Millepede alignment status

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GlueX Collaboration Meeting

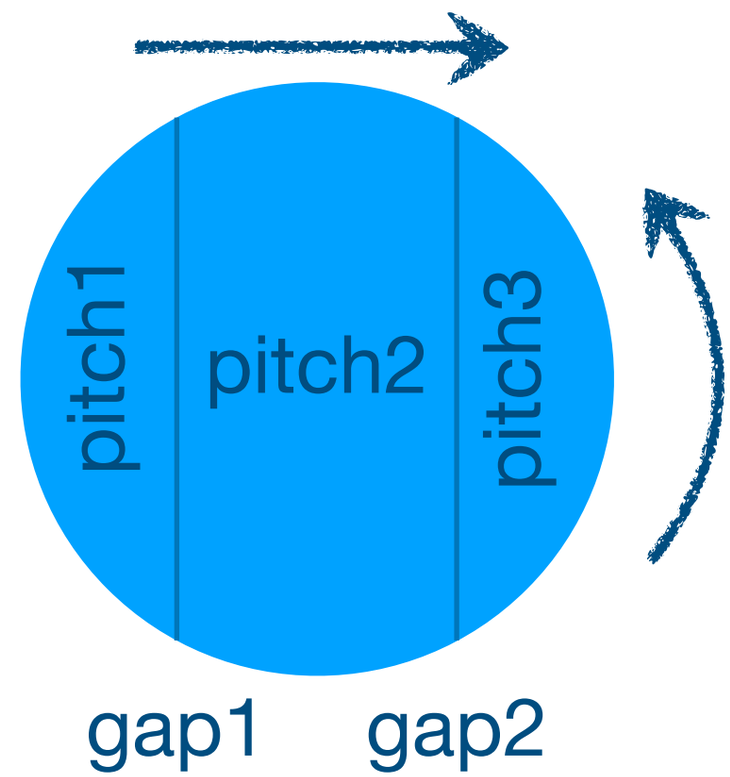
FDC parameters to be optimized

wire plane
- offset
- rotation

cathode plane
- offset
- rotation
- pitch
- gap

z-position of planes

Cathode plane



Determined by Field-OFF data.

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wire t_0 (TDC module dependent)

48 TDC modules in total

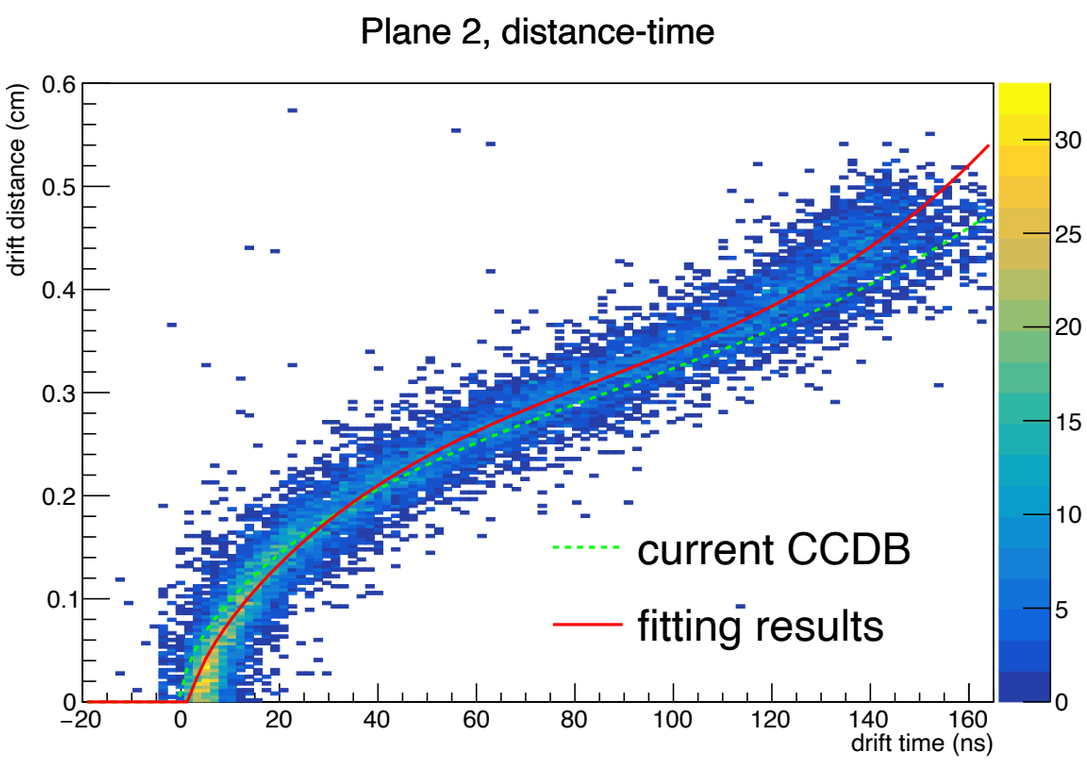
Determined by Field-ON data. (run by run)

Alignment using Field-OFF data

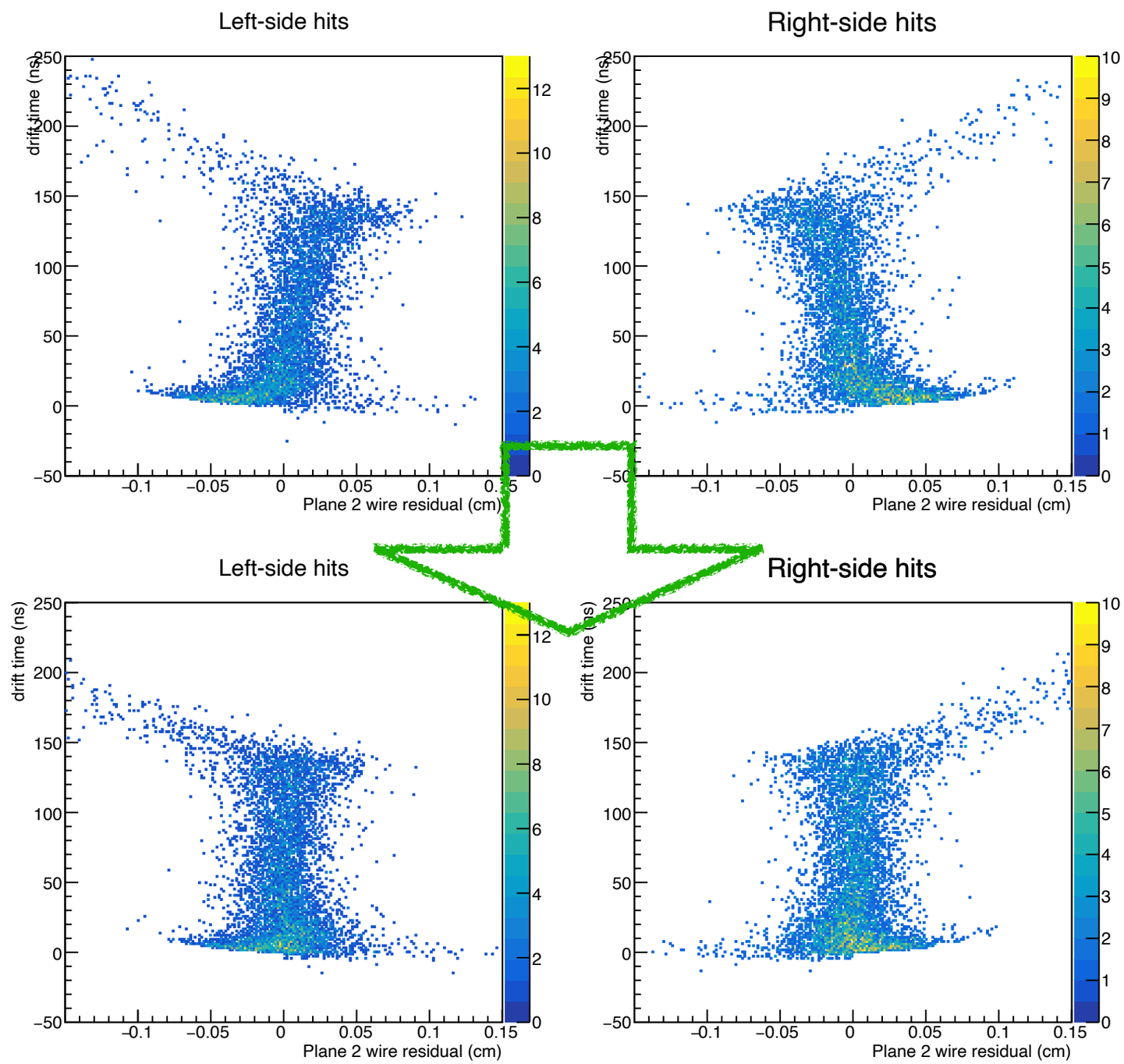
Before Millepede alignment, timing constants should be optimized.

