Alignment status // 2016

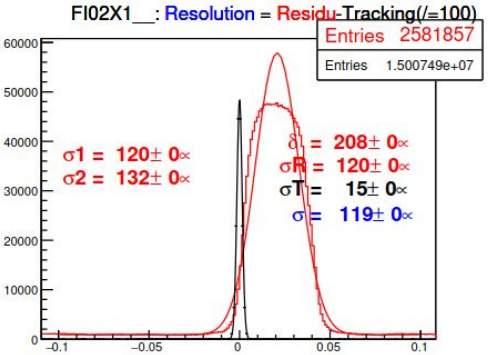
Slides for CW of 2020-10-23

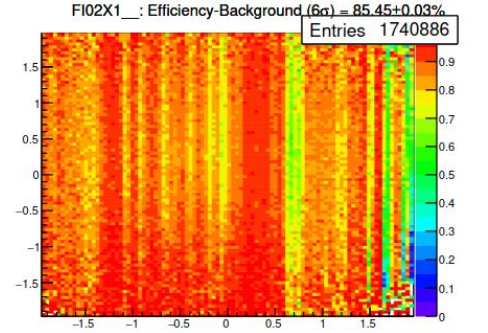
List of Remaining Issues // 2016-1

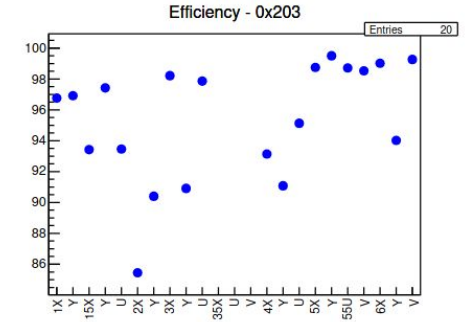
P06
* FI02X misaligned (released, I overlooked this)

P05: overall alignment seems raw, currently working on this
* Spot on FIs

P04
* Spot on FIs
* DC05 (apparently hardware issue)
* *272449*
  * GEMs might be improved
  * GM06[XY] - minor DZ misalignment
  * FIs misaligned: 05Y, 05X, 55V 04Y, 04X, 04U, 03Y, 03X, 03U
  * MP03M[UXY] misaligned (.5 RMS)
* *272615*
  * GP02P1 misaligned







List of Remaining Issues // 2016-2

P03

* Spot on FIs
* GM04Y misaligned, is a pivot plane
* *271827*
  * MP misaligned (all, disastrous, hopefully can fix with a dedicated effort, additionally DZ)
  * MP03M[UVX] inefficient/misaligned/broken

