- Signal peak ratio 4.3e-3 (47dB)
- Integral ratio 1.4e-4 (77dB)

# Cable crosstalks study System B



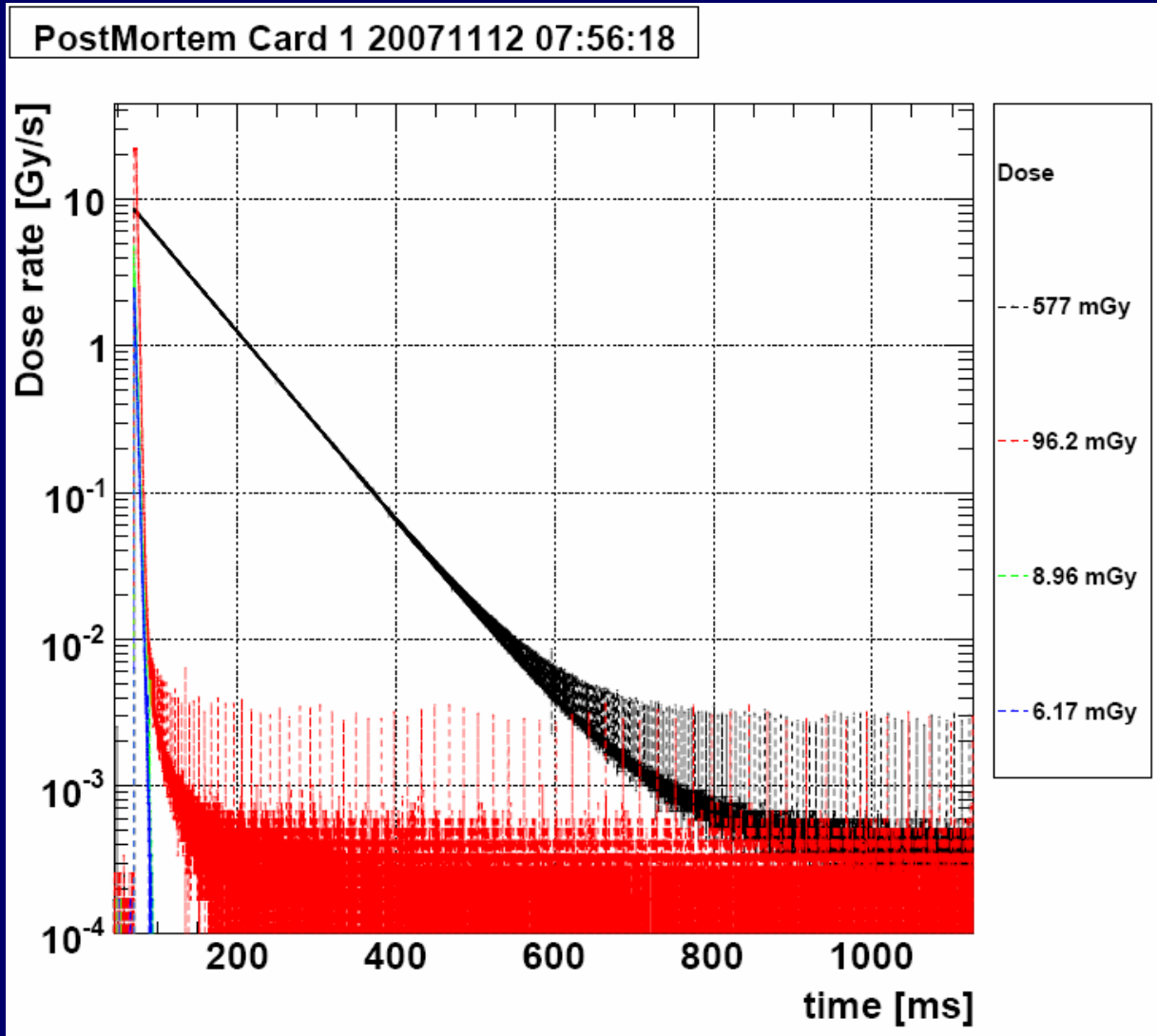




- Ch 6..8 unconnected
- Xtalk clearly depends on the derivation
- Signal peak ratio 5e-2 (26dB) (worst case)
- Integral ratio 4.4e-3 (47dB)
- No fundamental difference between A and B

