

Analysis of PR detector data from the GEn-RP experiment

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Talk by :

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On behalf of SBS Collaboration

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Experimental Setup

• Electron Arm:

- Bigbite magnet
- GEM detectors
- Cherenkov
- Timing hodoscope
- Pre-shower and Shower detector

• Nucleon Arm:

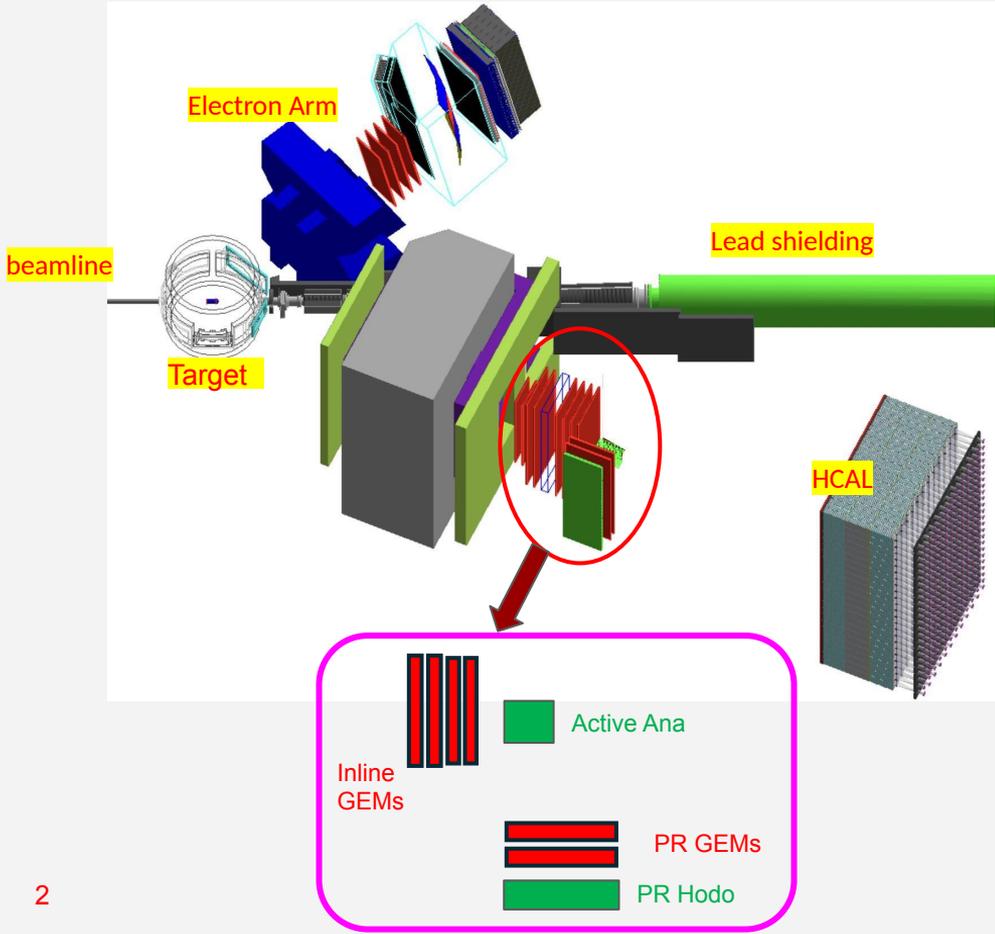
- Super-bigbite magnet
- Neutron Polarimeter

Charge exchange polarimeter ($np \rightarrow pn$)

- Inline GEM detectors
- Passive Steel Analyzer
- Hadron Calorimeter (HCAL)

Elastic np scattering Polarimeter ($np \rightarrow np$)

