MOLLER POLARIMETER TEST at 11 GeV

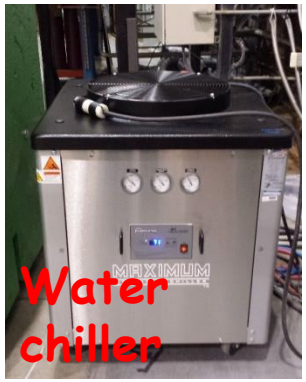
18-20 December, 2015

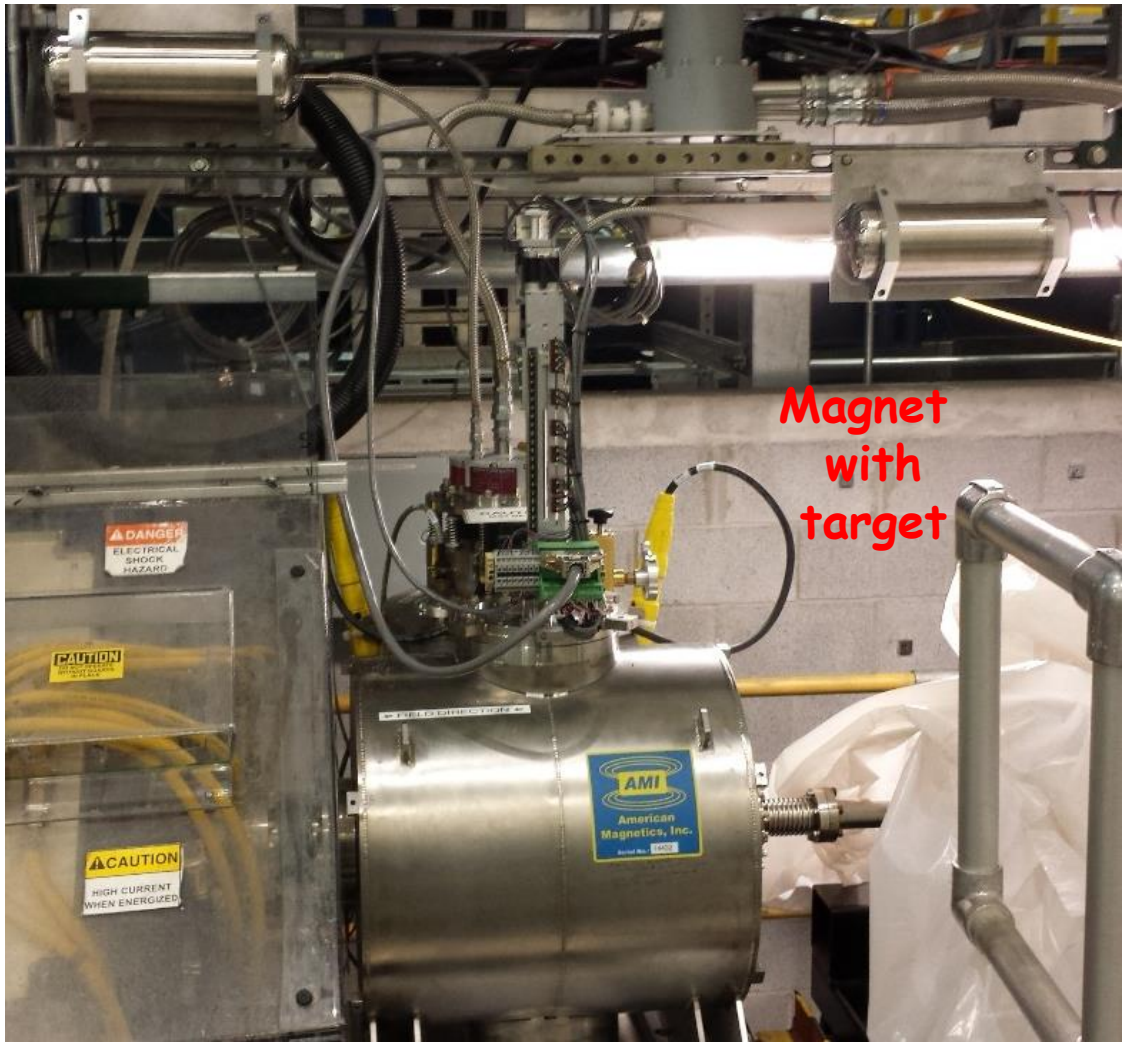
CONGRATULATIONS!