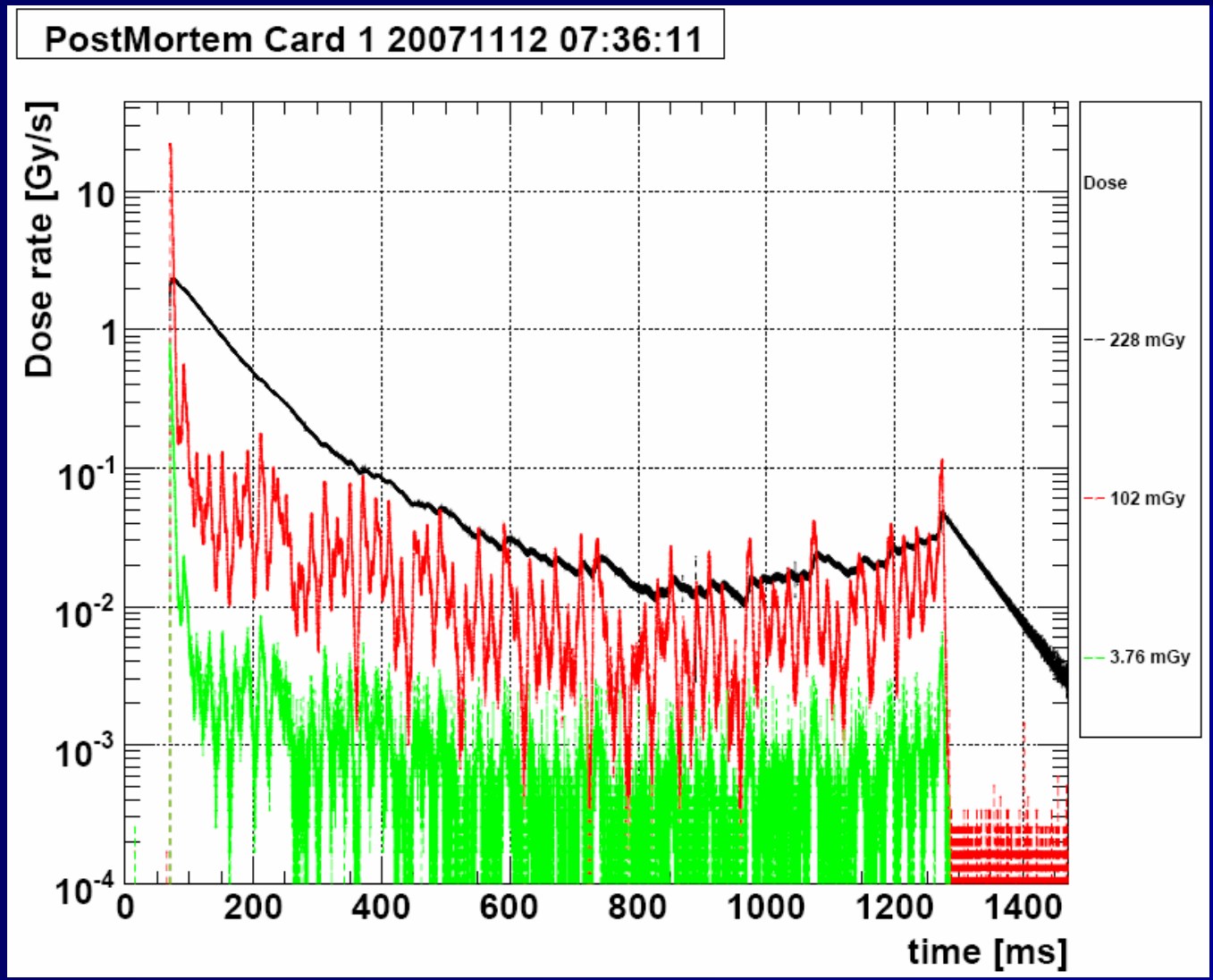
# Resulting actions for the LHC installation

- HV cables separated between SEM and BLMI
- Signal cables (NG18) not shared by SEM and BLMI
- CFC cards not shared either
- For collimation areas
  - capacitors removed from the chambers
  - 150kOhm resistance to limit the i/o BLMI current