- Active analyzer
- Side GEM detector and Side hodoscope
- HCAL



Process

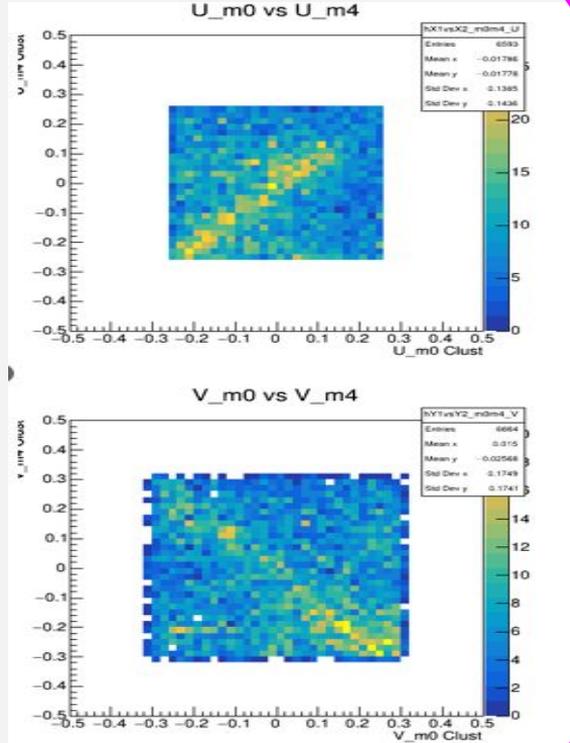
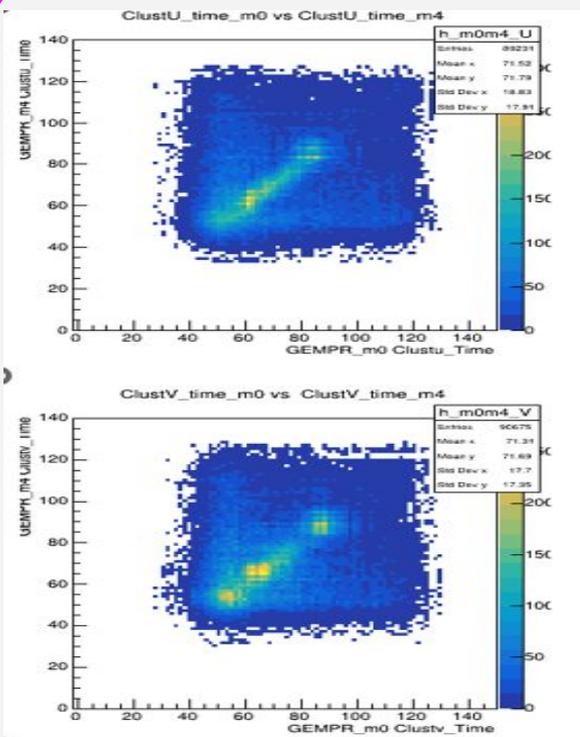
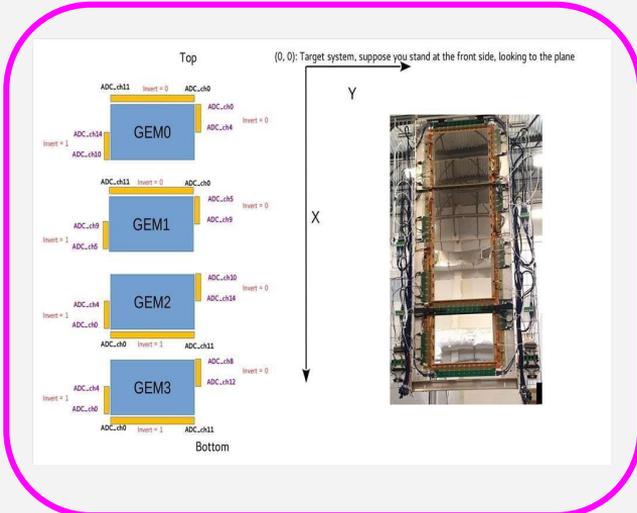
To identify the Large Angle Recoil Proton track candidates in the PR Detector System,

- Correlated Hits on the Two PR Gems
- Matching Hit in the PR hodoscope with correct mapping
- To Check there is timewalk effect on hodoscope time
- Timing consistent with the event (coincidence with HCAL or PRhodo)
- Remove Background Suppression
- clean sample of large angle proton candidates