12 GeV in CEBAF

11GeV in the Hall A

NEW POLARIZED ELECTRON TARGET





Superconductive magnet:

Maximal Field ±5T

Very limited information

- portable

- no LN required

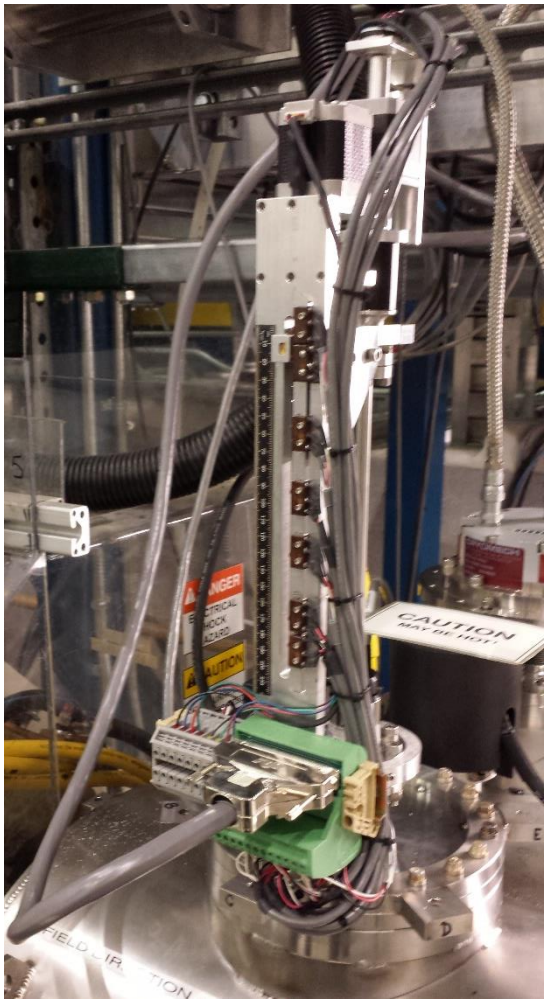
- no cryo lines required

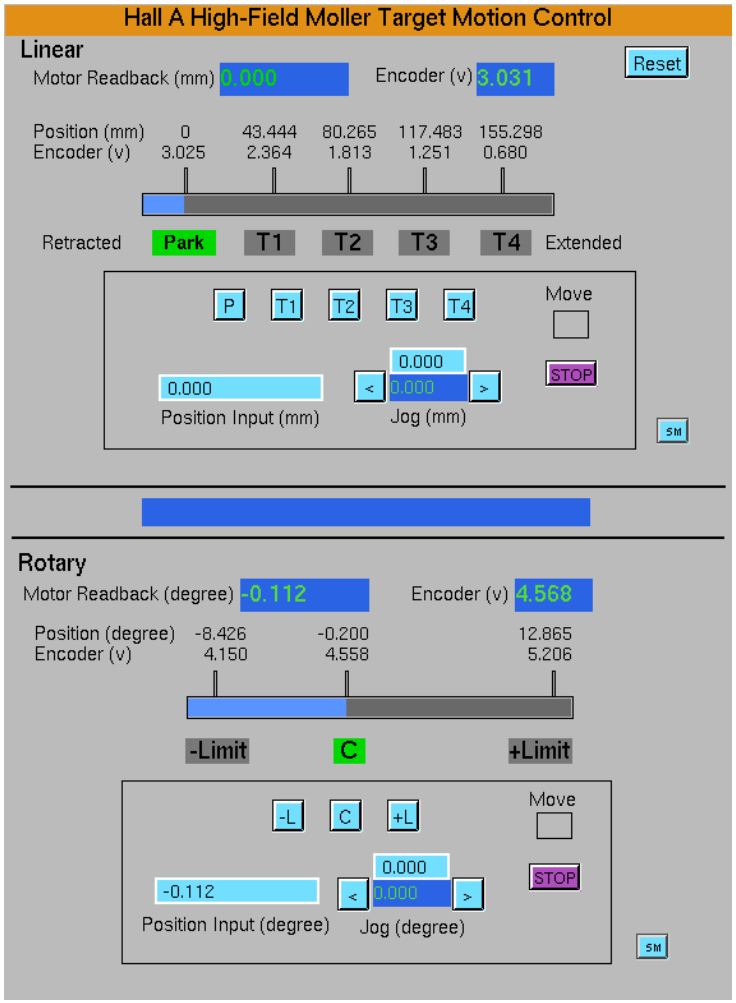
Small amount of He ->

low thermal capacity and "cold" production ->

low field ramping gradient (~35min: 0->3T)

NEW POLARIZED ELECTRON TARGET





TEMPLE UNIVERSITY

Made by Temple University
Rotation in horizontal plane ±10°
Vertical translation
Targets in holder: pure iron 1μm, 4μm, 12μm, 25μm

