E-01-006

Collaboration Meeting

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Analysis

- ∗ Hardware Calibrations
- ∗ First Pass Analysis
- ∗ Special Considerations
- ∗ To Do

Analysis Replay — Ingredients

"only" components of setup are:

- *rastered* beam

  calibration of beam position information

- target

  TEs, NMR base lines $\Rightarrow$ Paul

- HMS

HMS Calibrations

most calibrations are long-term stable

- wire chamber drift maps

  were done online, need re-checking

- hodoscope gains

  quite stable, but recently redone by Hamlet

- others

  quite stable, need checking

Beam Position Calibration

reconstruction cannot distinguish between vertical beam offset and momentum shift: $1mm \sim 0.1\%\ delta$

sources of beam position information:

* standard beam line `BPMs`

  were not expected to be useful

* Basel `SEM`

  absolute position, noisy, $1mm$ *resolution*

* `ADC` reading raster magnet current

  relative position only, requires conversion, offset

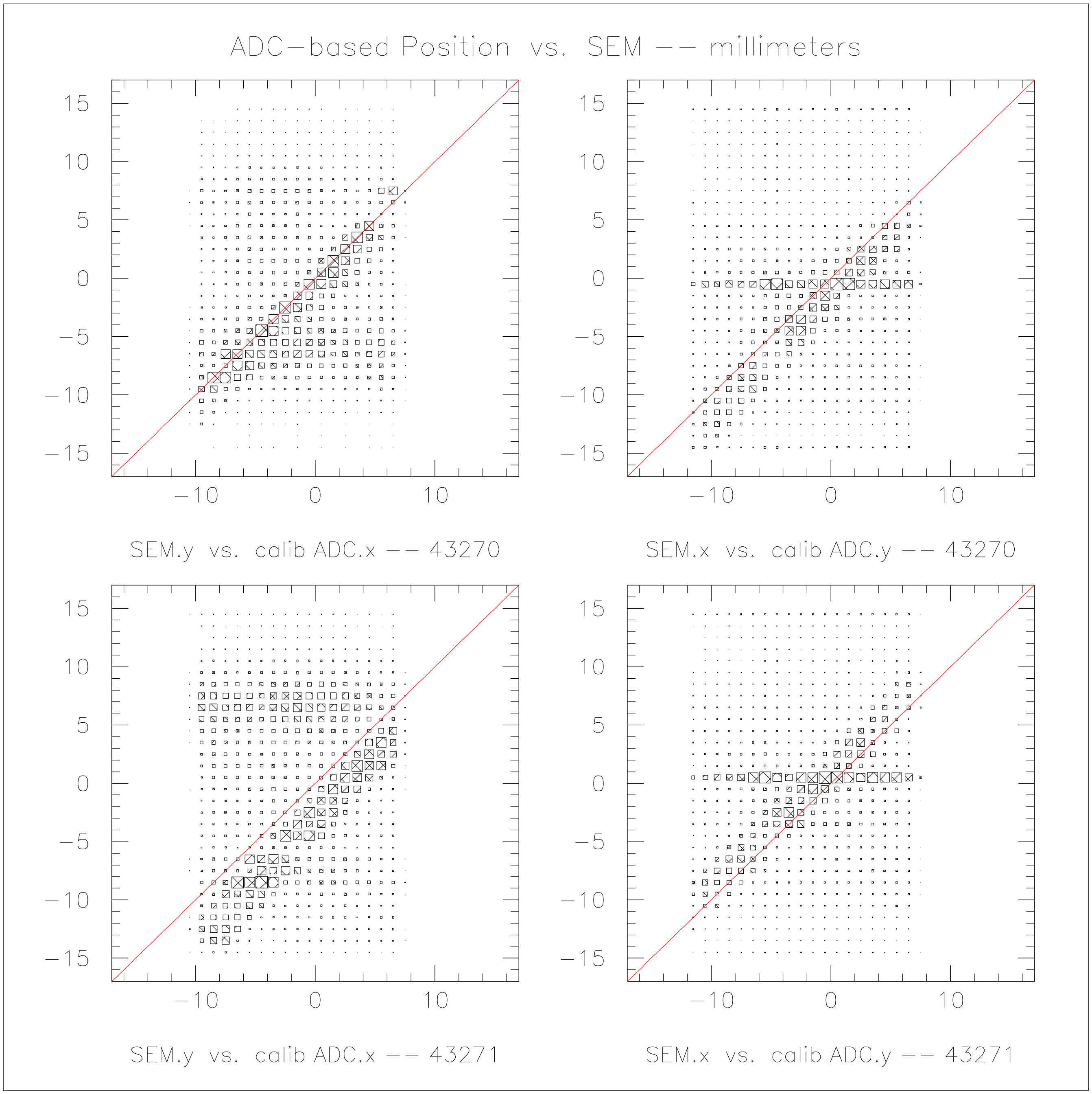
probably best approach: `ADC`

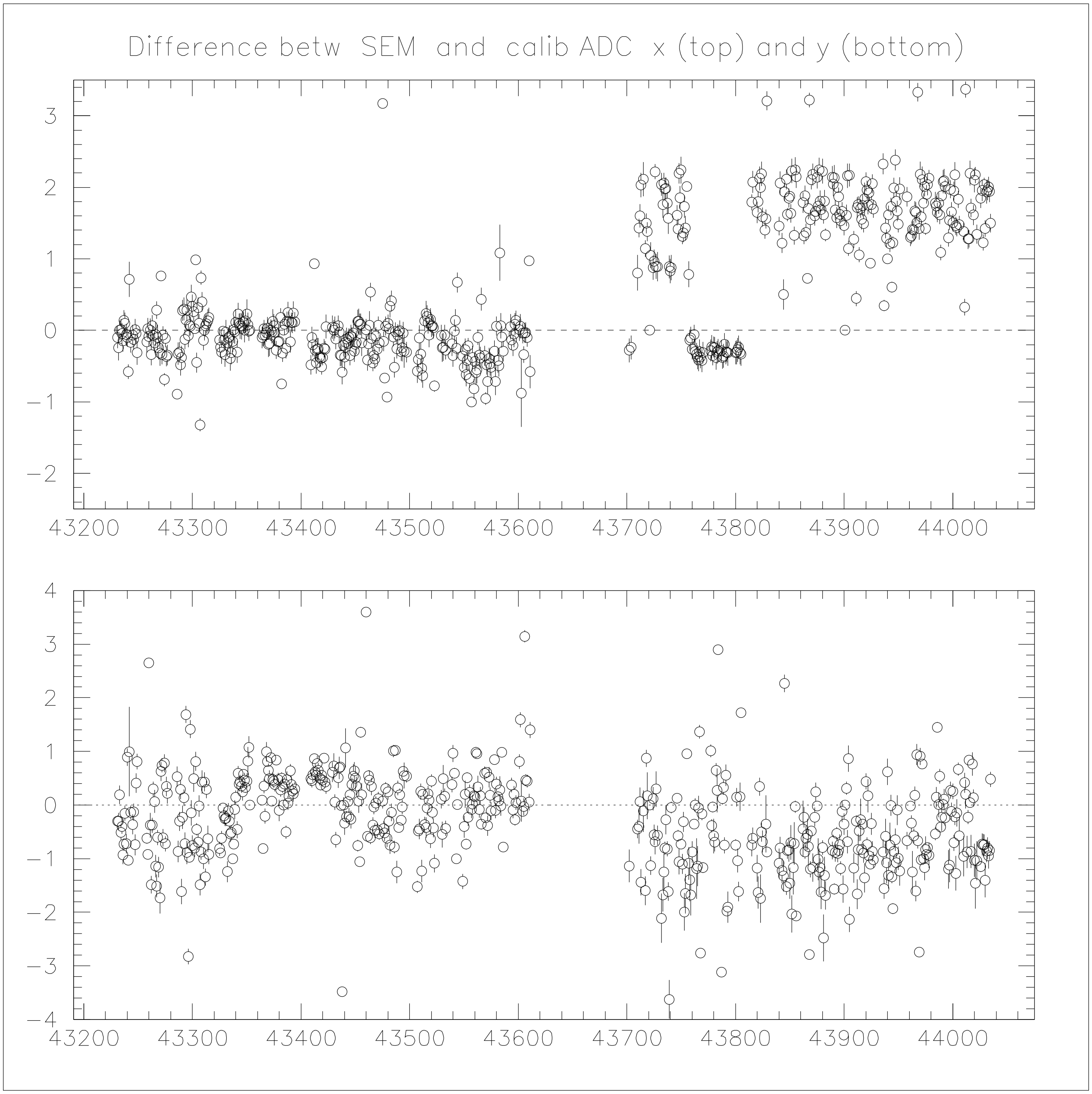
* fast, good resolution, little noise
* linear relation between `ADC` value and beam position