Data Analysis Update

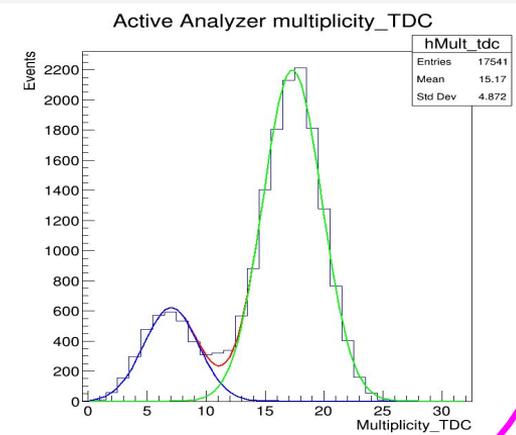
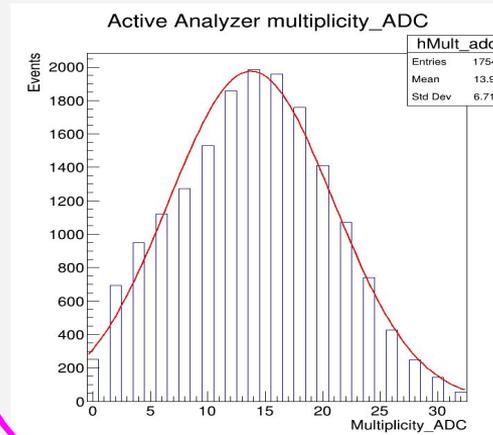
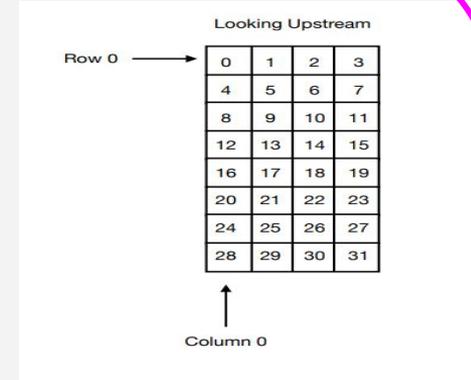
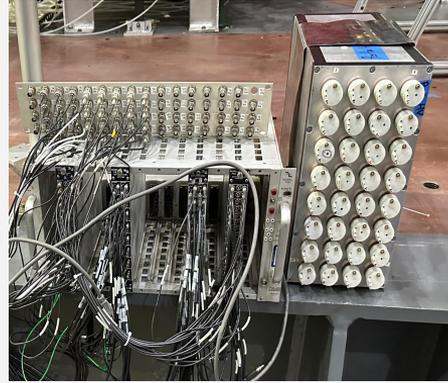
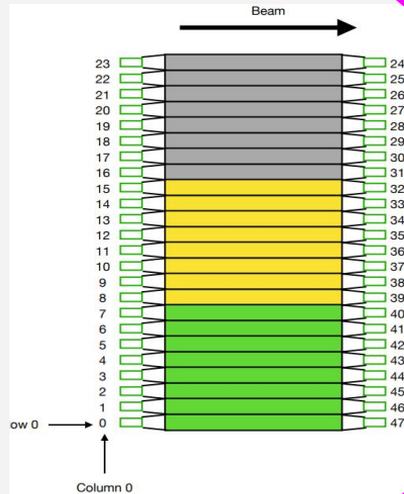
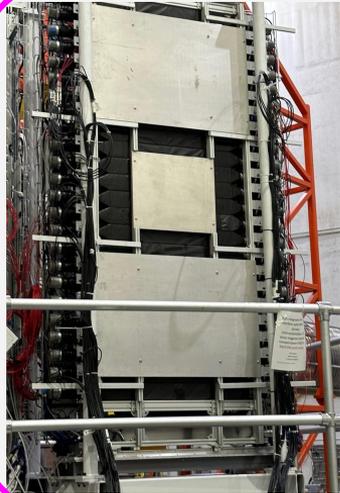
- 2 UVa XY GEMs
- Each GEMs have 4 modules
- In XY gems, Ustrips -1280 strips, Vstrip -1536 strips