# System A 1.3e13 $p^+$ dumped on collimator, Left Jaw at -5 mm, Right Jaw out

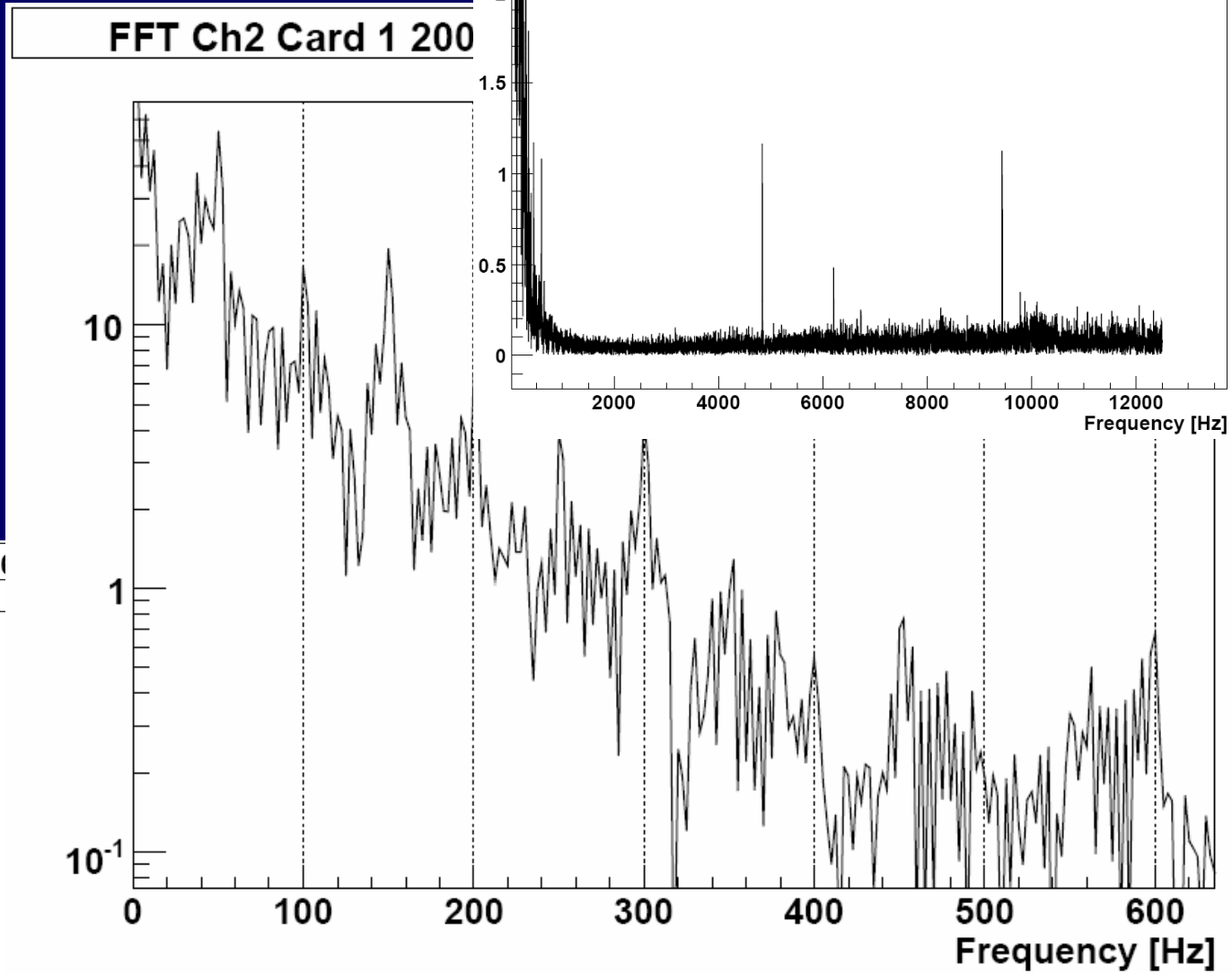


# System A 1.3e13 $p^+$ injection plateau, Left Jaw at 10mm, Right Jaw out, Dump @ 1.2s



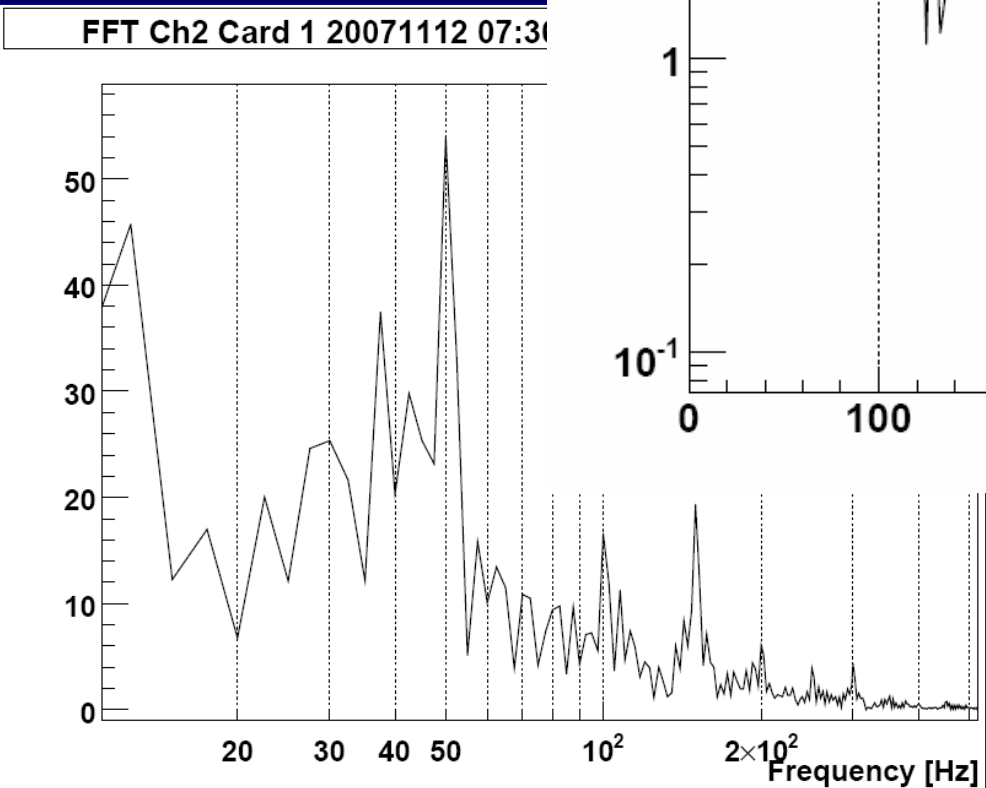
FFT of the previous plot (red channel from 200 to 1200ms)