  offset sensitive to beam movement

* requires conversion parameter

  need to be determined & stability checked; non-trivial due to `SEMs` *noise*


ADC−based Position vs. SEM −− millimeters
SEM.y vs. calib ADC.x −− 43270
SEM.x vs. calib ADC.y −− 43270
SEM.y vs. calib ADC.x −− 43271
SEM.x vs. calib ADC.y −− 43271
15
10
5
0
−5
−10
−15
−10
0
10


Difference betw SEM and calib ADC x (top) and y (bottom)
3
2
1
0
−1
−2
43200
43300
43400
43500
43600
43700
43800
43900
44000
4
3
2
1
0
−1
−2
−3
−4
43200
43300
43400
43500
43600
43700
43800
43900
44000

1^{st} Pass Analysis

all results are based on counts in 38+ W bins

* W determined by replay code

  online version made fixed angle approximation

* counts per bin are obtained via `CTP` report

  bins, cuts defined via `CTP` as well

  no Ntuples or histograms need to be processed

Post-Processing

simple `tcl` scripts

* merge each run's counts into one file

  counts NOT summed up

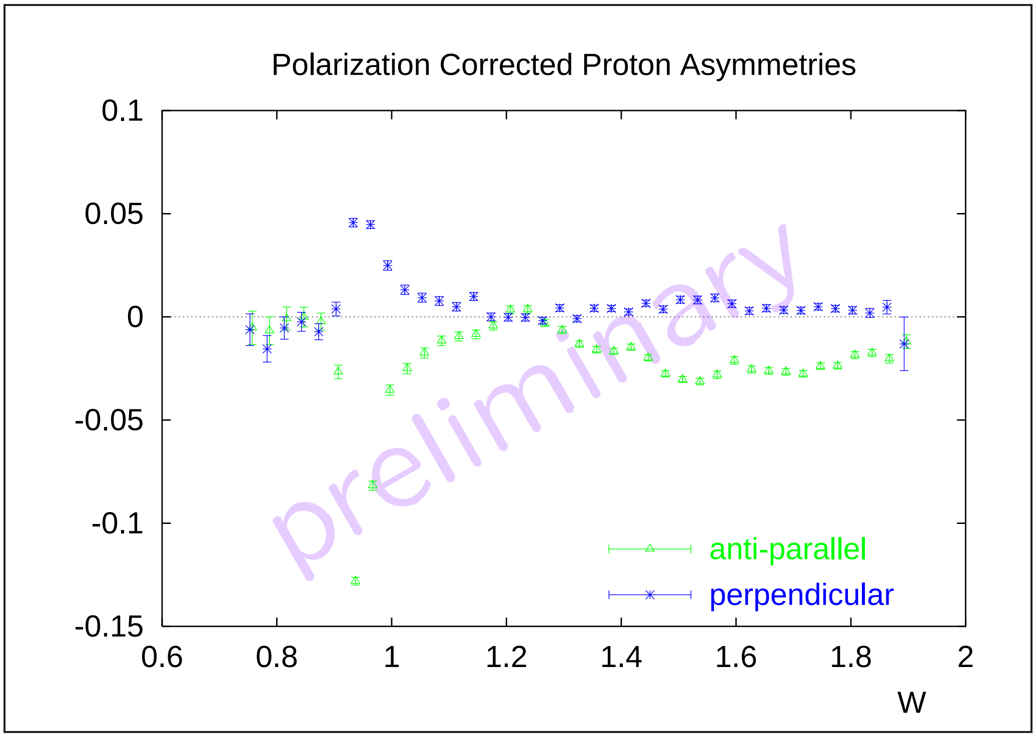
* determine raw asymmetry for each run, each bin
* extract polarizations etc from "database" file