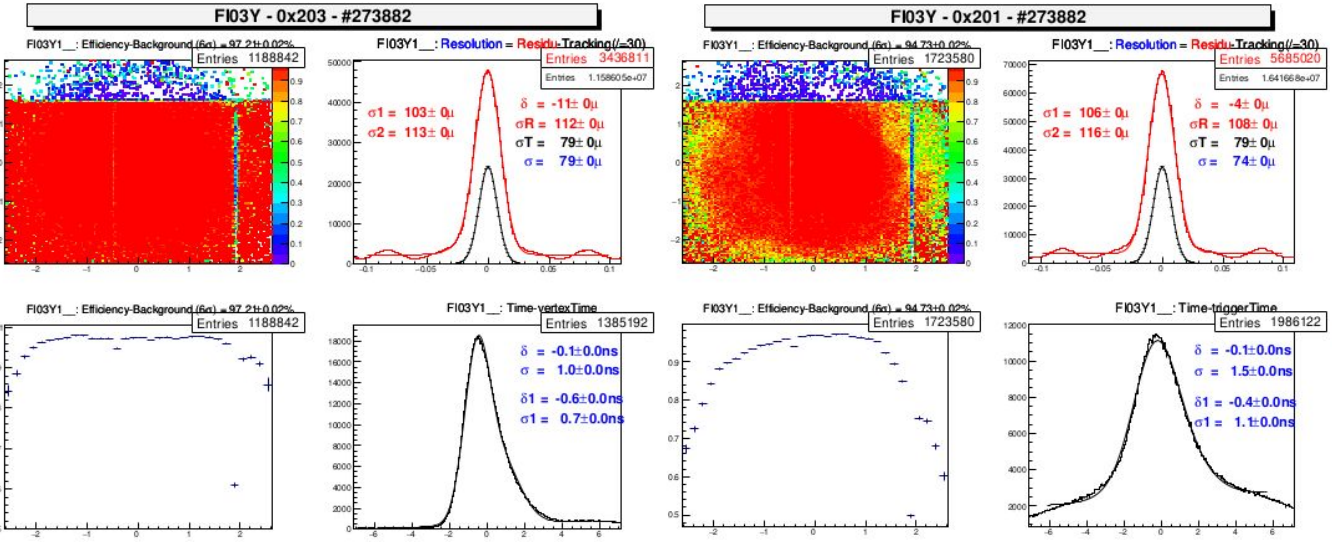
P01

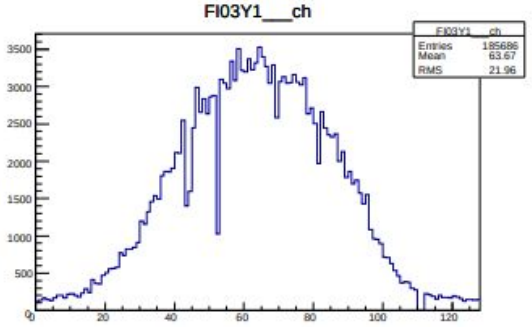
* *270941* GM03[XY] DZ bias (have to be fixed by DZ alignment procedure)

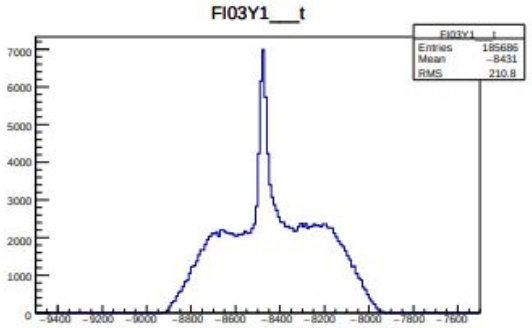
Overall minor issues:

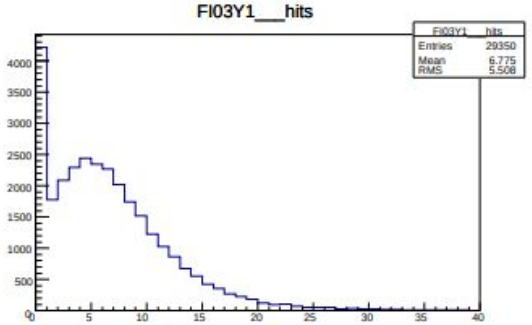
* No R(T) in UE11 data for any detector it have to be available
* Missed ST on DPS plots, dedicated subroutine needed (yet, well visible on `checkTracks' and with my own tools)
* Missed SIs and FI01, FI02X/Y on `checkTracks' plots (unclear reason -- do exist at `traf' data, `checkTracks' collects nothing, visible on DPS and with my own tools)

FIs: partially missed plane







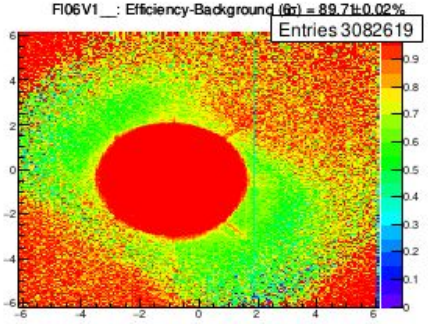


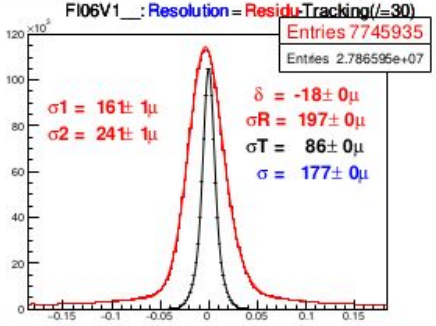
Part of the DI03 plane is missed for the entire 2016.
For >P07 it seemed to be a hardware issue (wrt COOOL plots).