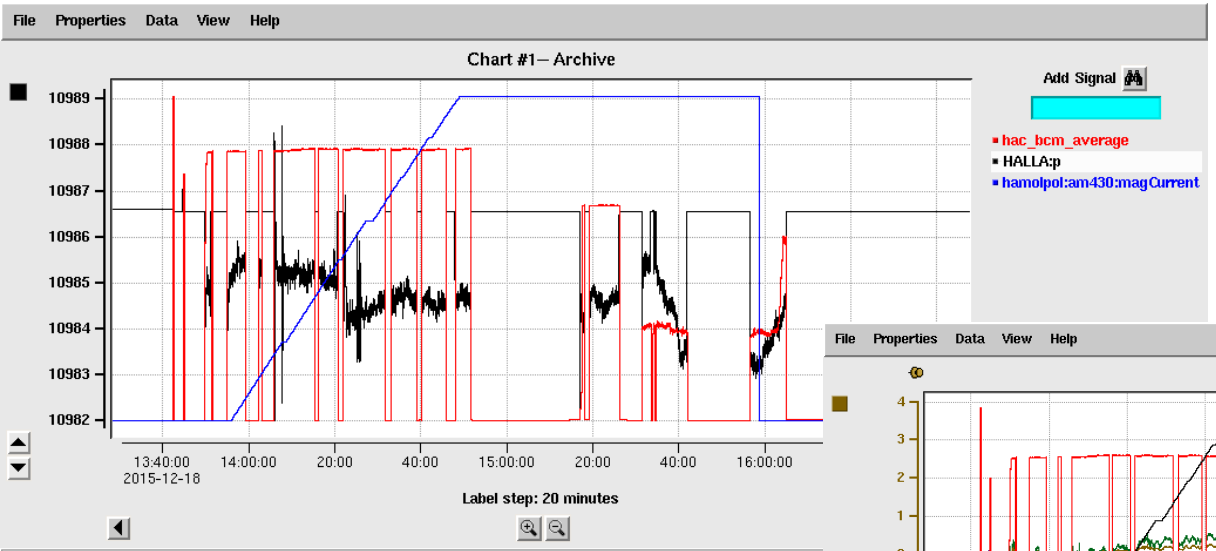
PLAN FOR THE TEST

- *To test new SC magnet with the beam*

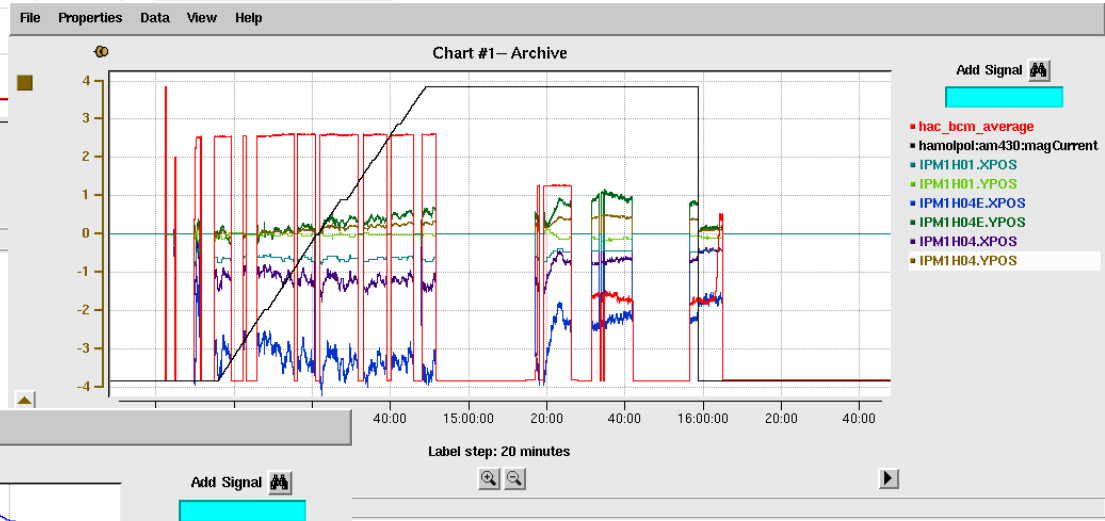
