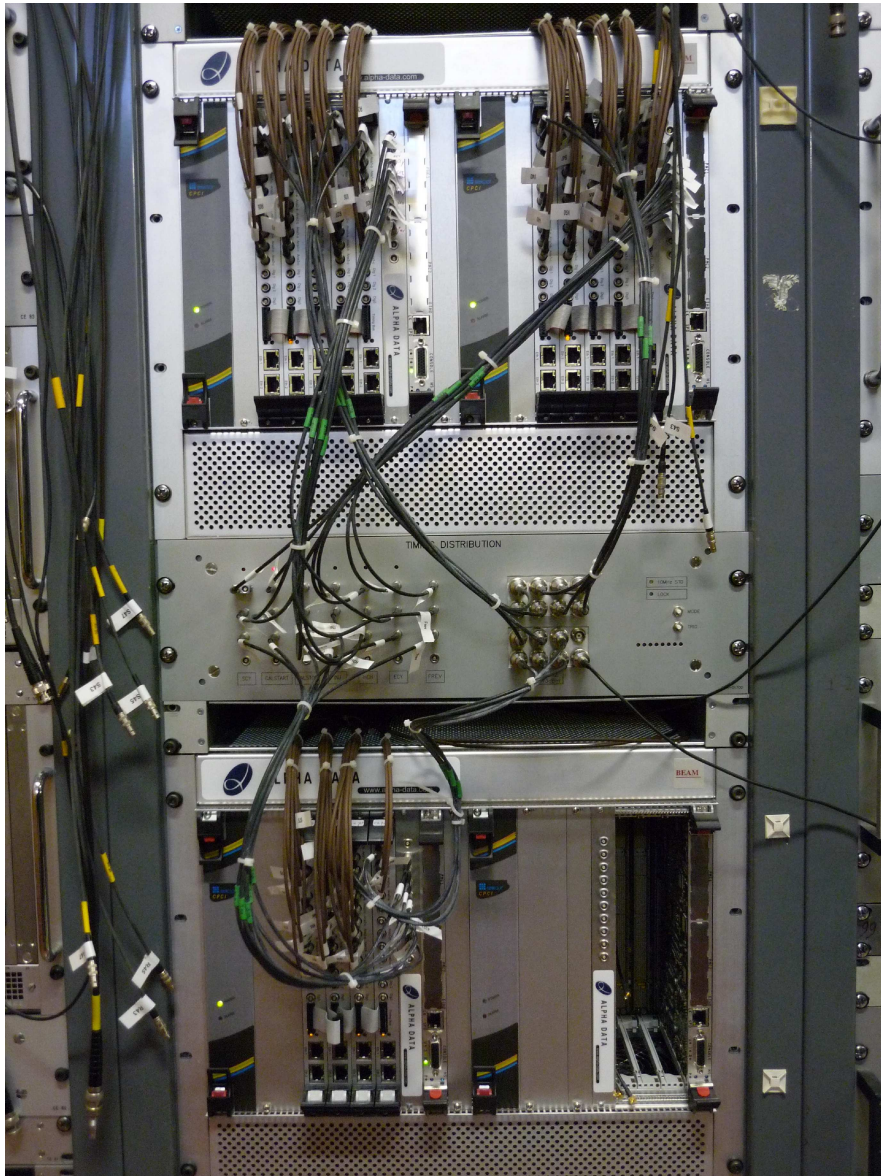
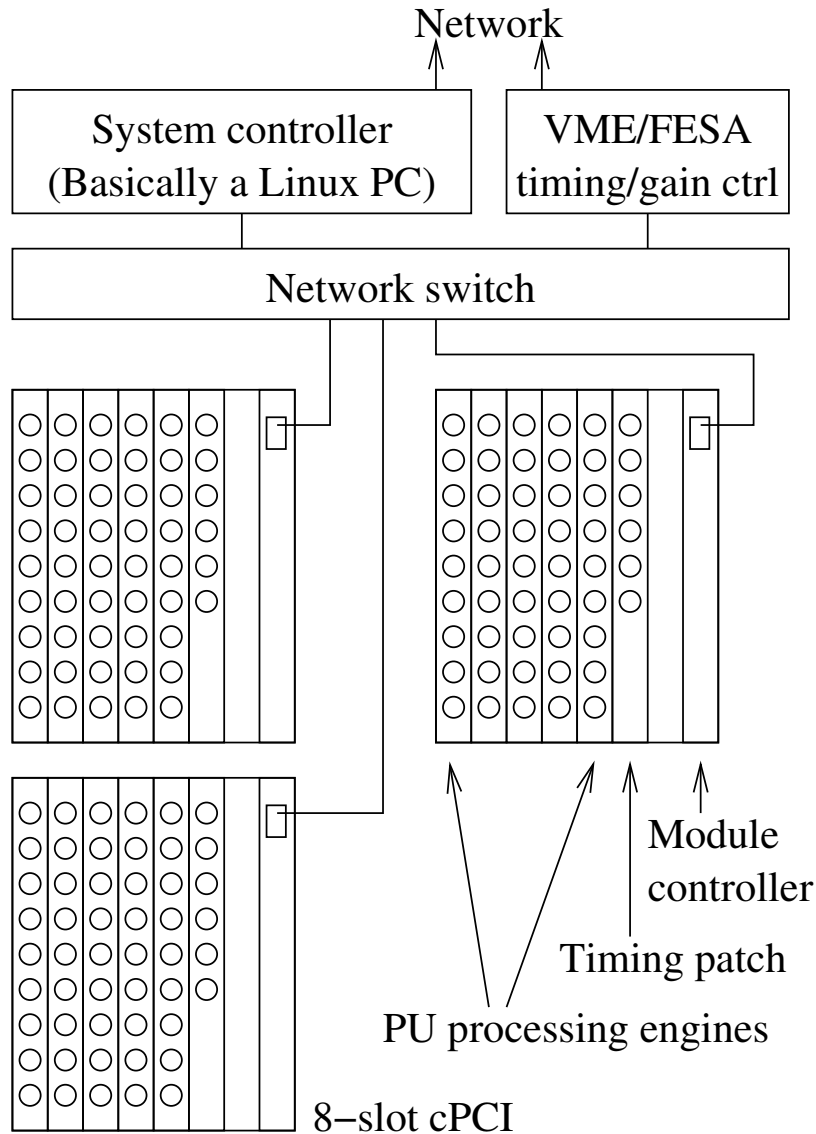