Different scales presented



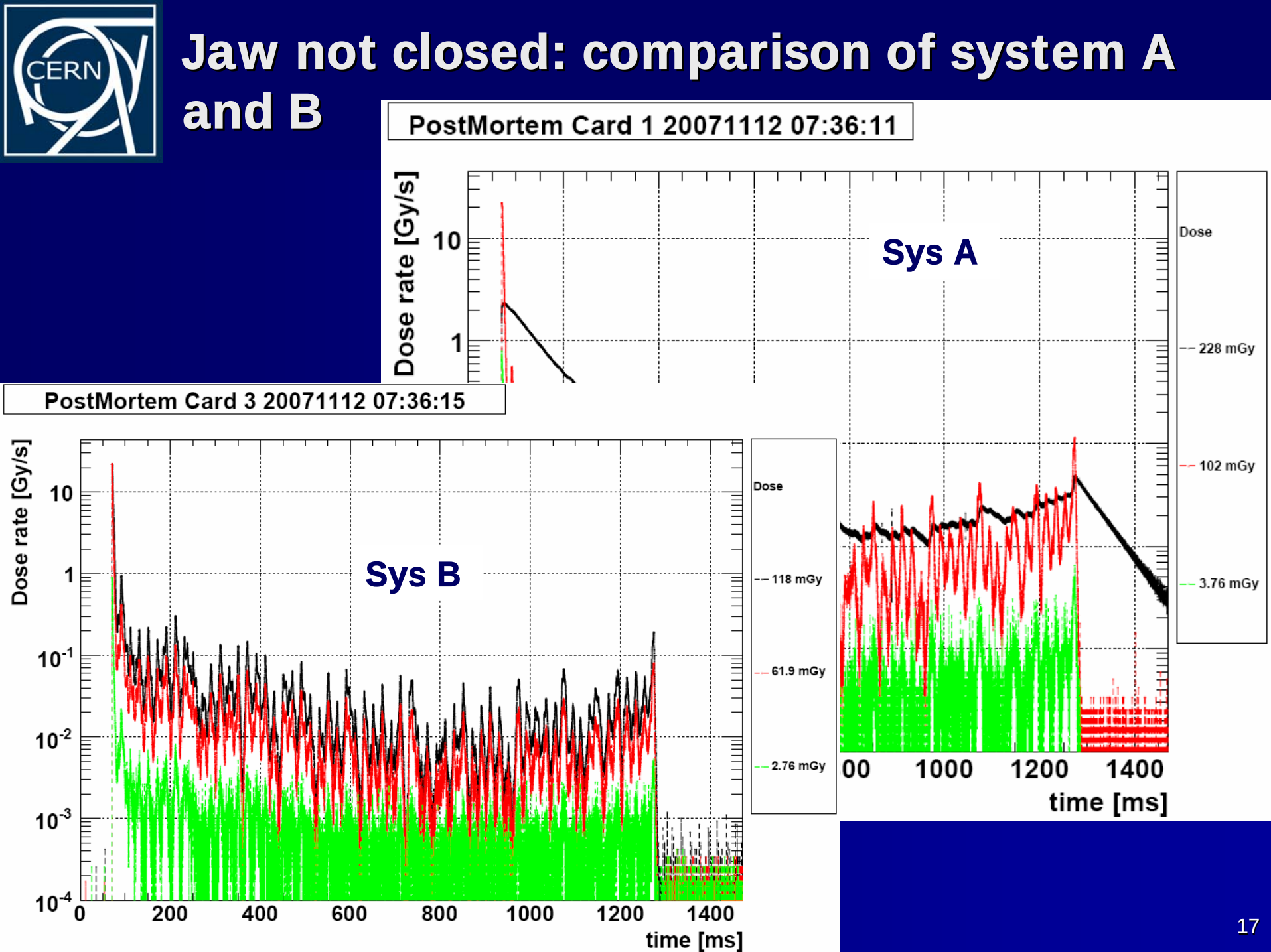






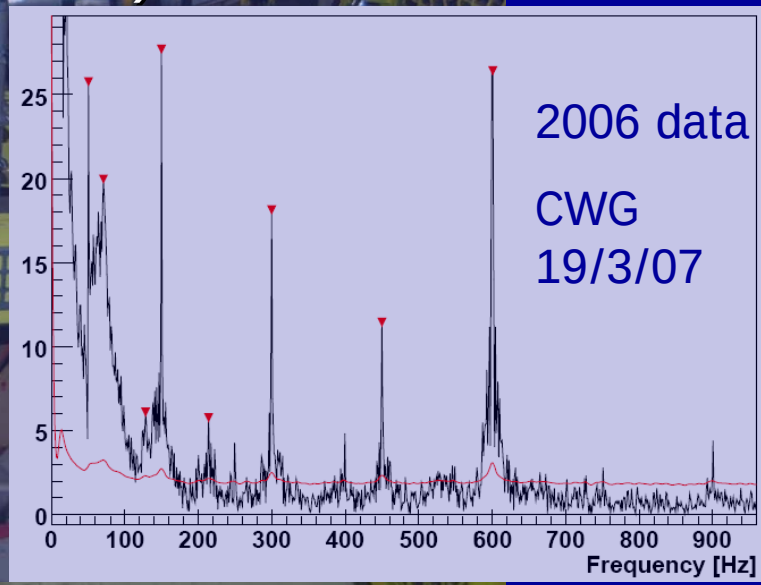

The 3-phase power supply lines similar to the coasting case. 600Hz should be caused by the 12-pole converter of the rectifier