xt-curve

tracking w/o wire plane#2
and predicts the drift distance of the plane



Drift time vs Residual

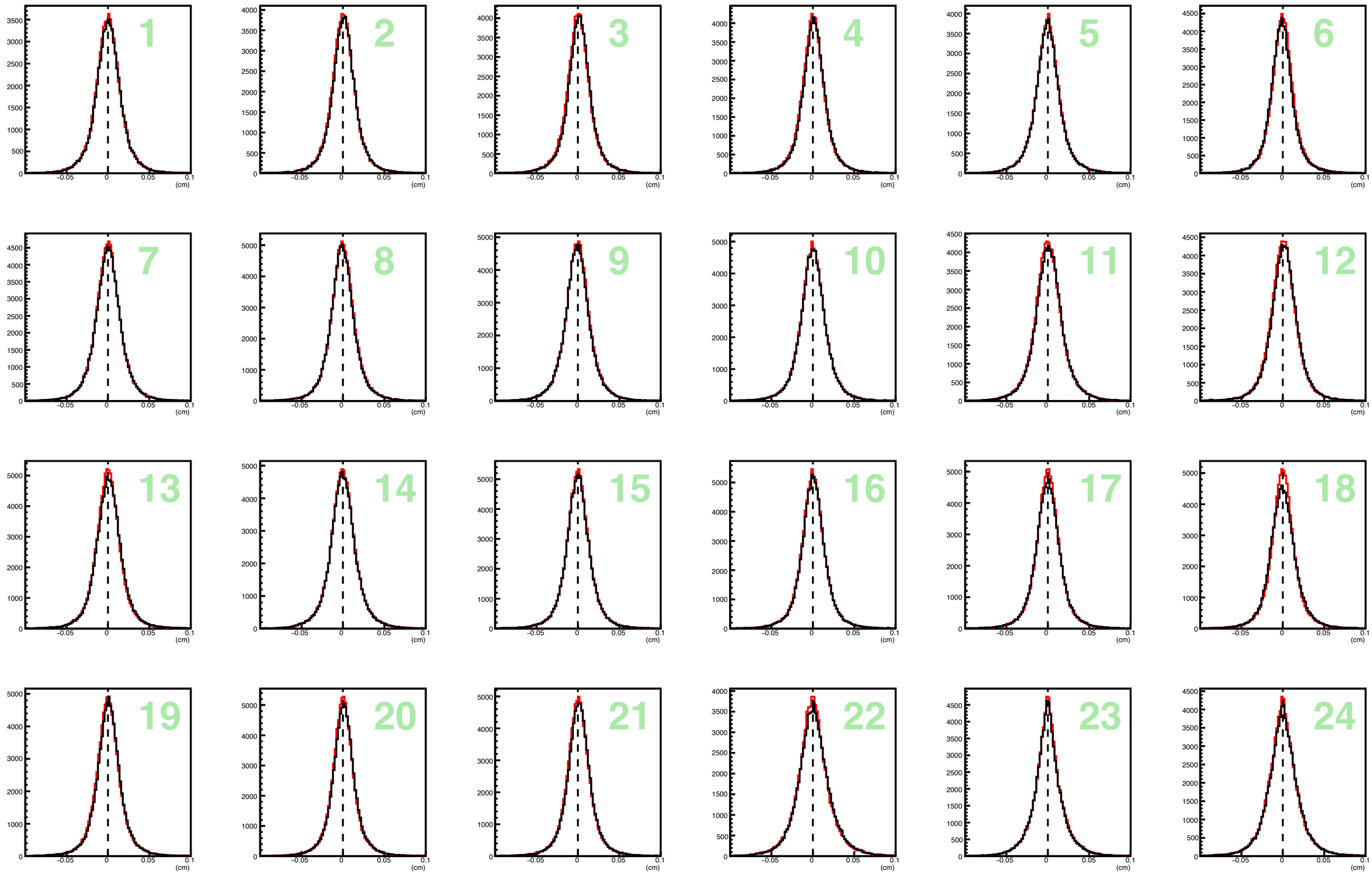


Wire Residual

histogram range: [-0.1, 0.1] cm

official CCDB values, t_0 & xt are updated