- *To test the target assembly with the beam*

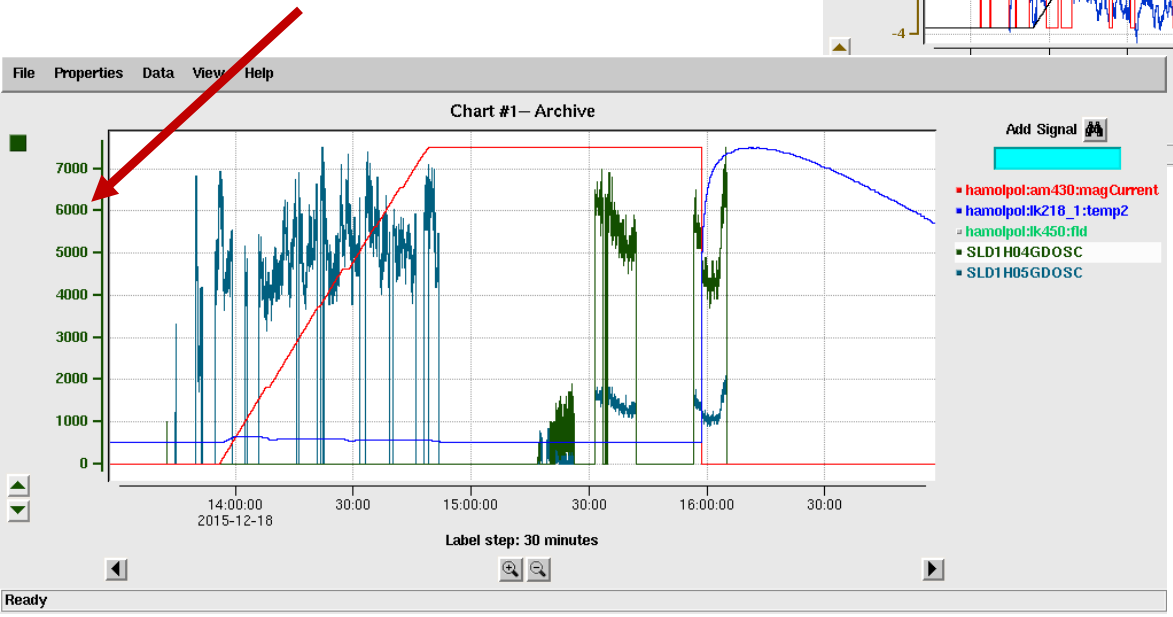
- *To test the Moller polarimeter with 11GeV*