# Jaw not closed: comparison of system A and B

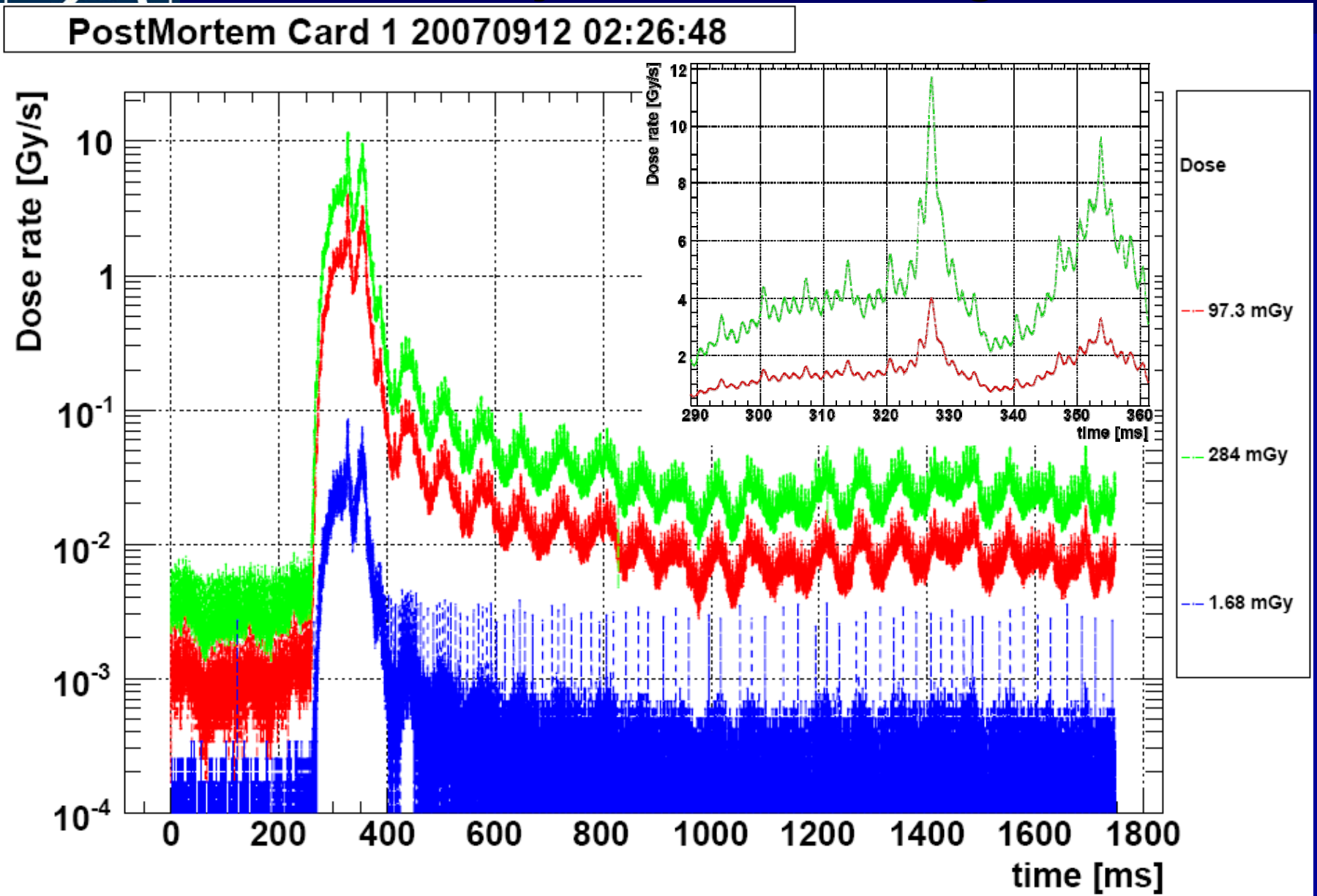


# MD request for 2008

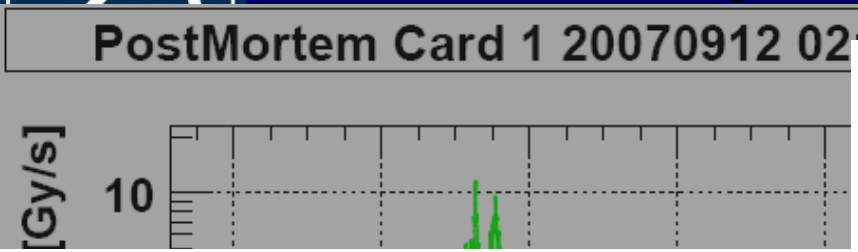
- 2007 halo oscillations estimated to ~1.8 um
- Aim is to verify the beam halo position oscillations
  - by using both horizontal jaws (LHC collimator)
  - By using vertical jaws of the SPS collimator
  - Is the beam center moving? (fast BPMs)
- Need
  - coasting beam 270 GeV
  - Up to 12 bunches
  - LHC Collimator control
  - SPS Collimator control