- Correlation between two layers in terms of clust_time and clust_position



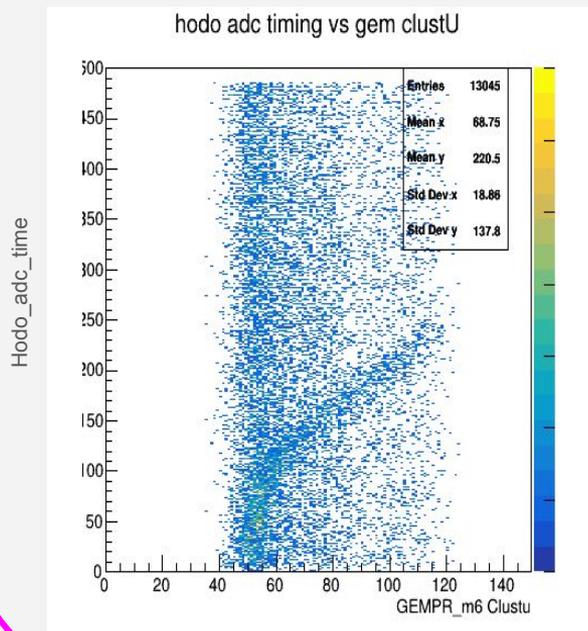
PR hodoscope and Active Analyzer

- Using ADC information, TDC mismatch problem on HodoPR and Active Analyzer

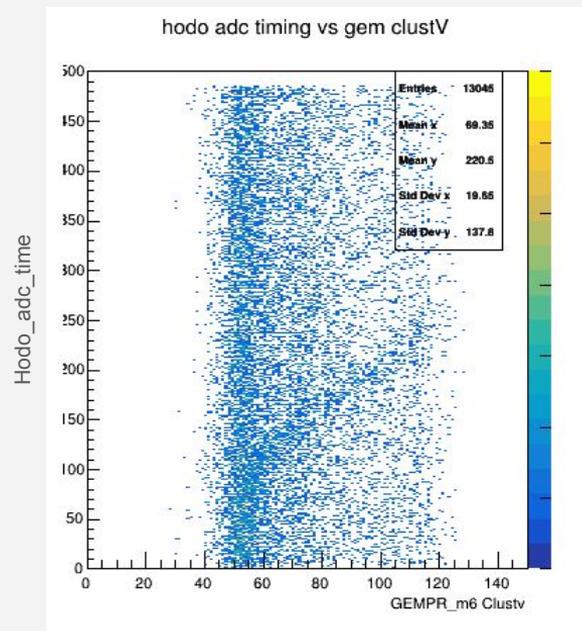


Correlation between HodoPR timing with GEMsPR Time

Hodo time vs GEM_ClustU_Time

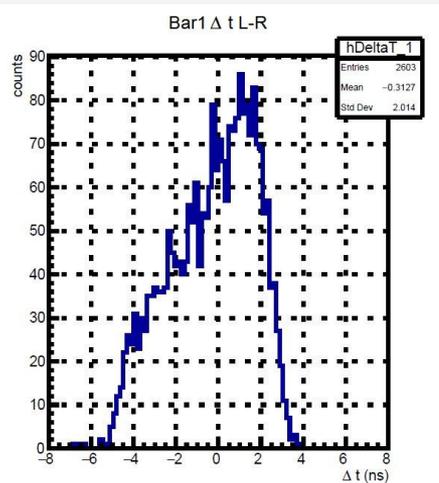


Hodo time vs GEM_ClustV_Time

