

Progress and plan of CGEM cosmic ray data analysis

Linghui Wu, Liangliang Wang

CGEM Software Meeting

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Digitization

Jingyi, Liangliang, Linghui, Ryan








- Simulation of TIGER has been implemented in CgemDigitizerSvc
- The package were committed to CgemBossCvs
CgemDigitizerSvc-00-00-23
- It has been released to CgemBoss 6.6.5.f

CgemBossCvs/Cgem/CgemDigitizerSvc

Current directory: [\[BESIII\]](#) / [CgemBossCvs](#) / [Cgem](#) / CgemDigitizerSvc

Current tag: CgemDigitizerSvc-00-00-23

Files shown: 1

File	Rev.	Age
 _CgemDigitizerSvc/		
 cmt/		
 dat/		
 share/		
 src/		
 _ChangeLog	 1.17	43 hours

Show files using tag:

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Calibration

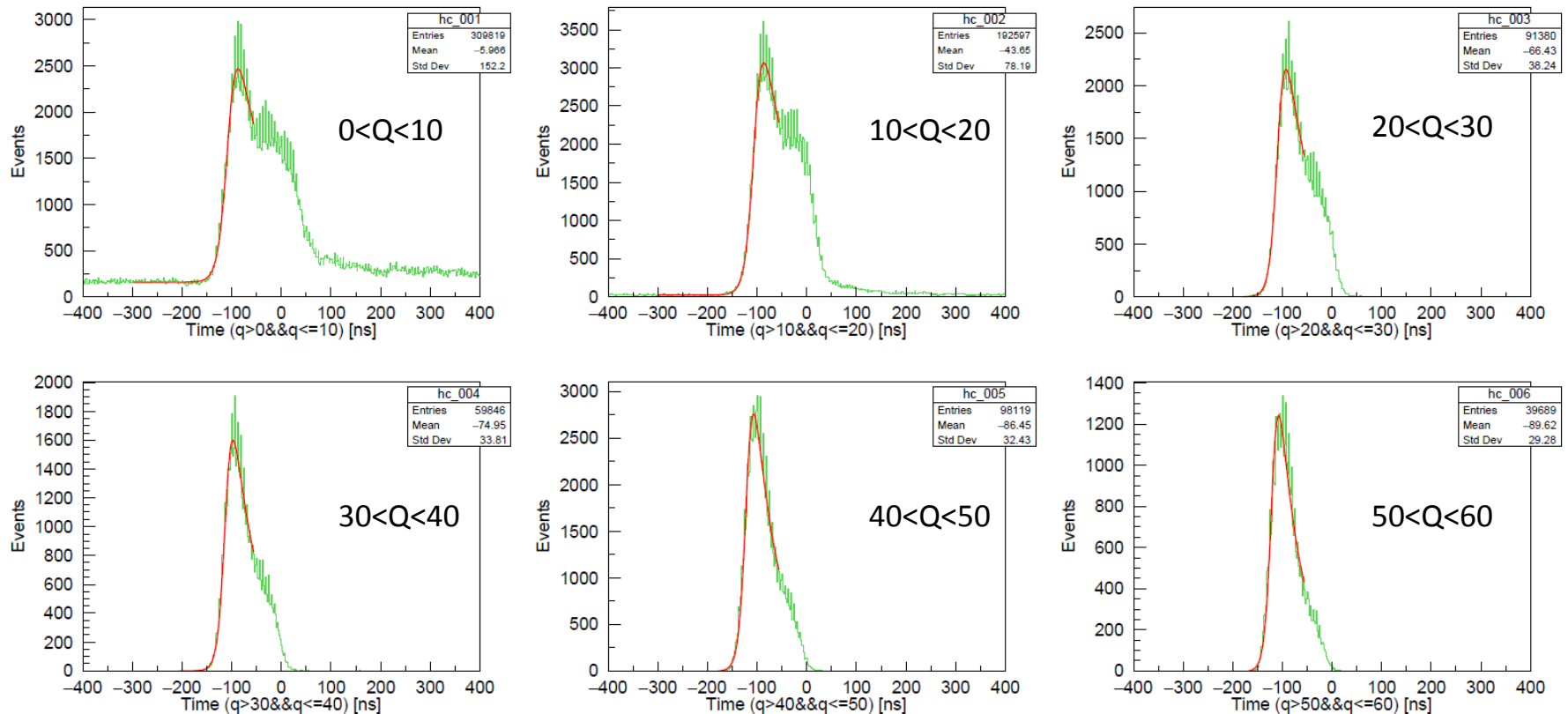
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- ✓ Preliminary study of time walk effect
- Next
 - Study of propagation time of the signal at the strip