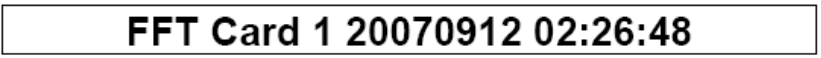


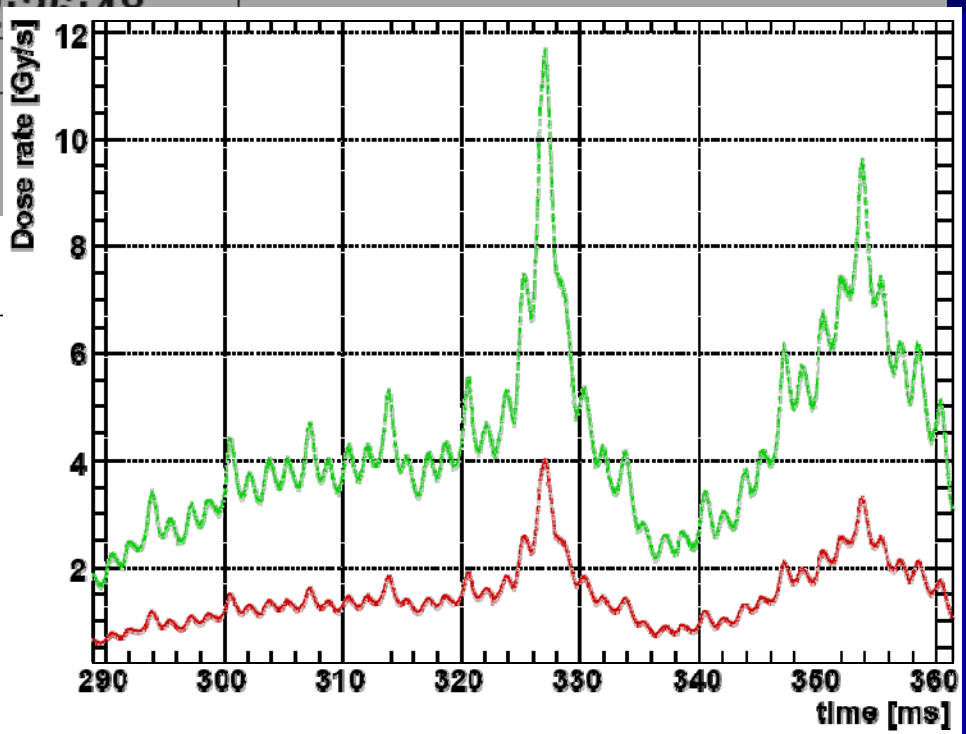
# W37 Coasting beam 270GeV
# 200um Left jaw move, no signal filters