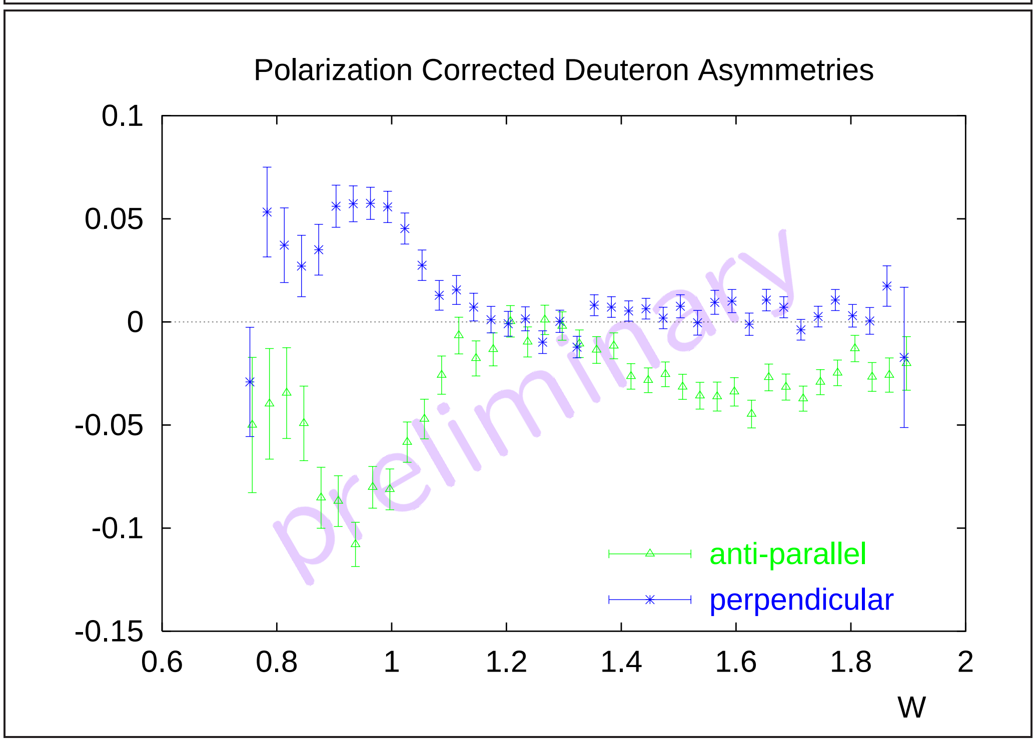
  apply corrections for each run individually