Preliminary study of time walk effect

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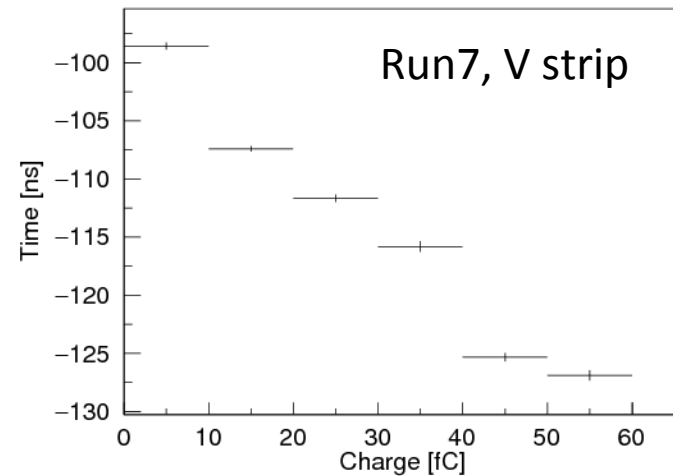
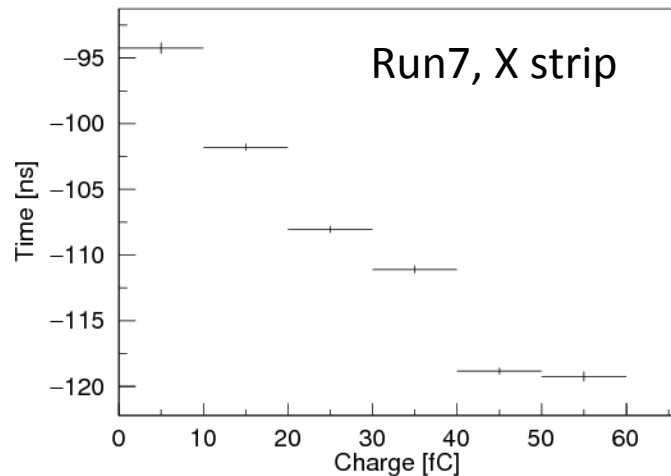
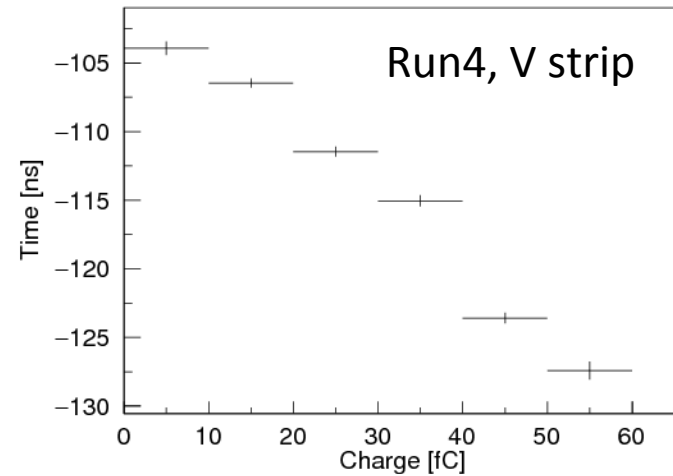
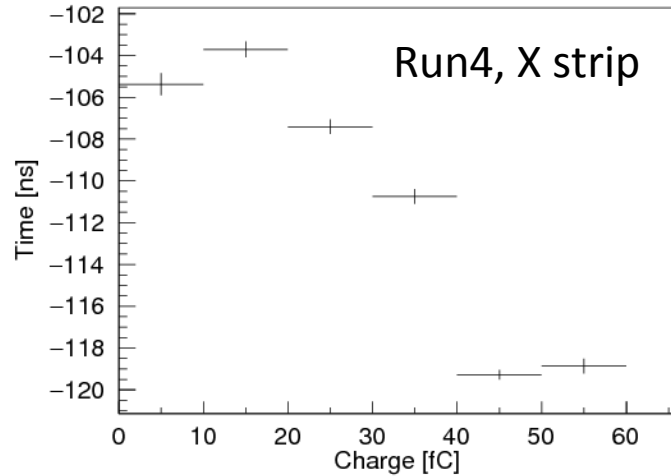
Time distribution in different Q Range (run4, X strip)



- The shape varies with charge
- A possible reason for the shape with large Q: the track is nearly perpendicular with the anode plane so that only too few strips are fired

T_rising vs Q

Jingyi, Will



- Time walk effect can cause big uncertainty in time measurement (0~25ns)

A question about threshold

- Does the threshold have to be so different strip by strip?