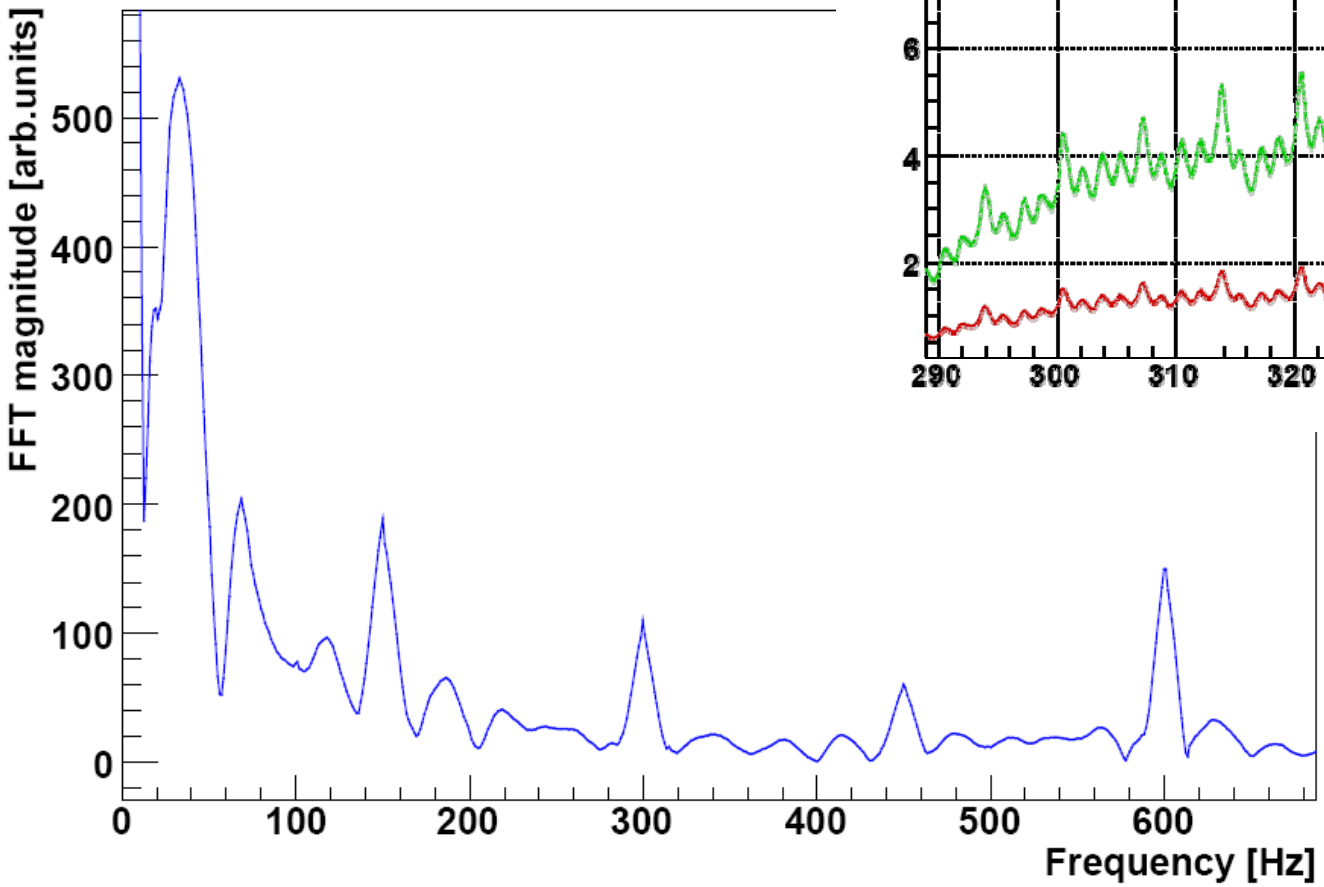


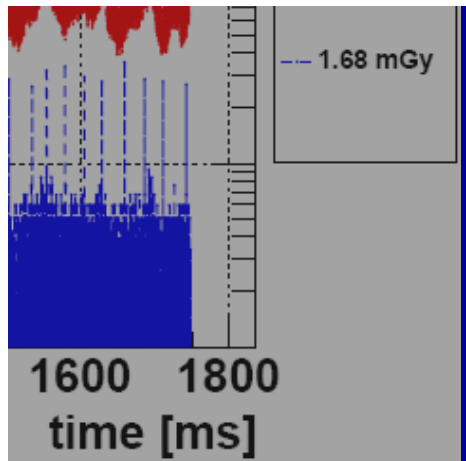
# W37 Coasting beam 270GeV
# 200um Left jaw move, no signal filters