+ Millepede alignment

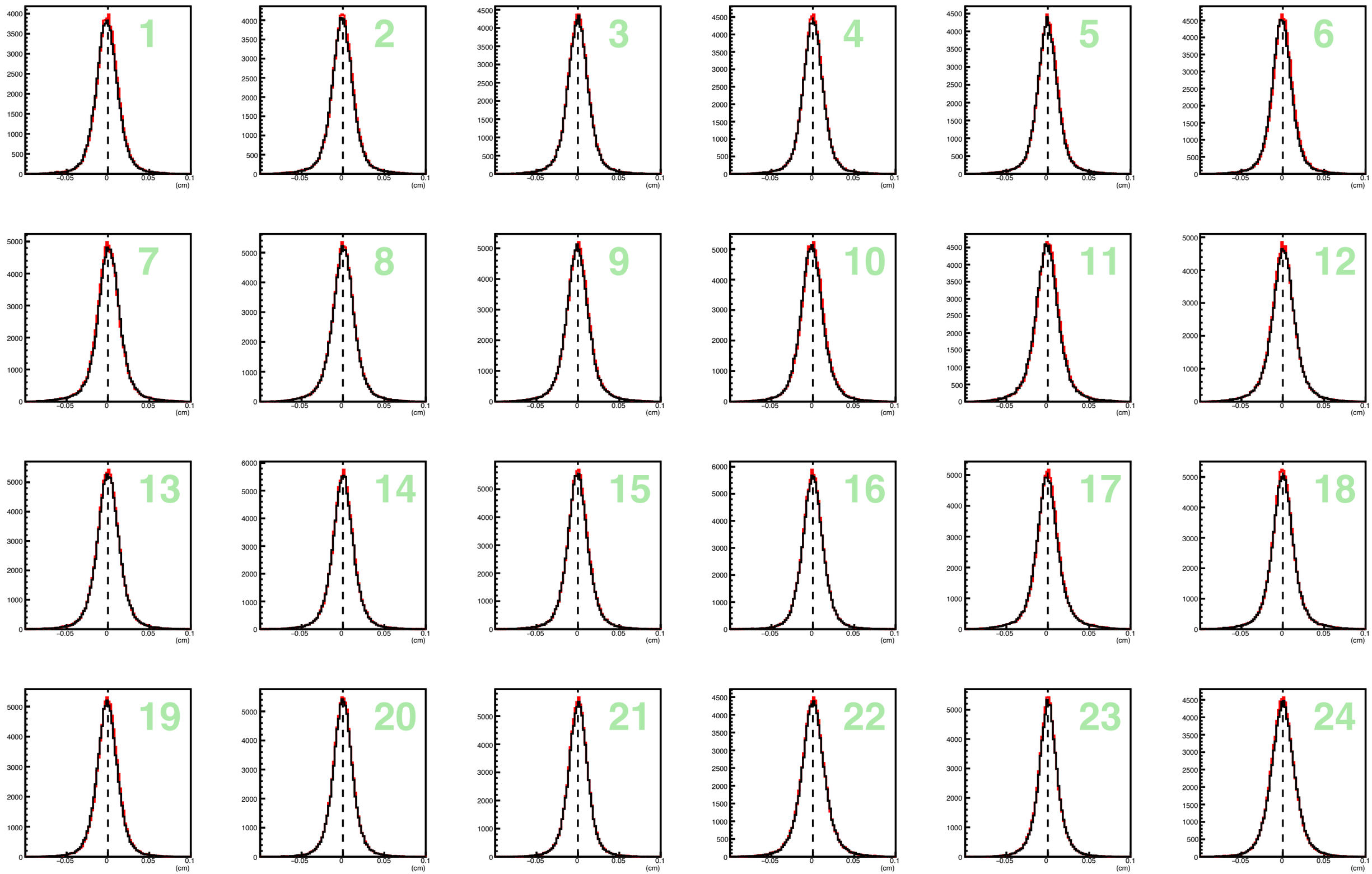


Cathode Residual

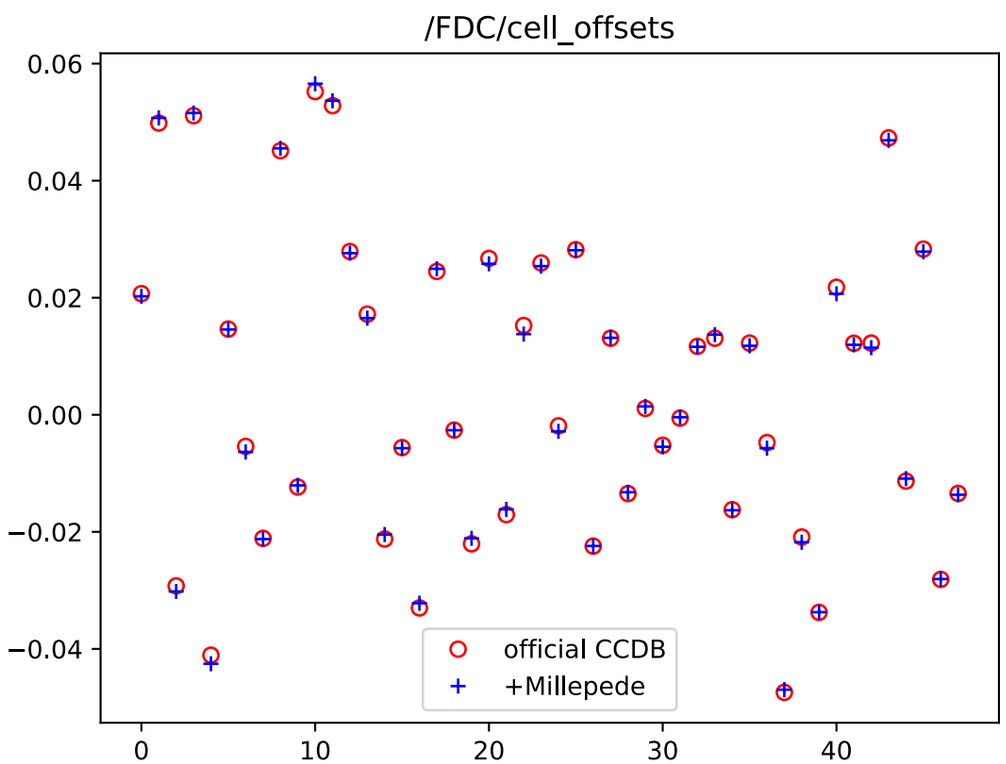
histogram range: [-0.1, 0.1] cm

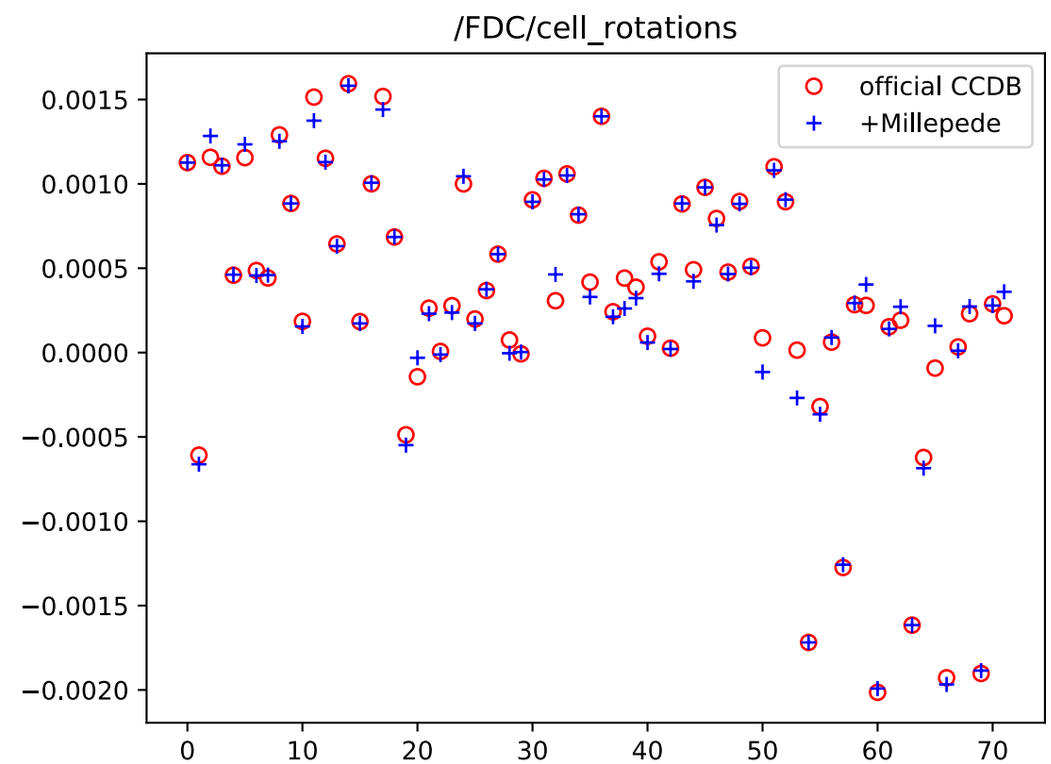
official CCDB values, t_0 & xt are updated