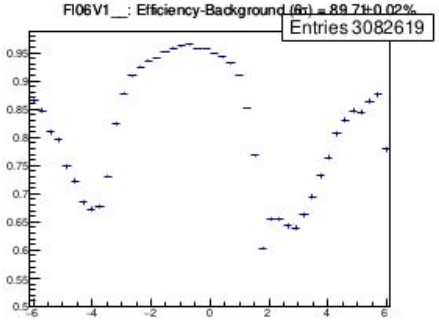
FIs: spot

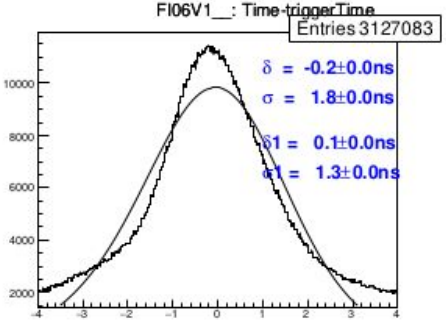
```
- Summary of <mode> bit pattern meaning:
0x2     : Require vertex, i.e. require sampling track to be in best pVertex.
          (Defaut = yes.)
```

FI06V - 0x201 - #272449

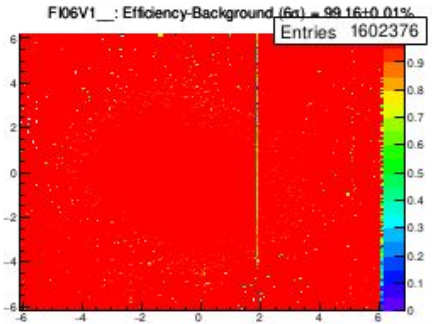


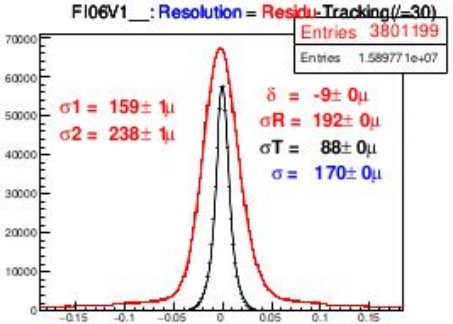


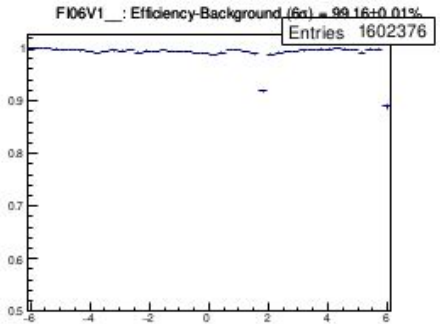


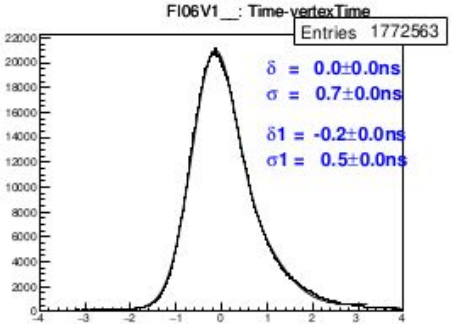


FI06V - 0x203 - #273882

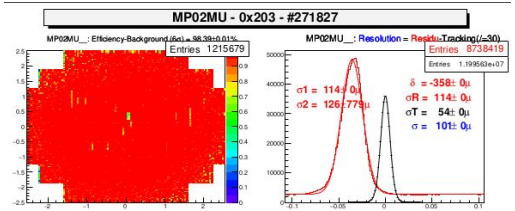


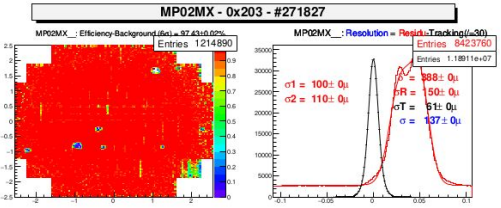


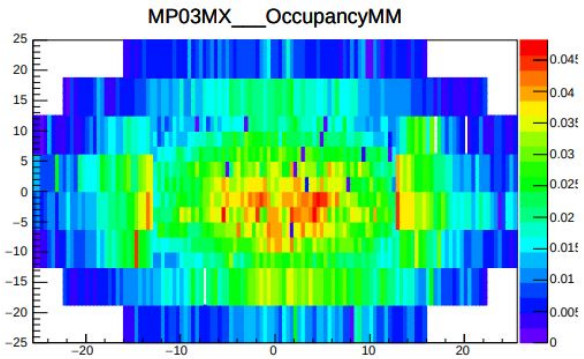


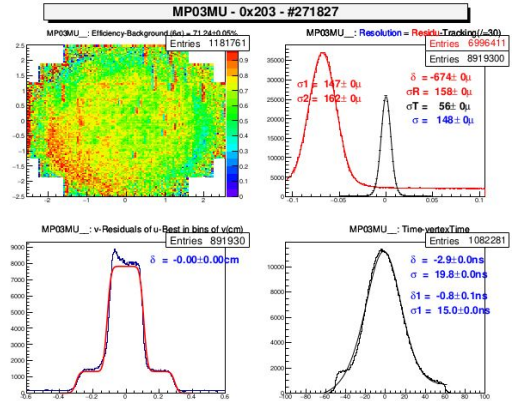


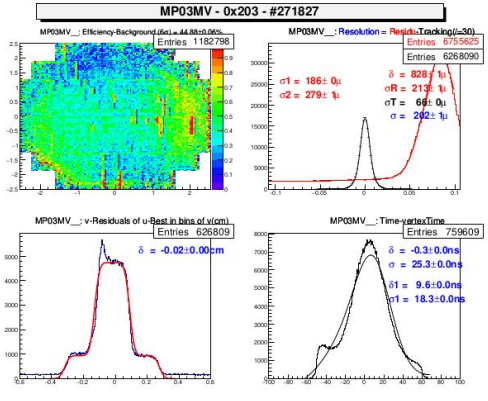
MP at P03

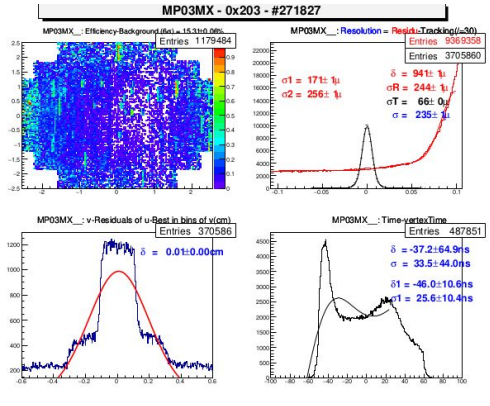

MP02MU - 0x203 - #271827
MP02MU__: Efficiency-Background(/σ) = 98.39±0.01%