# The PS Trajectory Measurement System (TMS)



- Three half-width cPCI crates
- 120 Analogue inputs
- Six timing inputs
- 125MS/s per channel
- Five computers

# System block diagram

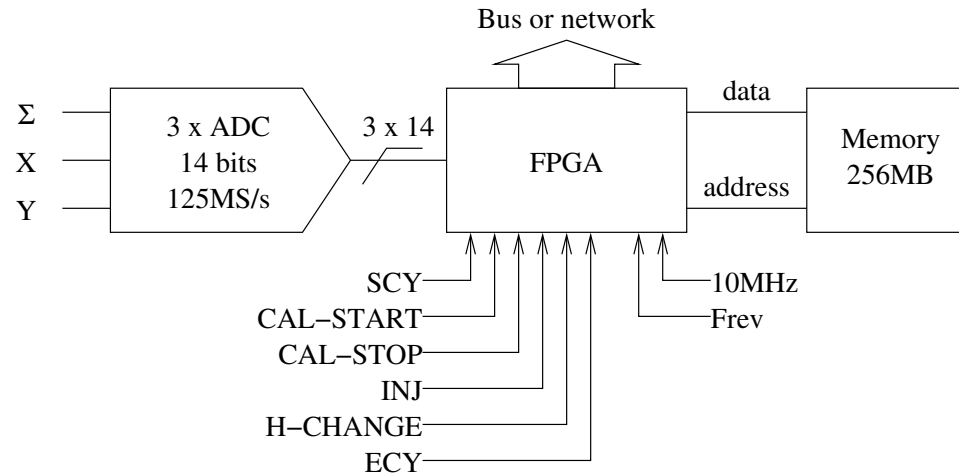


Each cPCI crate has a Concurrent Technologies PP410 CPU board.

System Controller is a Supermicro Core i7 5046-XB PC.

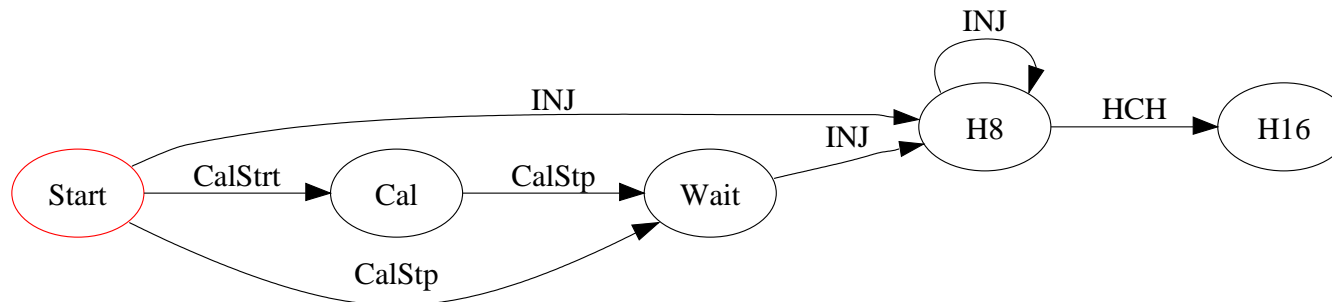
VME crate with timing and amplifier control hardware runs FESA. Gigabit ethernet private segment links it all together.