18 December, 2015



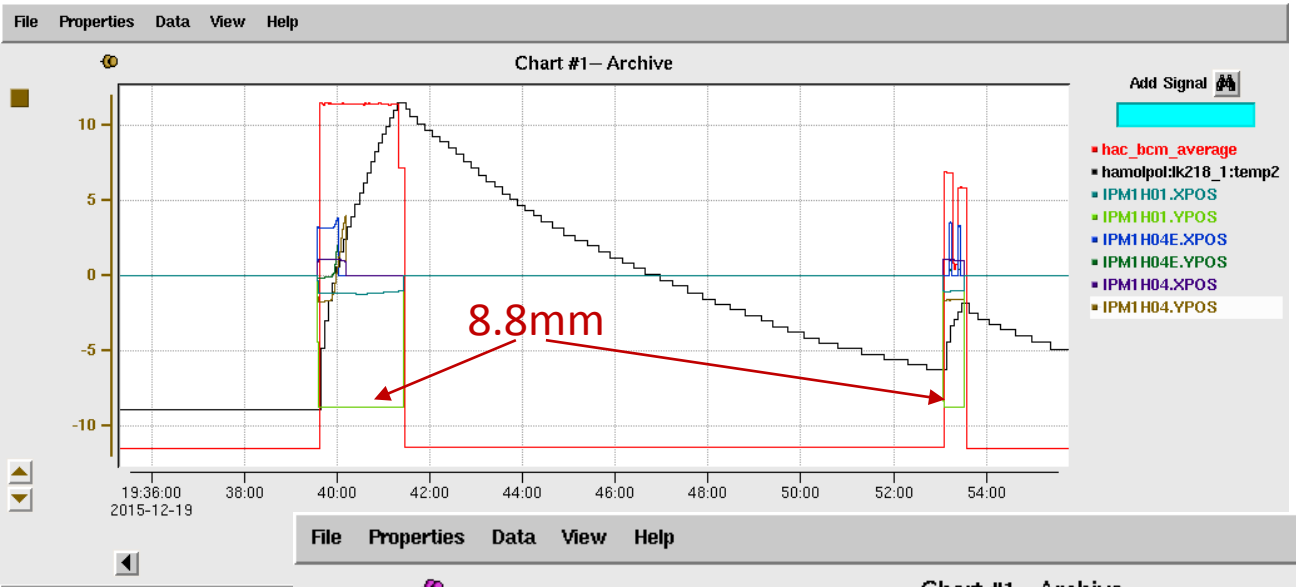
CW beam 1.5μA
Straight beam
4T field in magnet
Target #3 (12μm)
Magnet ***QUENCH***