Entries 1215679
MP02MU__: Resolution = Residu-Tracking(//=30)
Entries 873419
Entries 1.199563e+07
σ1 = 114± 0μ
σ2 = 126± 77μ
δ = -358± 0μ
σR = 114± 0μ
σT = 54± 0μ
σ = 101± 0μ
MP02MU__: v-Residuals of u-Best in bins of v(cm)
Entries 1199563
δ = 0.01±0.00cm
MP02MU__: Time-vertexTime
Entries 1505822
δ = -8.8±0.0ns
σ = 16.7±0.0ns
δ1 = -3.5±0.0ns
σ1 = 12.4±0.0ns


MP02MX - 0x203 - #271827
MP02MX__: Efficiency-Background(/σ) = 97.43±0.02%
Entries 1214890
MP02MX__: Resolution = Residu-Tracking(//=30)
Entries 8423760
Entries 1.18911e+07
σ1 = 100± 0μ
σ2 = 110± 0μ
δ = 388± 0μ
σR = 150± 0μ
σT = 61± 0μ
σ = 137± 0μ
MP02MX__: v-Residuals of u-Best in bins of v(cm)
Entries 1189110
δ = 0.01±0.00cm
MP02MX__: Time-vertexTime
Entries 1491486
δ = -10.7±0.0ns
σ = 17.4±0.0ns
δ1 = -8.4±0.0ns
σ1 = 13.8±0.0ns