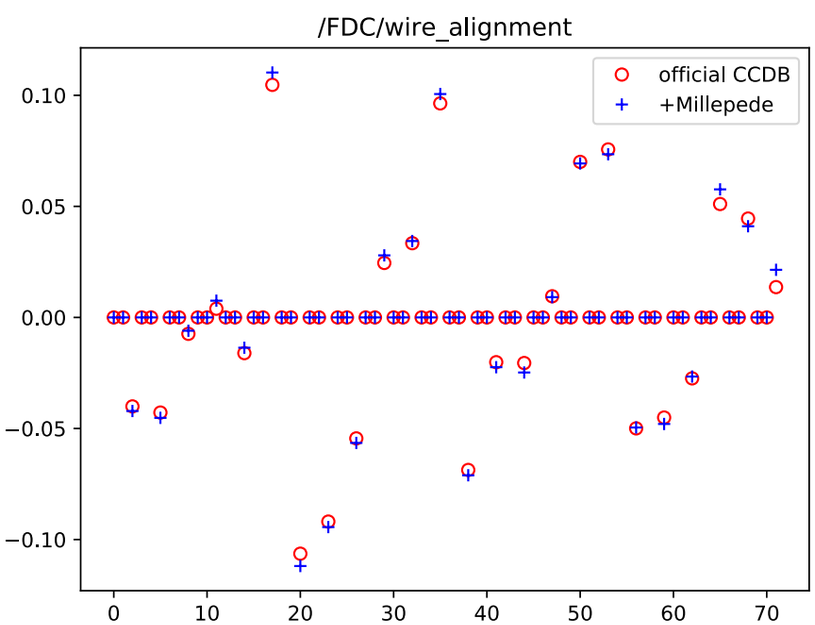
+ Millepede alignment

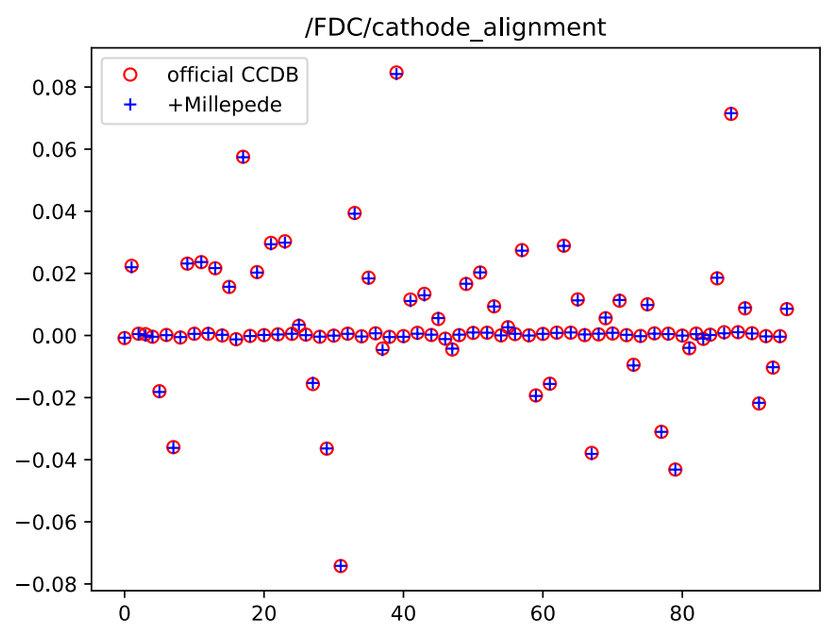


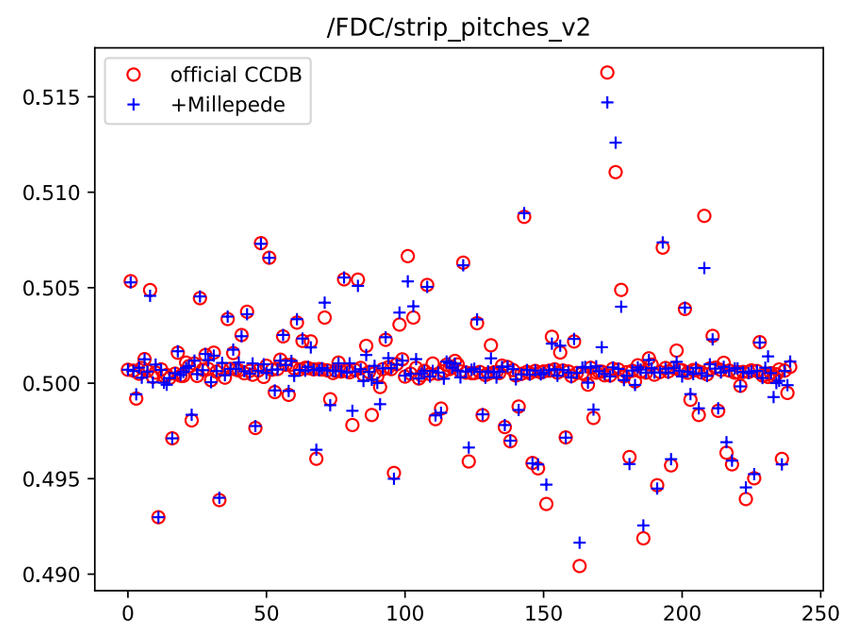
CCDB tables







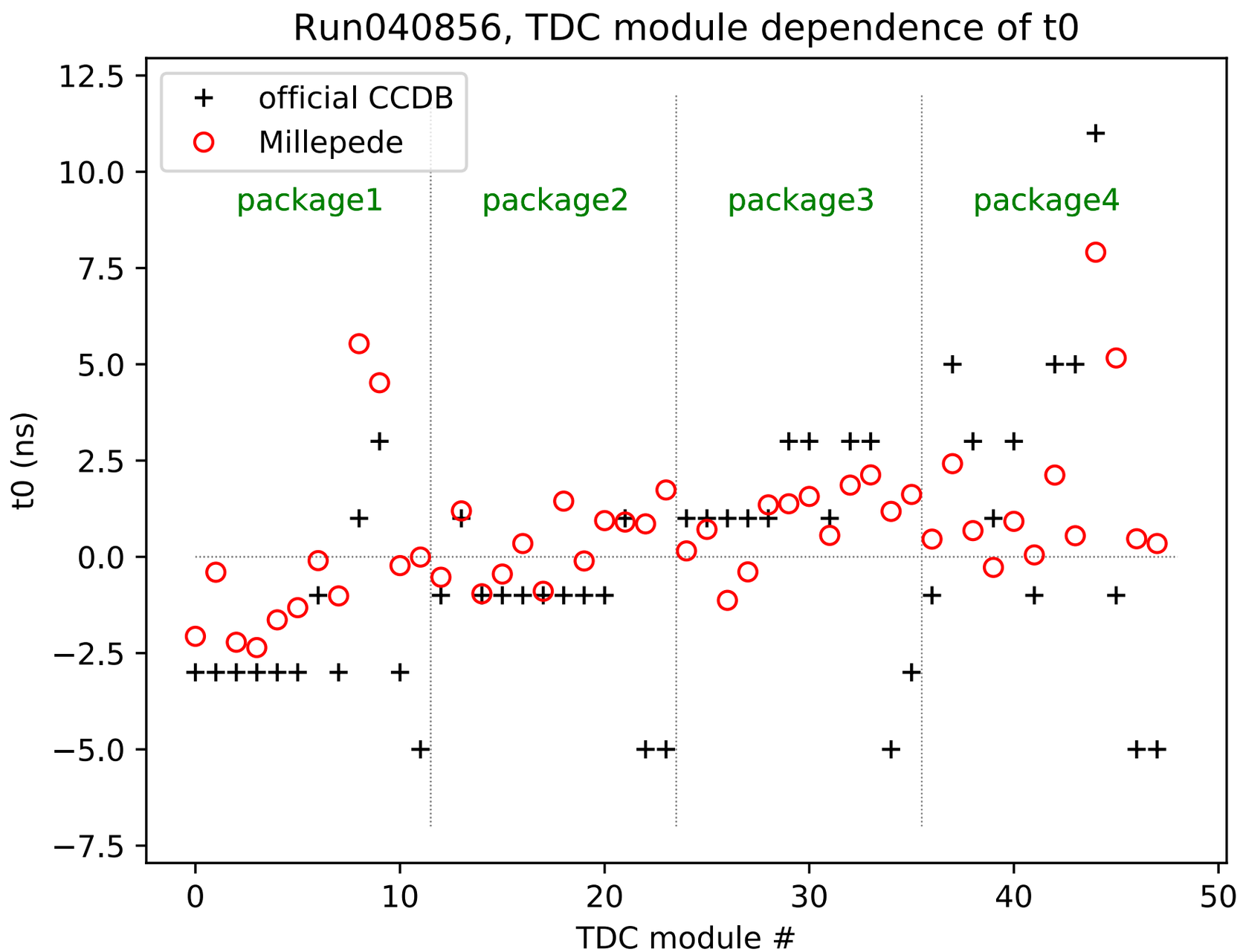