# Timing inputs



Timings drive FSM, programmed for each USER

(Is that really optimal?)



No timings are under user control !

You're not supposed to touch these, but...

---



PX.SCY-TMS	Start of Cycle (Simple C-timing)
PX.CALSTRT-TMS	Calibration start (Idem)
PX.CALSTP-TMS	Calibration stop (Idem)
PIX.INJ-TMS	Injection timing (RF periods, PPM)
PX.MP14HCH-TMS	Harmonic change (C+10MHz, PPM)
PX.MP16HCH-TMS	Idem
PX.MP21HCH-TMS	Idem
PX.MPSWPHCH-TMS	Idem
PX.ELFT-TMS	End of Last Flat Top (C-timing, PPM)

## USER lines

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SFTPRO  
CNGS  
TOF  
TSTLHC25  
LHC PROBE  
EAST[ABC]

Adjusted, including H-change, but...

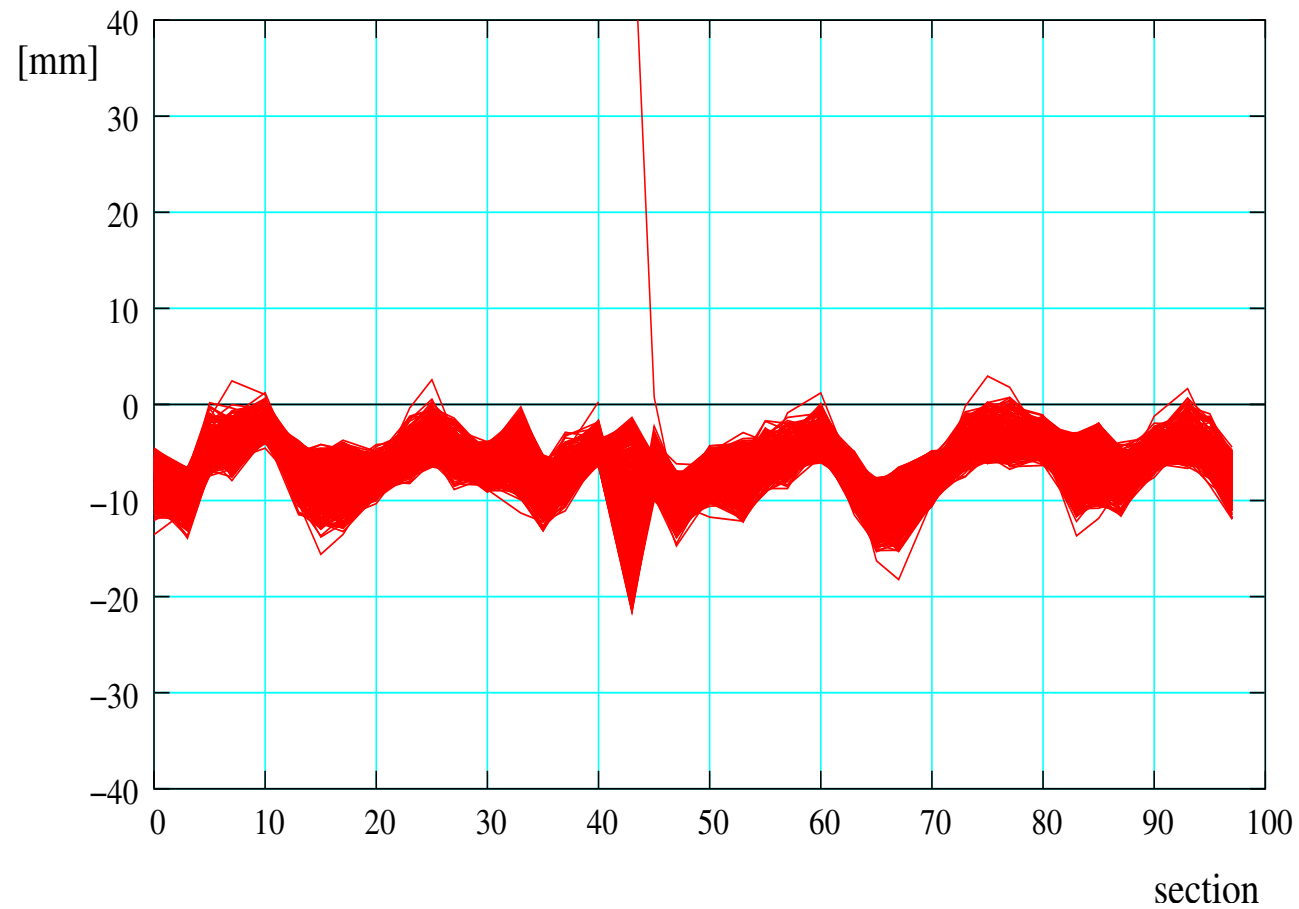
MDPS  
MD1

Adjusted, but MDs are volatile

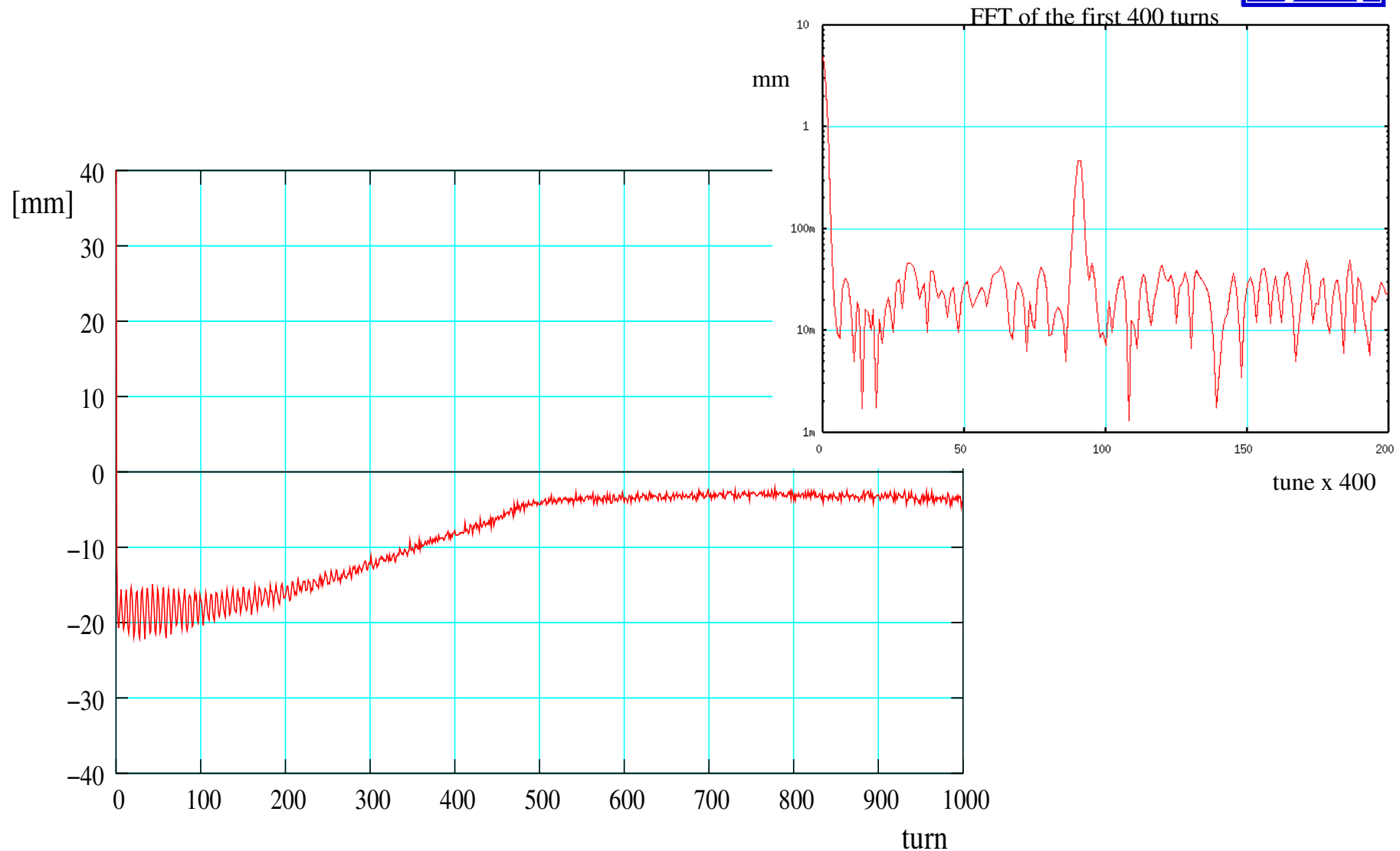
AD  
\*ION  
others

Not adjusted (Except AD injection)