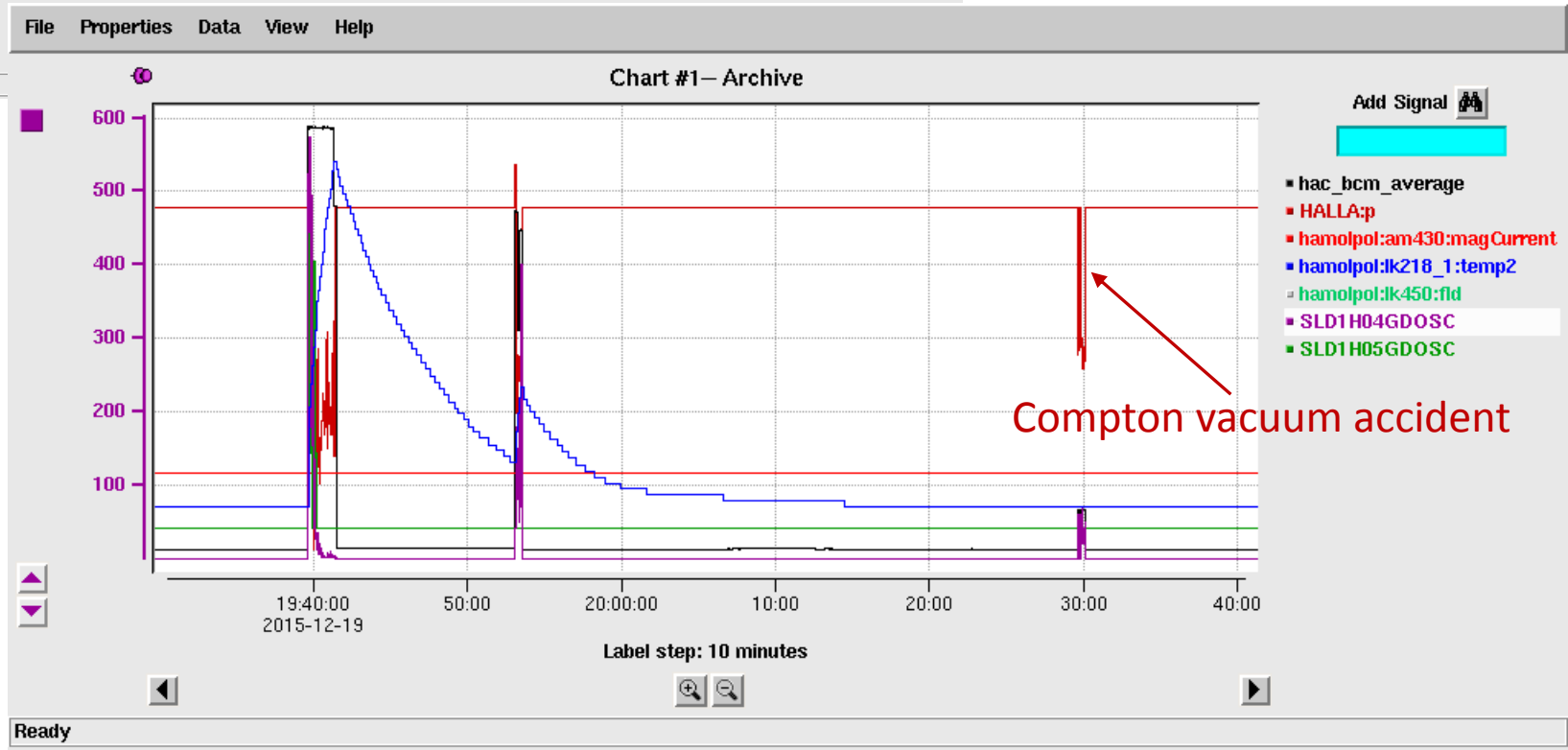


5-6 hours for
the magnet recovery
after quench!

19 December, 2015



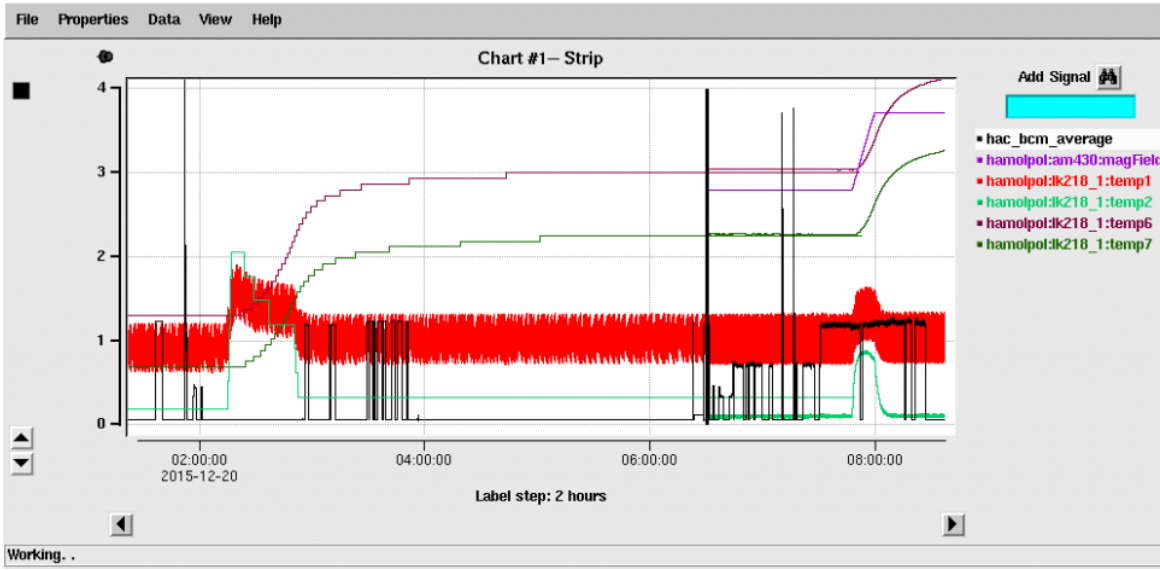
Beam through Compton
Pulse/Tune
Low radiation
No field in magnet
No Moller target



