Progress and plan of CGEM cosmic ray data analysis

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CGEM Software Meeting

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Calibration

✓Rough calibration (done by Jingyi)

- Time fit to estimate T_rising and T_falling which are used in micro-TPC cluster reconstruction

  Results of time fit should be provided as calibration constants. Currently, we can not consider the difference between strips due to low statistics.

- Fine calibration — Will, Jingyi, Linghui
  - Study of propagation time/velocity, i.e. to look into z dependence on T_rising and T_falling. (This step should be based on the results of cluster reconstruction)
  - Single cluster resolution of CC and μTPC (multi-variables dependent)
- Calibration interfaces — Linghui
  - ✓Interfaces for reading T_rising & T_falling have been implemented in CgemCalibFunSvc (slide6, 7)
  - More interfaces will be added

Alignment

Aiqiang, Linghui

- MC study (done by Aiqiang)
  - ✓An input/output test in a simple case
  - ✓Test in more complicated misalignment cases
- Application in cosmic data analysis
  - This requires a close cooperation between Aiqiang and Hongpeng

Cluster reconstruction

- μTPC reconstruction (done by Riccardo, Xiaoling, Liangliang)
  - ✓ Linear fit of T vs strip positions (by Xiaoling)
  - ✓ Line parameters calculation (by Riccardo)
  - ✓ All in CgemClusterCreate-00-00-21
  - ➢ To be tested (e.g. Straight fitting)

- An angle dependent μTPC-CC merging function
  - ➢ Angle dependent resolutions obtained with planer GEM in beam test can be implemented (Riccardo?)
  - ➢ Updated by calibration of CGEM

Straight line fit

Hongpeng, Liangliang

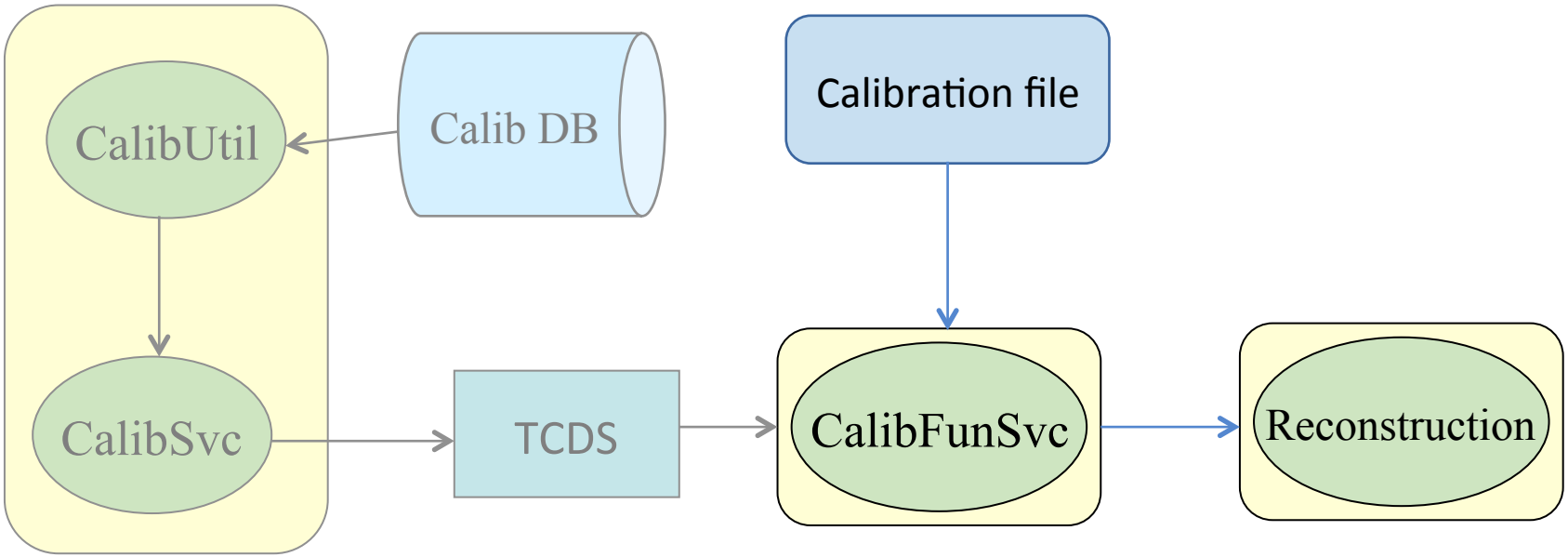
- Test with CC almost done
  - ✓Most energetic cluster on each sheet chosen
  - ✓3D line fitting
  - ✓Rough alignment in phi
  - ➢new version will be ready for calibration/alignment

➢Test 3D line fitting with μTPC results

➢Add μTPC-CC merging in fit iteration

Work flow for calibration data

- **CalibUtil**: Search calibration data from data base
- **CalibSvc**: Data conversion service from DB to TCDS (Transient Calibration Data Store)
- **CalibFunSvc**: Interfaces to access TCDS and functions for calibration related calculations



Update of CgemCalibFunSvc

- Interfaces for reading T_rising and T_falling were implemented
  - ✓ **double** getTimeRising(**int** layer, **int** xvFlag, **int** sheet, **int** stripID, **double** Q=100., **double** z=0.)
  - ✓ **double** getTimeFalling(**int** layer, **int** xvFlag, **int** sheet, **int** stripID, **double** Q=100., **double** z=0.)
- Calibration files for run 1~4 are ready
- Two methods for loading the calibration file
  - Define the calibration file
  - Define runNo and the path of calibration files

  (the default path is $CGEMCALIBFUNSVCROOT/dat)

Calibration files for run 1~4

Current directory: [BESIII] / CgemBossCvs / Cgem / CgemCalibFunSvc / dat
Current tag: CgemCalibFunSvc-00-00-02
Files shown: 4

File	Rev.	Age
timeFit_Run1.txt	1.1	83 minutes
timeFit_Run2.txt	1.1	83 minutes
timeFit_Run3.txt	1.1	83 minutes
timeFit_Run4.txt	1.1	83 minutes

Show files using tag: CgemCalibFunSvc-00-00-02 ▾
Show | Show all files

The calibration file could be loaded according to runNo

```
//------------------------------------------------------------
// Set output level threshold (2=DEBUG, 3=INFO, 4=WARNING, 5=ERROR,
MessageSvc.OutputLevel = 3;
MessageSvc.useColors = true;

ReadCosmicRayData.runNo=1;
ReadCosmicRayData.Dir_file="/bes3fs/cgemCosmic/data/cgem_run1.root";

ApplicationMgr.HistogramPersistency = "ROOT";
//NTupleSvc.Output = {
```