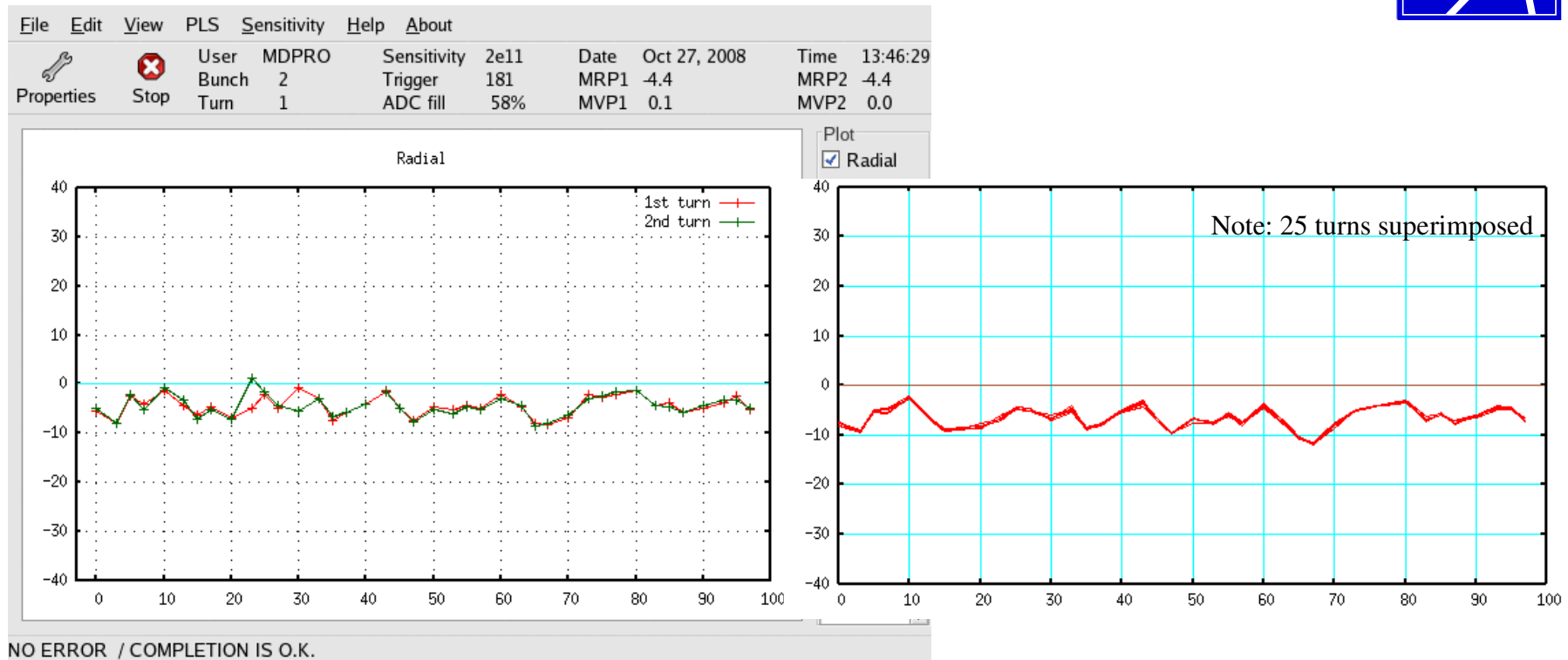
# P+ beam, injection + 1000 turns



# P<sup>+</sup>, injection oscillations & injection bump collapse

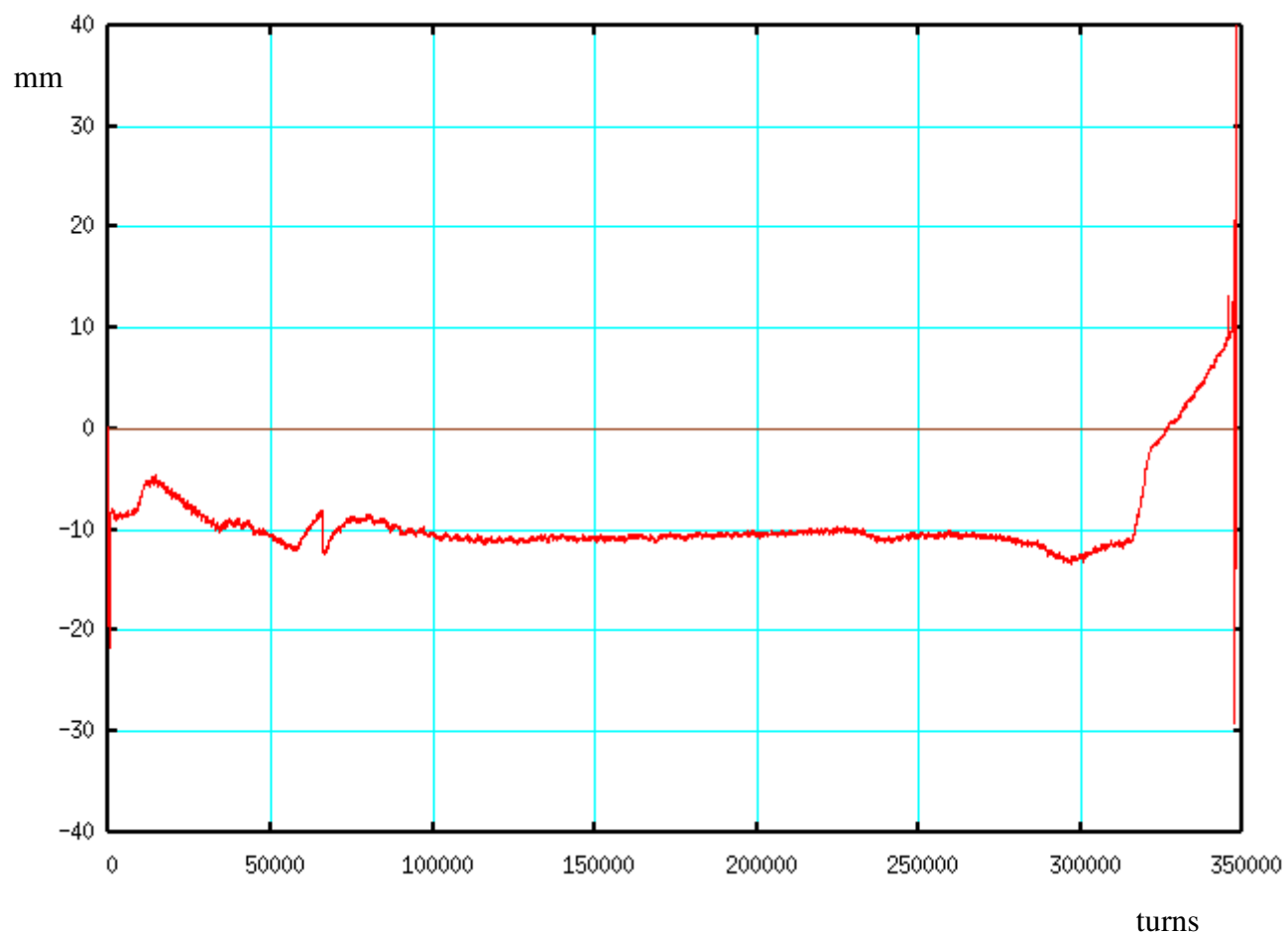