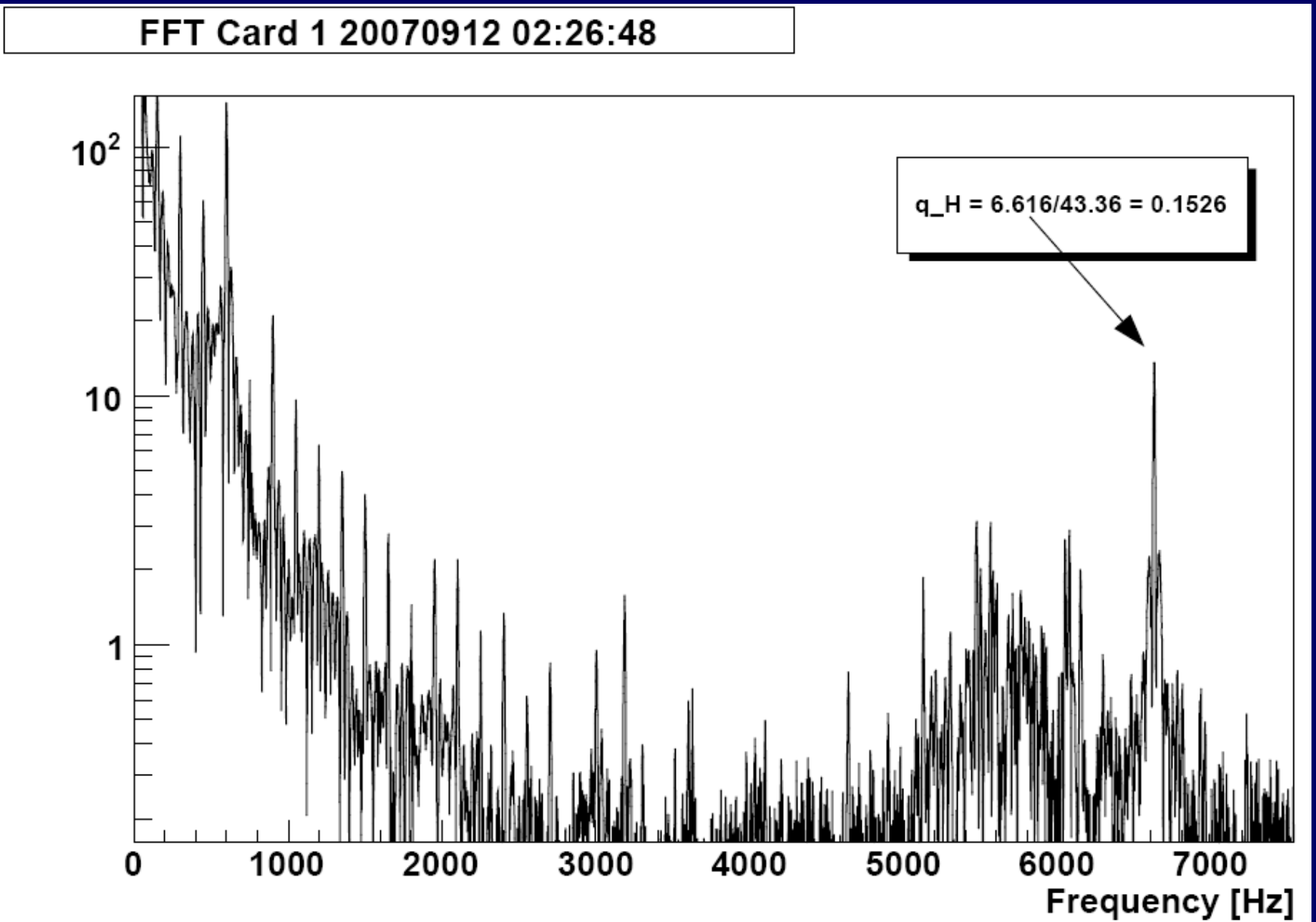



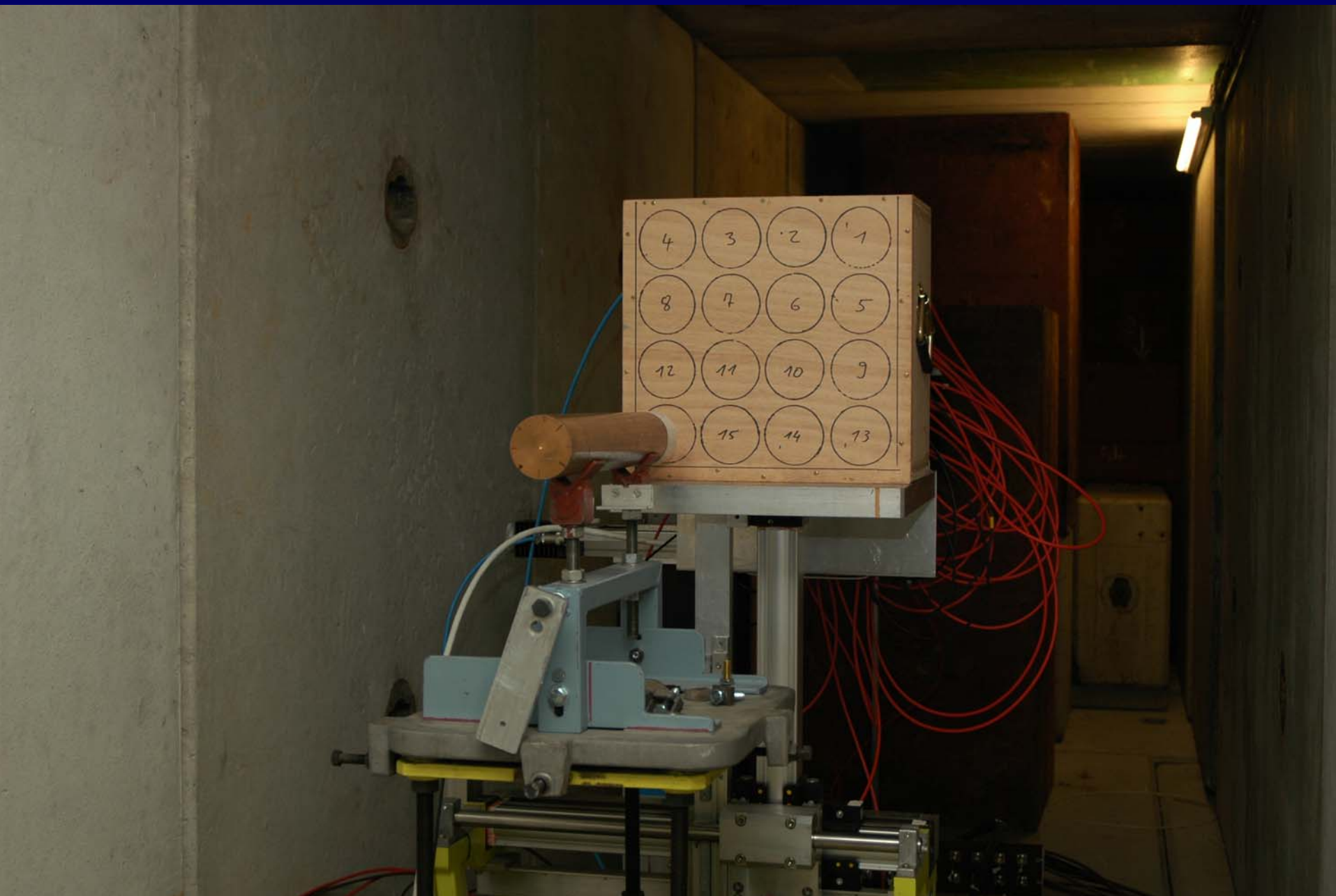



# thanks

# Spare plots 1 Tune calculation from the BLM measurement



# Spare plots 2 H4 Calibration of the SEM (to be presented later)



# Spare plots 3 SEM assembly