The noise rate for each strip can be tuned to be at the similar level

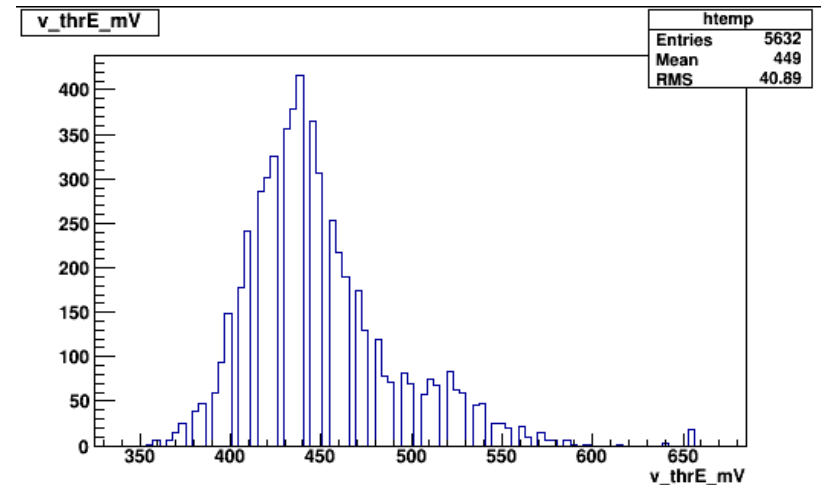
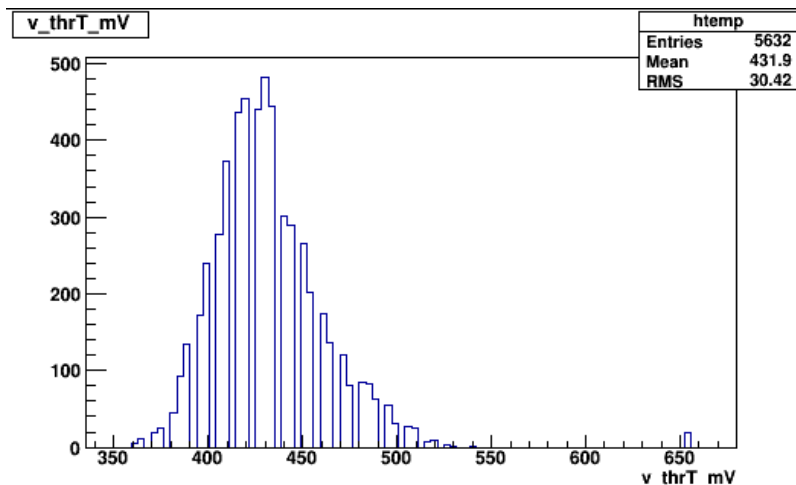
But:

Efficiency/time walk/... for signal are very different between strips => strip dependent calibration

=> Large statistics

If thresholds change run by run, the situation becomes more complicated

Threshold distribution (from look up table provided by Riccardo)



Alignment

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




- ✓ Alignment algorithm for CGEM-IT using Millepede method has been committed to CgemBossCvs
- Next: MC study with only three clusters (the same case as the cosmic ray test)

CgemBossCvs/Cgem/CgemAlignAlg/src

Current directory: [\[BESIII\]](#) / [CgemBossCvs](#) / [Cgem](#) / [CgemAlignAlg](#) / [src](#)

Current tag: **CgemAlignAlg-00-00-02**

Files shown: 9

File	Rev.	Age
 components/		
 _CgemAliEvent.cxx	 1.1	17 hours
 _CgemAliRecHit.cxx	 1.1	17 hours
 _CgemAliRecTrk.cxx	 1.1	17 hours
 _CgemAlignAlg.cxx	 1.2	17 hours
 _CgemAlignBase.cxx	 1.2	17 hours
 _CgemAlignPar.cxx	 1.2	17 hours
 _CgemAlignment.cxx	 1.1	17 hours
 _CgemMilleAlign.cxx	 1.2	17 hours
 _Millepede.cxx	 1.2	17 hours

Show files using tag: [CgemAlignAlg-00-00-02](#) ▼

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Cluster reconstruction

- μ TPC reconstruction

- ✓ Linear fit of t vs strip positions (by Xiaoling)
- ✓ Line parameters calculation (by Riccardo)
- ✓ All in CgemClusterCreate-00-00-21 as the first workable version

- Cluster reconstruction check/update

- ✓ check of CgemClusterCreate-00-00-21/22/23 with cosmic data and simulation in both CC and μ TPC modes (Hongpeng, Xiaoling)
- ✓ Complete information filling, solve crash problem, use $T_{\text{rasing}}/T_{\text{falling}}$ in μ TPC mode from CgemCalibFunSvc (Liangliang)
- ✓ Latest version: CgemClusterCreate-00-00-24
- Tests continue

- An angle dependent μ TPC-CC merging function

- ✓ Angle dependent resolutions and merging function for planer GEM in beam test have been provided (by Riccardo)
- To be put into CgemCalibFunSvc soon
- Update for CGEM in future

Straight line fit

Hongpeng, Liangliang

- Test with CC almost done
 - ✓ Most energetic cluster on each sheet chosen for layer2
 - Cluster for layer 1 should be selected according to the prediction from layer 2 (for MC, not current L1 data)
 - ✓ 3D line fitting
 - ✓ Rough alignment in phi
 - new version will be ready for calibration/alignment
- Test 3D line fitting with μ TPC results
- Add μ TPC-CC merging in fit iteration