# Side-by-side comparison of CODD and TMS

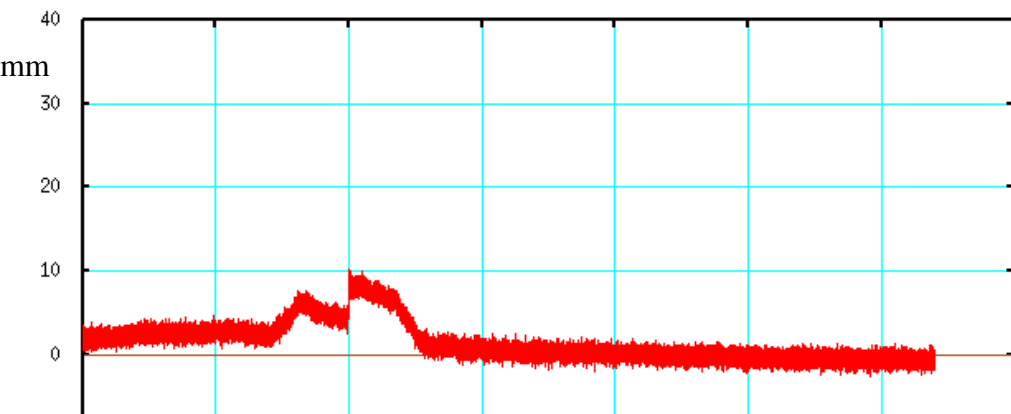


One of two  $5e12$ ppb  $P^+$  bunches, 11ms after injection

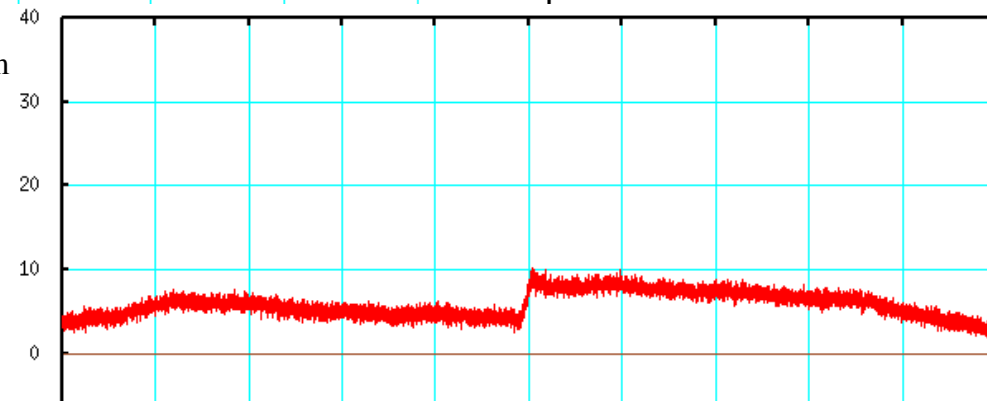
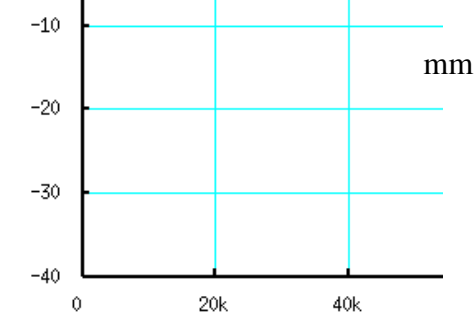