FDC alignment parameters are stable.

t_0 for 2018 Field-ON production run

TDC module dependent t0 derivatives are implemented to optimize them using Millepede.

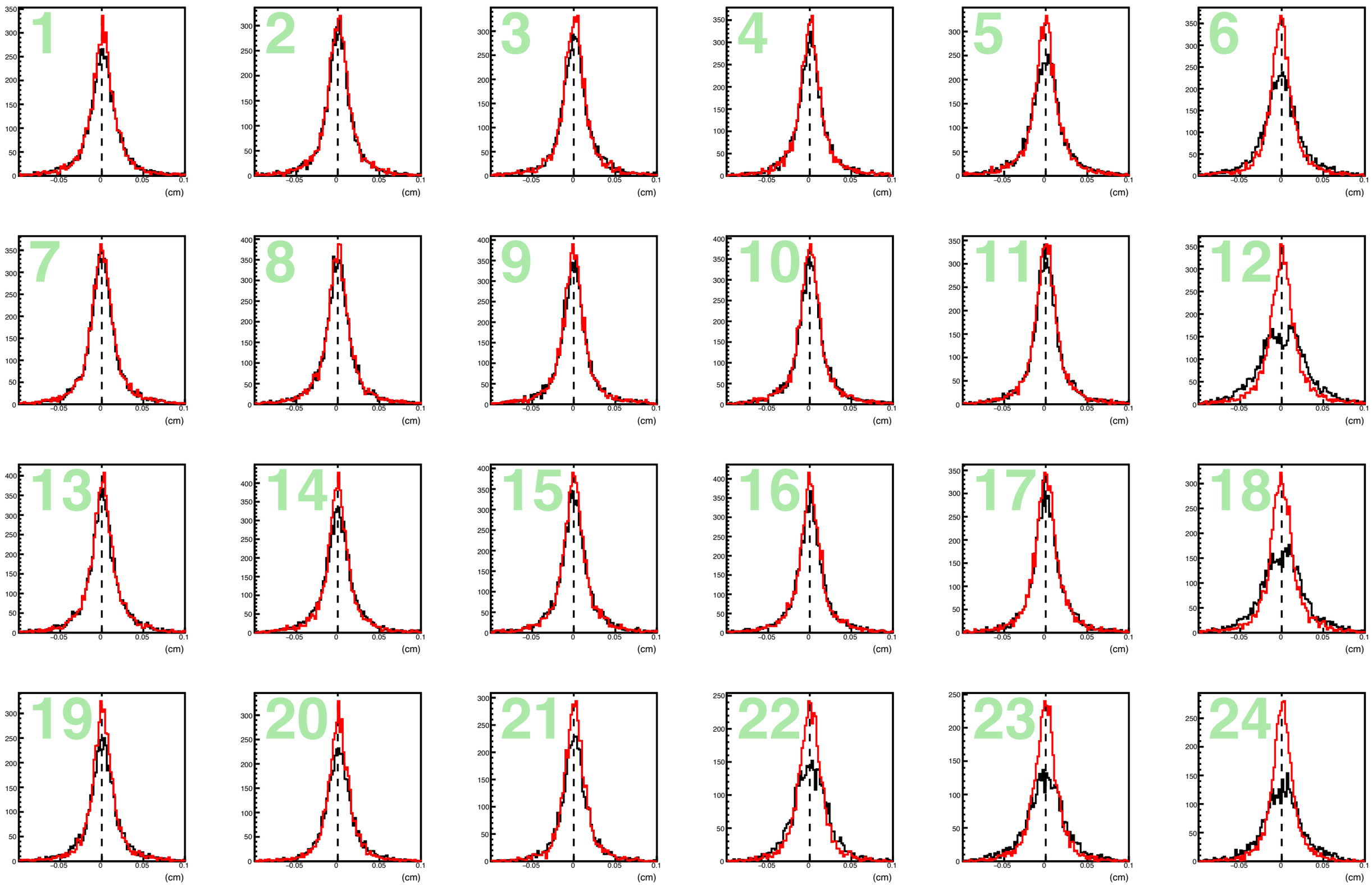


Wire Residual (Run040856)