20 December, 2015

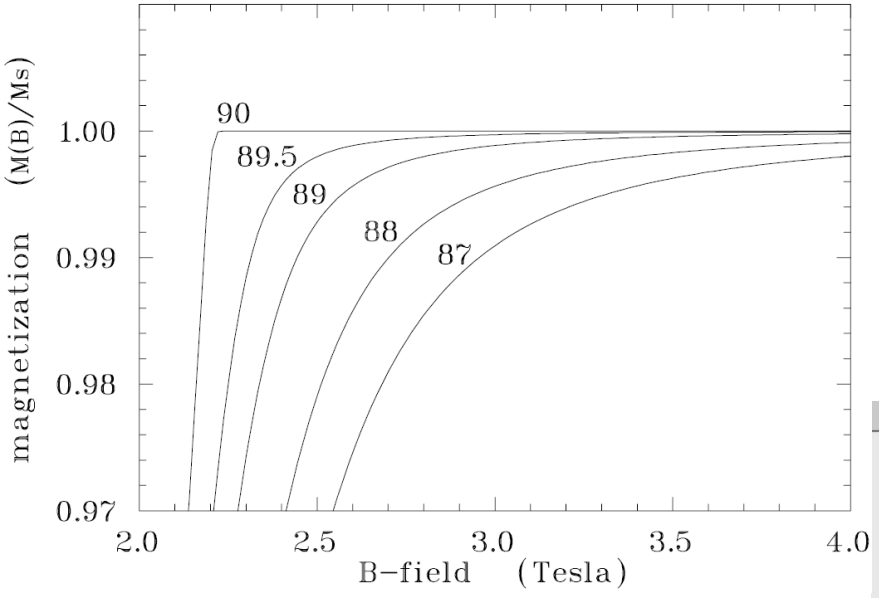
2am: MCC set the Moller settings
ramp the Moller magnet up to 3T
Tune beam/no beam
6:30am - CW! Taking data
Target #2 (4um), 0.5uA
Target #3 (12um), 1-1.2uA
7:47am - ramp magnet up to 4T
Target #3 (12um), 4T, 1.1uA
Very preliminary
Beam polarization Target #3:
at 3T: -56.91+/-0.22
at 4T: -59.43+/-0.22

Straight beam
Low radiation
Good beam tuning
~2 hours of CW



Low polarization:
- Did not tune detector (HV, thresholds)
- Unknown target angle -> target is not saturated -> low polarization
*- **Unprecise energy** -> unknown precession angle*
- Unprecise Wien filter
Need spin dance and target angle tuning