# P<sup>+</sup>, position at PU43, full cycle



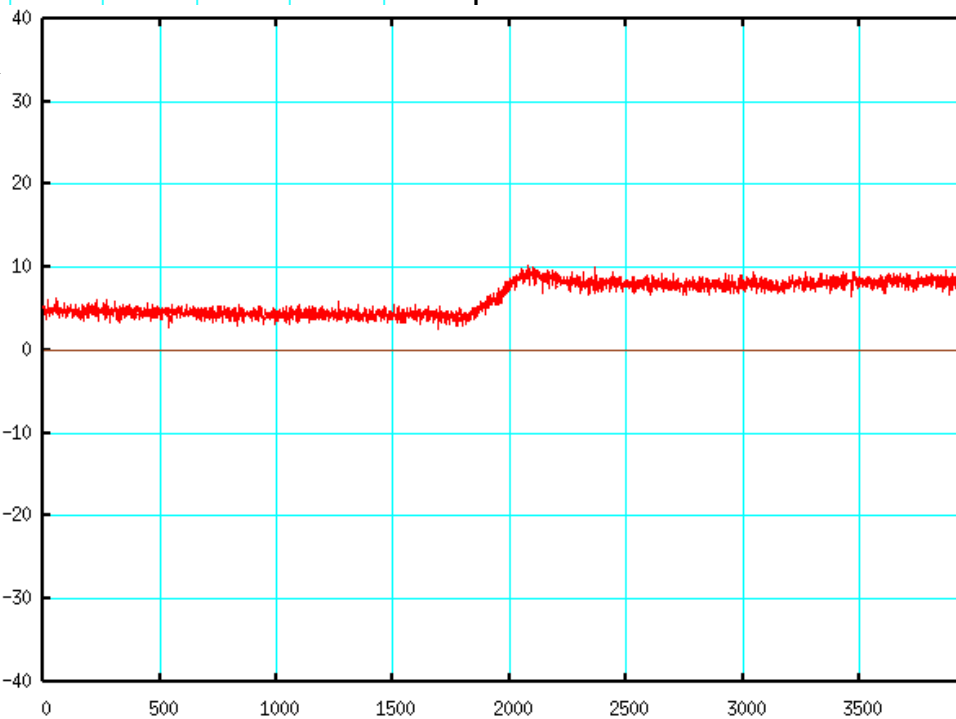
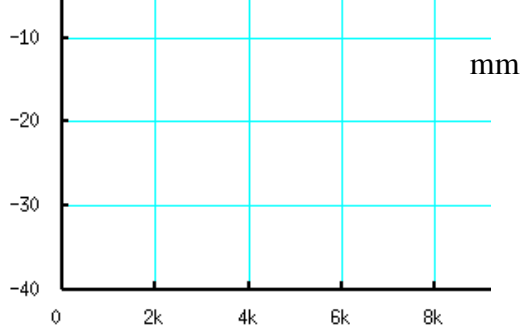
(These data are low\_pass filtered to reduce noise)