histogram range: [-0.1, 0.1] cm

official CCDB

t_0 determined by Millepede

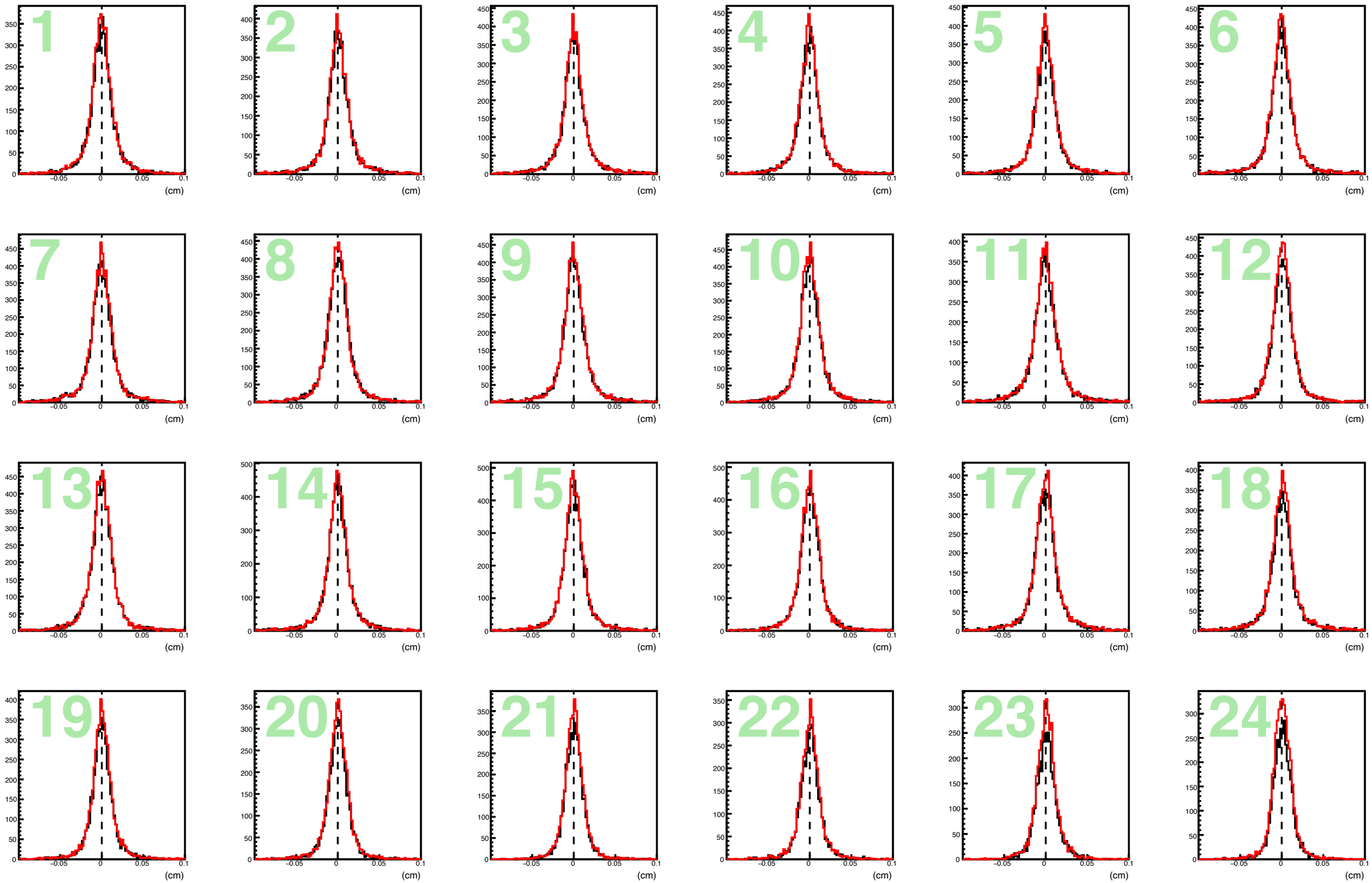


Cathode Residual (Run040856)