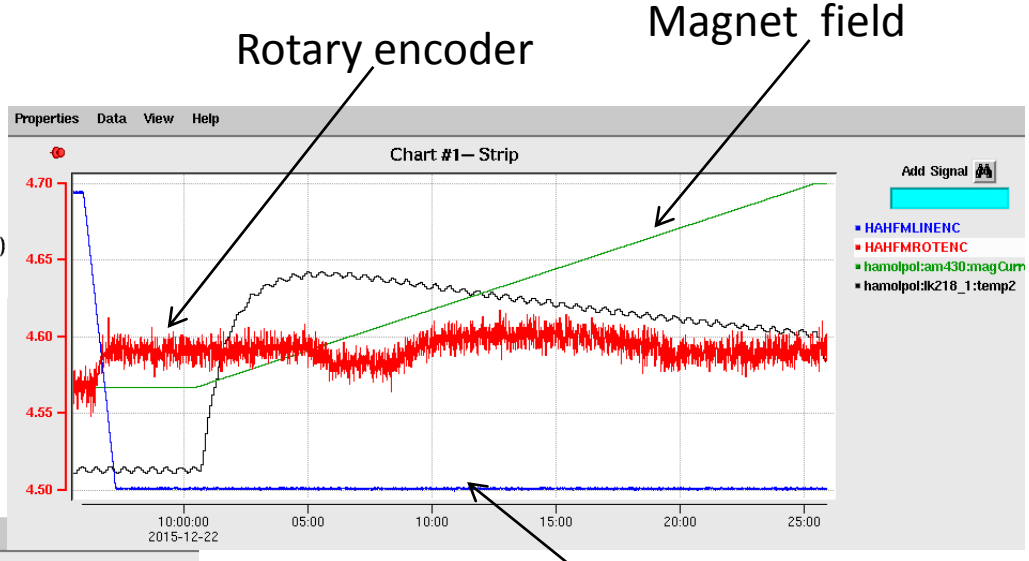
Target Rotation Test

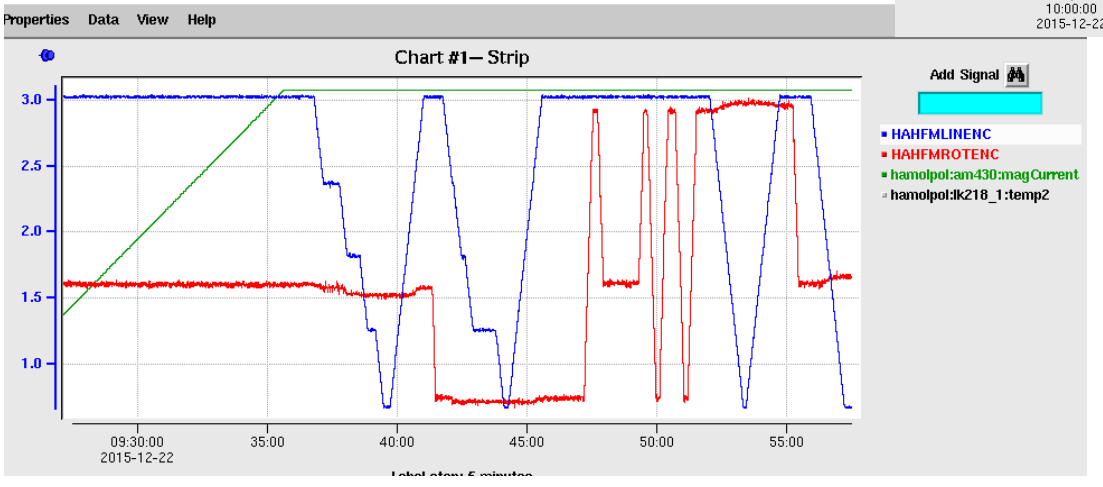


Goal: yaw + pitch <0.5º -> 3T

Target rotation angle dependence of
- magnet field
- target position

Magnetic coupling?
Motor in different magnetic field?





Target angle:
Accuracy?
Repeatability?

SUMMARY

Moller polarimeter at 11GeV:

- *Optics (quads, dipole, power supplies) OK*
- *Detector OK*
- *Moller DAQs (old and FADC) OK*
- *New SC magnet:*
  - *~2hours of CW, quench, lost of superconductivity*
  - *need more experience*
  - *magnet alignment check at low beam energy*
  - ***Don't shoot the magnet!***
  - *beam tuning requirements*
  - *coexisting with Compton?*
- *New target*
  - *have to discuss the data with Temple*
  - *need more data (target orientation)*