128k revolutions



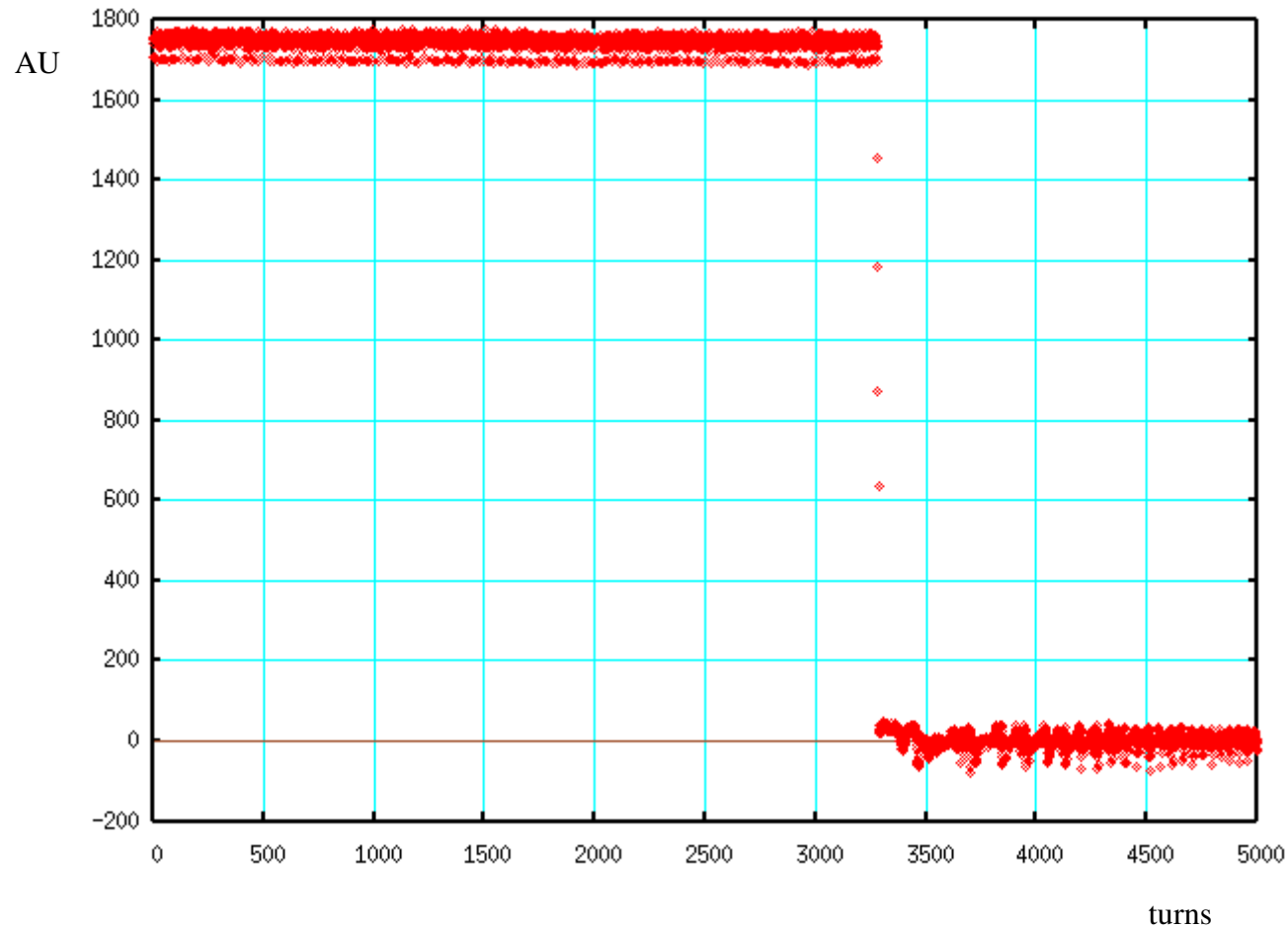
20k



4k

SFTPRO  $\gamma$ -Transition crossing  
seen at PU33

# Ejection: Sum signal on PU15 starting at 838ms



Note: Extraction over 5-turns