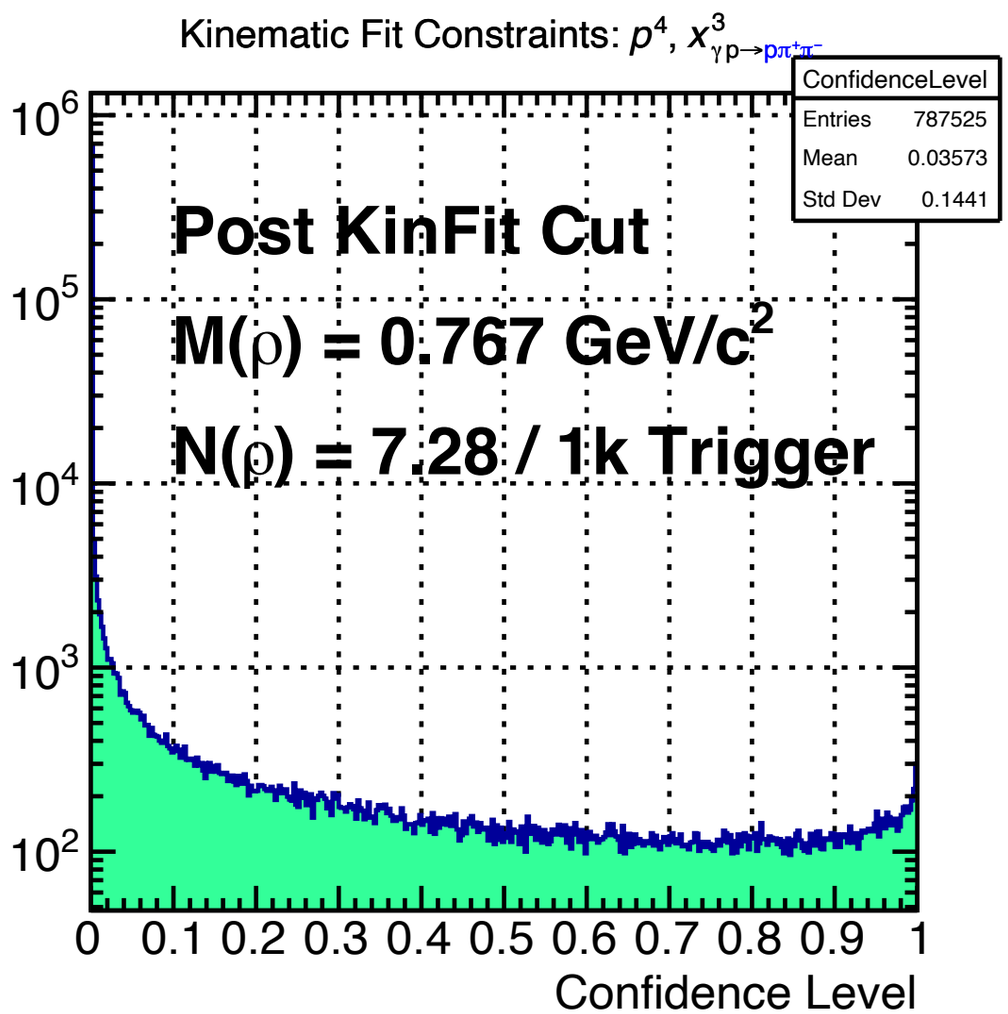
histogram range: [-0.1, 0.1] cm

official CCDB

t_0 determined by Millepede

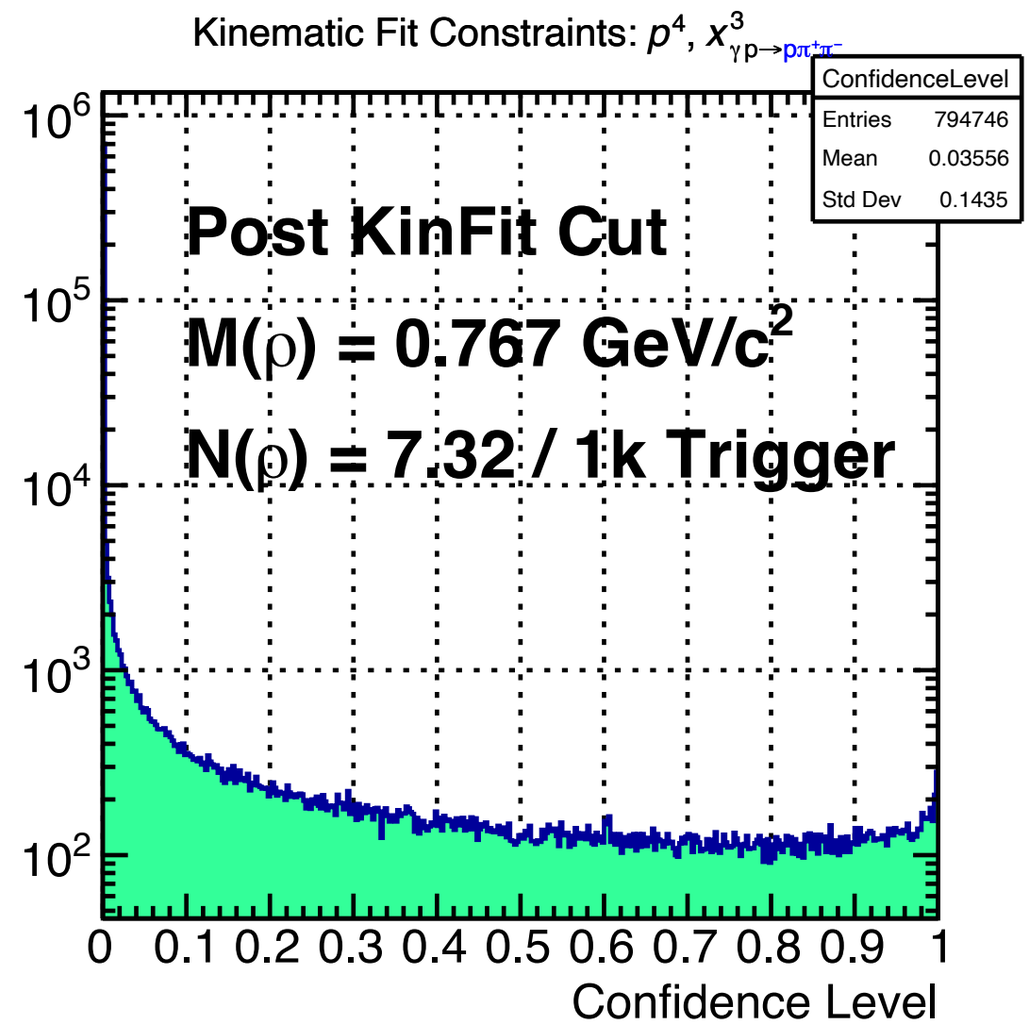


Number of ρ mesons



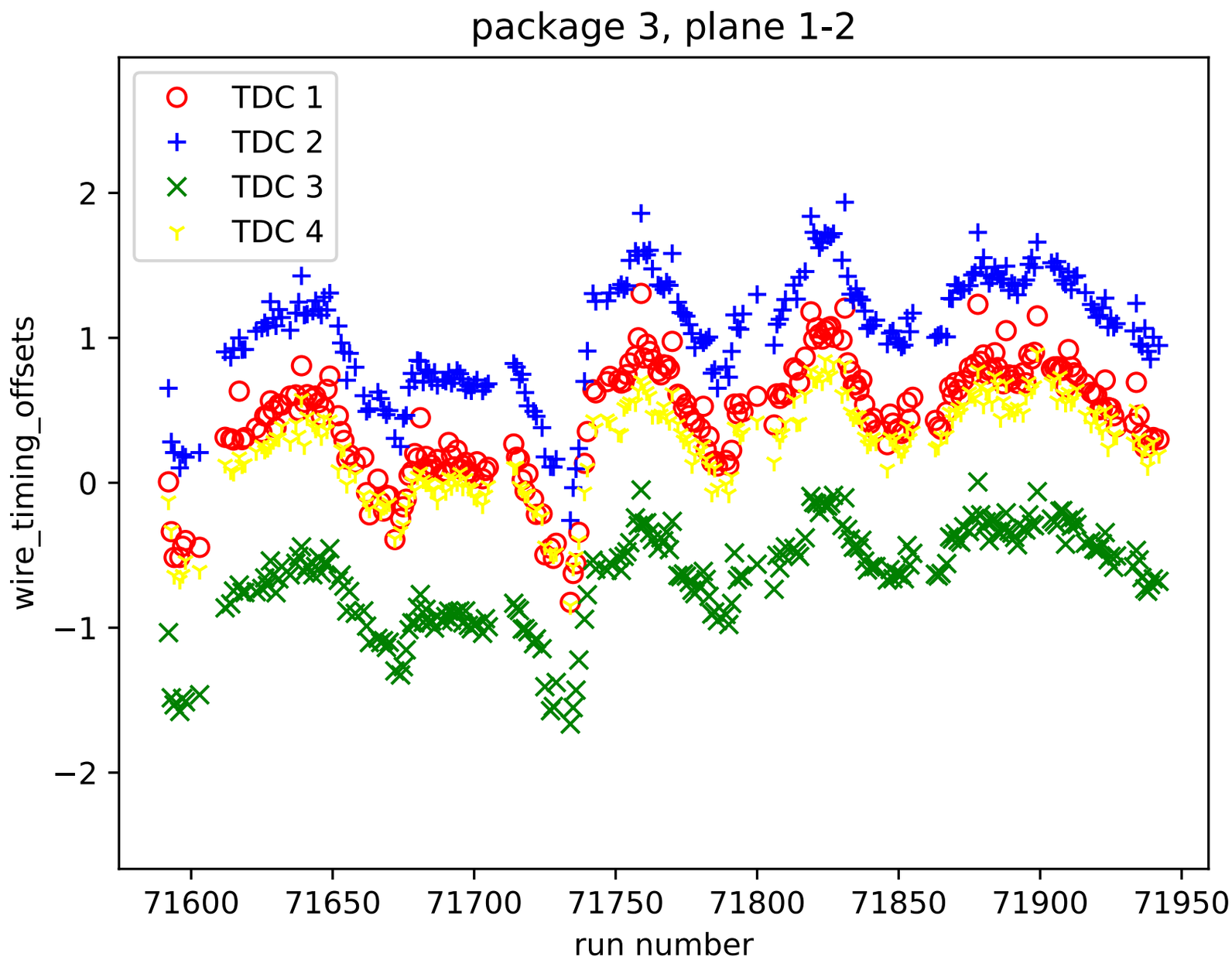
FDC t_0 update

Run040856



#ρ does not change much (slightly improved).

Run dependence of t0



FDC wire t0 parameters are not stable.
Need to be determined run by run.

For other TDC modules, see
https://halldweb.jlab.org/wiki/index.php/Meeting-4-16-2020

FDC alignment summary

- Both plugins for Field-OFF and Field-ON work well.
- Alignment parameters are stable.
- Millepede can be used to determine wire t0 parameters.
- The next step: CDC alignment

CDC alignment status

- Plugin for Field-OFF does not work well.
  - Still debugging to analyze cosmic ray data.
- Plugin for Field-ON works.