* determined weighed averages for each bin, data set

  numerous subsets, auxiliary results

1^{st} Pass Results



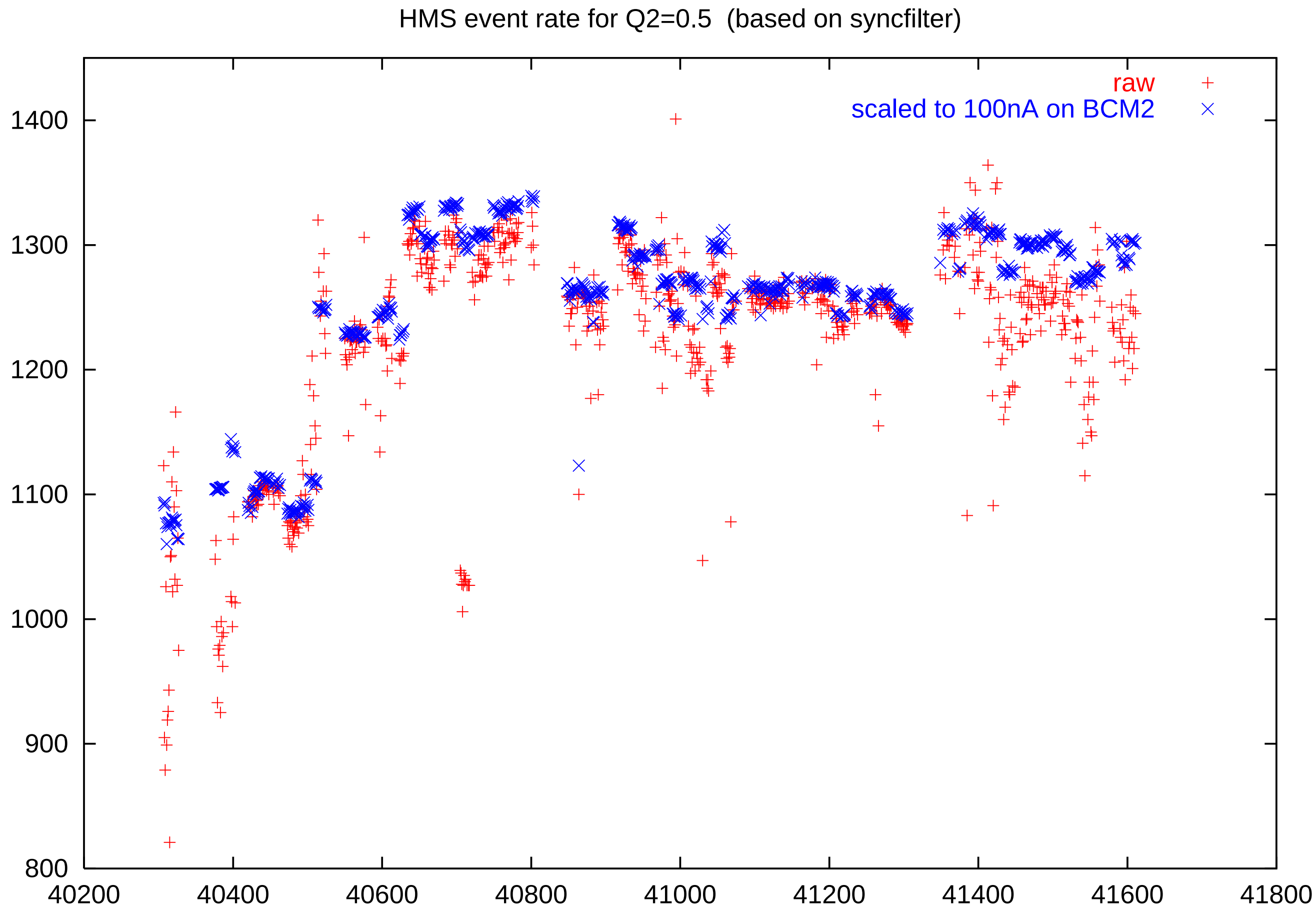


SyncFilter

C code filter between data file and replay engine

∗ detects & fixes/flags data problems

∗ establishes correlation between data and charge



SyncFilter Details: Data–Charge Correlation

* charge scaler gated by `DAQLIVE` ($\overline{\texttt{DAQBUSY}}$)

  eliminates `DAQ` *dead time*

* charge read from helicity scalers

  eliminates charge during ill-defined helicity: 1/30 sec $\leftrightarrow$ 0.031 sec

  normally data only acquired during well-defined helicity

  s.f. processes data in chunks corresponding to helicity intervals

* flag entered into data stream when current below $50nA$

  non-zero `BCM` *minimum*

  evaluated as helicity interval average

  any data ignored during affected helicity interval

* determines *actual* beam charge asymmetry

  relative charge normalization between helicity states

  corrects raw counts asymmetry

Analysis Future

* fix calibrations, update parameter database

  raster, target polarization

* check available histograms for trouble

  script generated summaries?

* study cuts, Ntuple contents for 2^{nd} pass

  1^{st} *pass used plain* `HMS` *event cuts*

* multiple replays of raw data realistic option

  BatchMan *queue-stuffer & progress monitor*