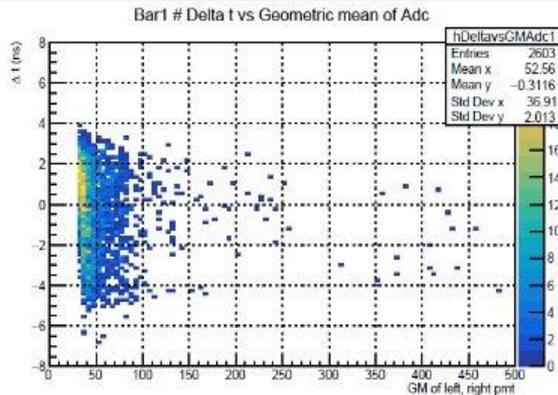


Time walk Analysis

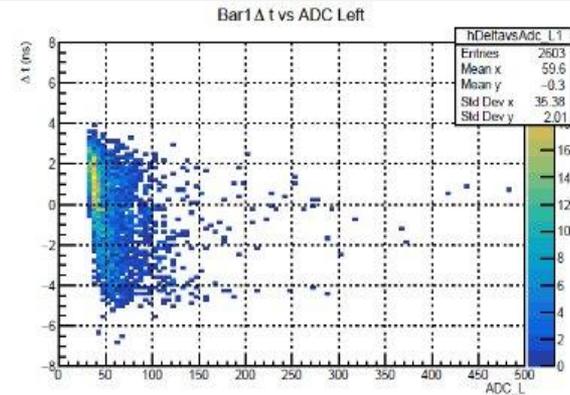
Delta_t plot



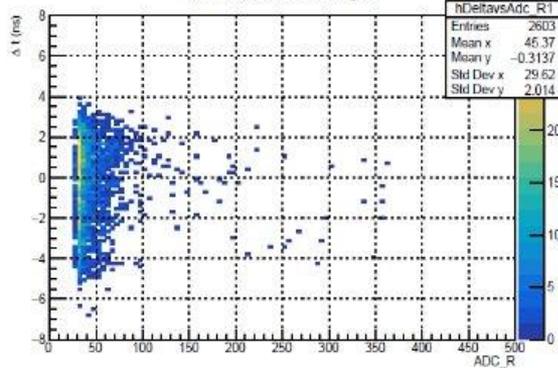
Delta_t vs Geometrical mean of ADCs



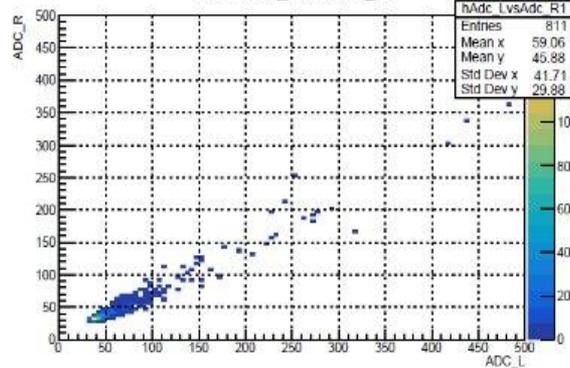
Delta_t vs ADC_L



Delta_t vs ADC Right



ADC_L vs ADC_R



Delta_t vs ADC_R

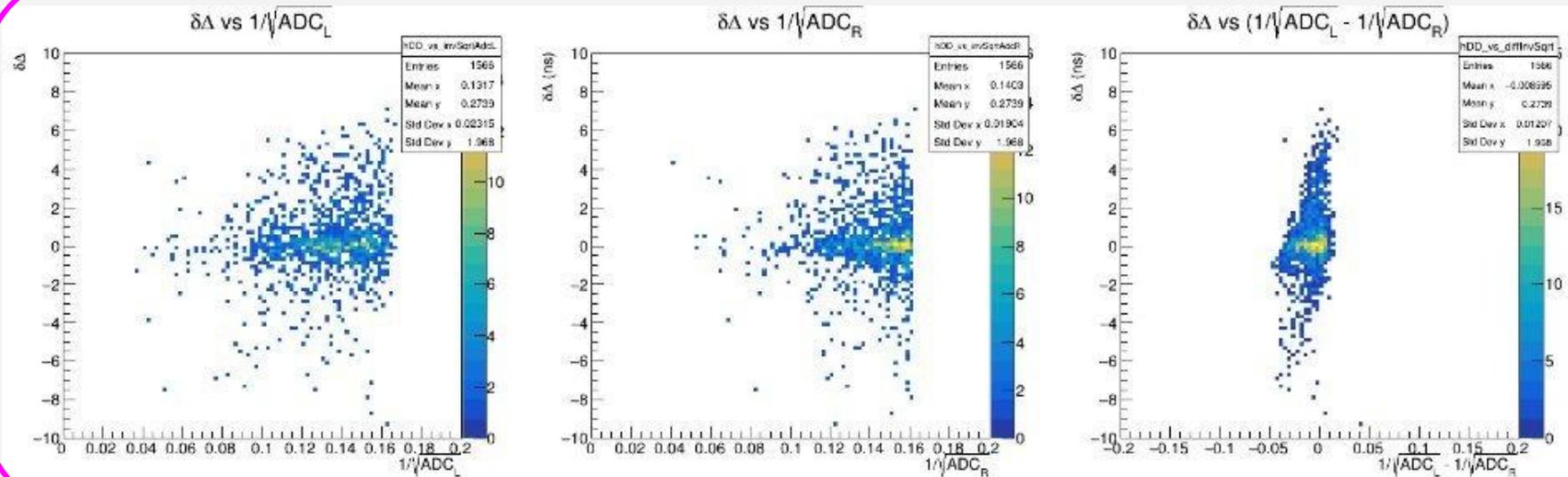
ADC_L vs ADC_R

- Raw timing defined as:

$$\Delta t = t_L - t_R$$

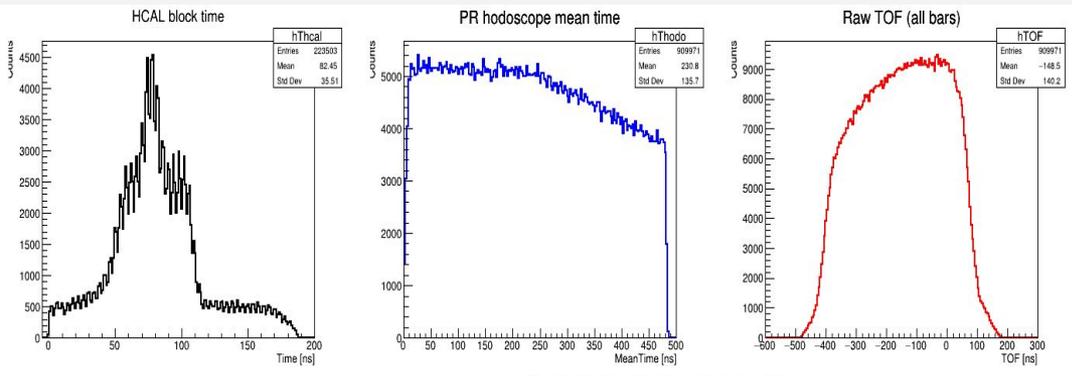
- Use GEM y position to remove geometrical contribution:

$$\delta\Delta = \Delta t - \frac{2y_{GEM}}{v_{scint}}$$



TOF Analysis

- 1D plot for Hcal time and PRhodo time for all
- Time difference plot between Hcal and HodoPR

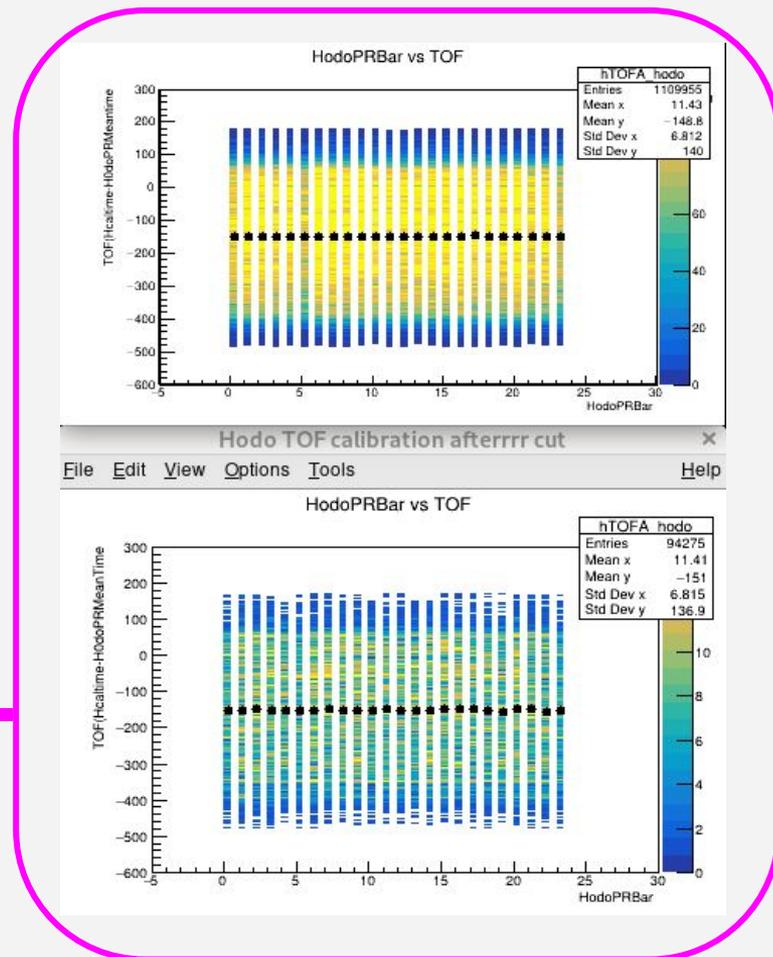


Cuts use

- Sbs.hcal.nclus>0
- bb.ps.e>0.2
- Abs(bb.tr.vz[0])<0.08
- Abs(bb.etot_over_p[0]-1.)<0.3
- Sbs.hcal.e>0.02
- 0.4<W2<1.6

9

- Correlation plot between HodoPR Bar with respect to Time difference between hcal and hodoPR



Summary

- Looked at PR Detector Data
 - GEM time, GEM Position Correlations
 - Hodo ADC time vs GEMs Time
- Working on
 - Time walk correction of PR hodo
 - TOF study between HCAL and PRhodo
- Successfully merged old SBS-offline, SBS-Replay to New SBS-offline, SBS-Replay
- Needs to calibrate ADC time for PRhodo first after to get Time difference plot for hcal with PRhodo

Next Steps ----

- Setup SWIF2 to replay large number of events to get more statistics
- Simulation to find what fraction of events produce a proton on PR detectors