CDC parameters to be optimized

Alignment Parameter	Total Number of Parameters
Up and downstream δx and δy	14,088
Global translation and rotation	6
Wire t_0	3,522

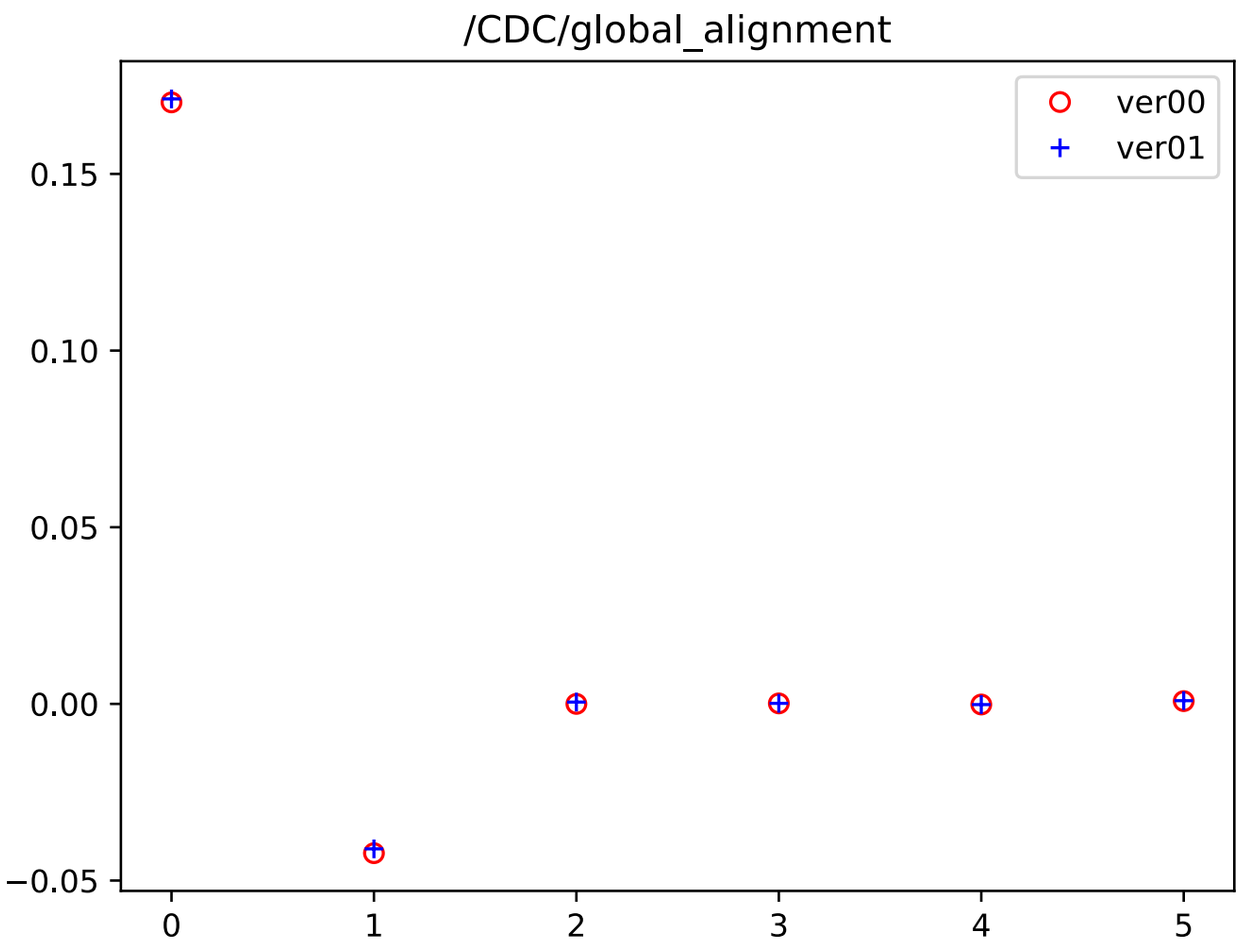
Wire t_0 optimization is not implemented yet.

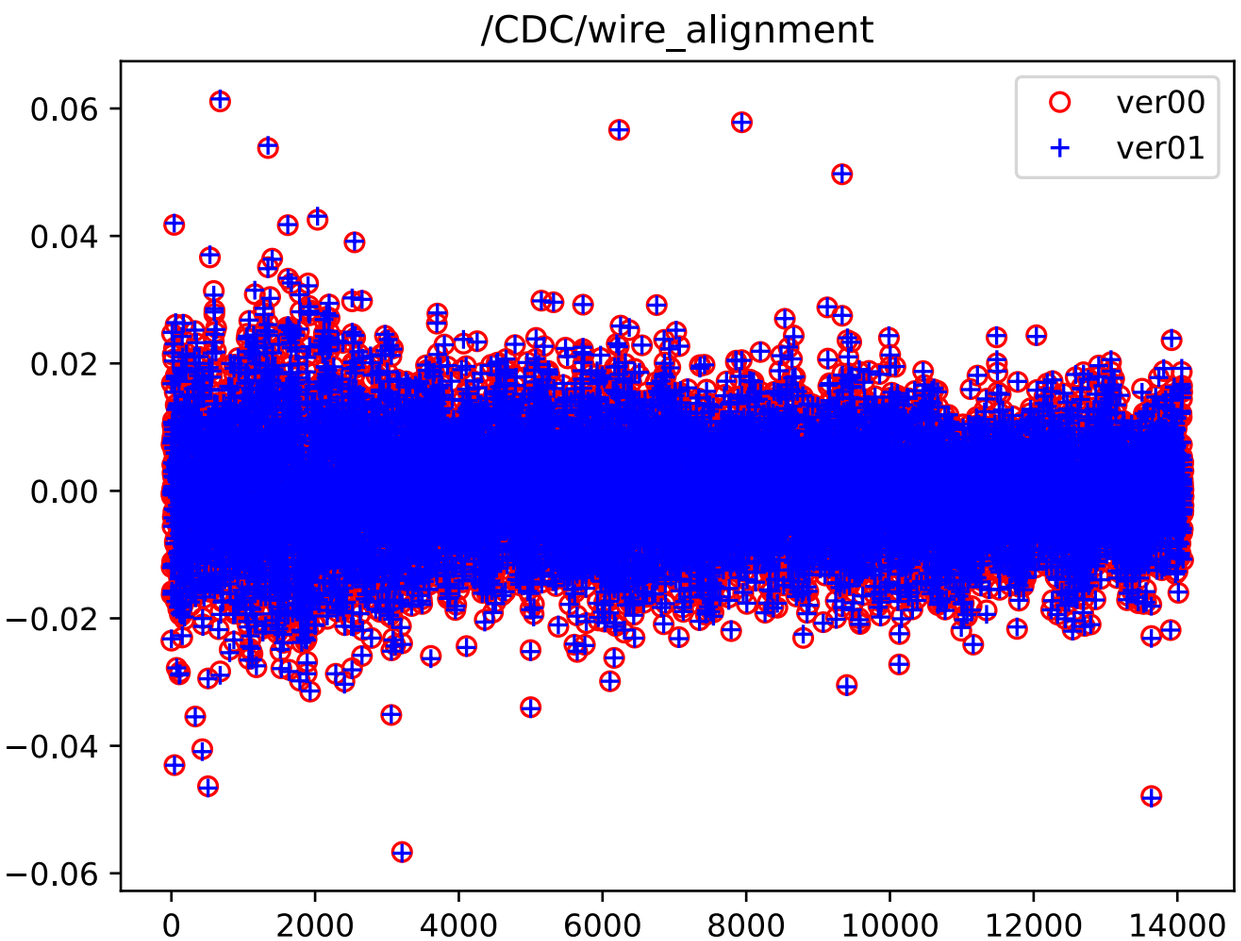
Alignment by Field-ON data

○ Official CCDB value
+ Millepede

4 edge parameters $\delta x^{up/down}$, $\delta y^{up/down}$ for each wire

Shifts and rotation parameters





Alignment parameters seem stable.

Residual (Run 71483, Field-ON)

histogram range: [-0.05, 0.05] cm

official CCDB values
Millepede