MP03MX___OccupancyMM


MP03MU - 0x203 - #271827
MP03MU__: Efficiency-Background(/σ) = 71.24±0.05%
Entries 1181761
MP03MU__: Resolution = Residu-Tracking(//=30)
Entries 6996411
Entries 8919300
σ1 = 147± 0μ
σ2 = 162± 0μ
δ = -674± 0μ
σR = 158± 0μ
σT = 56± 0μ
σ = 148± 0μ
MP03MU__: v-Residuals of u-Best in bins of v(cm)
Entries 891930
δ = -0.00±0.00cm
MP03MU__: Time-vertexTime
Entries 1082281
δ = -2.9± 0.0ns
σ = 19.8±0.0ns
δ1 = -0.8±0.1ns
σ1 = 15.0±0.0ns


MP03MV - 0x203 - #271827
MP03MV__: Efficiency-Background(/σ) = 44.88±0.06%
Entries 1182798
MP03MV__: Resolution = Residu-Tracking(//=30)
Entries 6755625
Entries 6268090
σ1 = 186± 0μ
σ2 = 279± 1μ
δ = 828± 1μ
σR = 213± 1μ
σT = 66± 0μ
σ = 202± 1μ
MP03MV__: v-Residuals of u-Best in bins of v(cm)
Entries 626809
δ = -0.02±0.00cm
MP03MV__: Time-vertexTime
Entries 759609
δ = -0.3±0.0ns
σ = 25.3±0.0ns
δ1 = 9.6±0.0ns
σ1 = 18.3±0.0ns

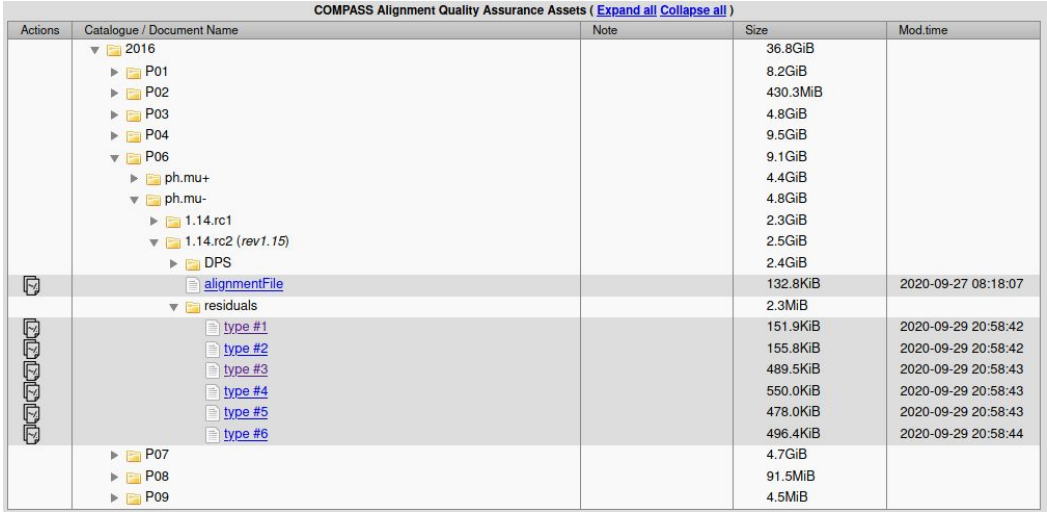

MP03MX - 0x203 - #271827
MP03MX__: Efficiency-Background(/σ) = 15.31±0.08%
Entries 1179484
MP03MX__: Resolution = Residu-Tracking(//=30)
Entries 9369358
Entries 3705860
σ1 = 171± 1μ
σ2 = 256± 1μ
δ = 941± 1μ
σR = 244± 1μ
σT = 66± 0μ
σ = 235± 1μ
MP03MX__: v-Residuals of u-Best in bins of v(cm)
Entries 370586
δ = 0.01±0.00cm
MP03MX__: Time-vertexTime
Entries 487851
δ = -37.2±64.9ns
σ = 33.5±44.0ns
δ1 = -46.0±10.6ns
σ1 = 25.6±10.4ns

New Page for Alignment Plots

http://na58-dev.cern.ch/QA.d/

Current features:

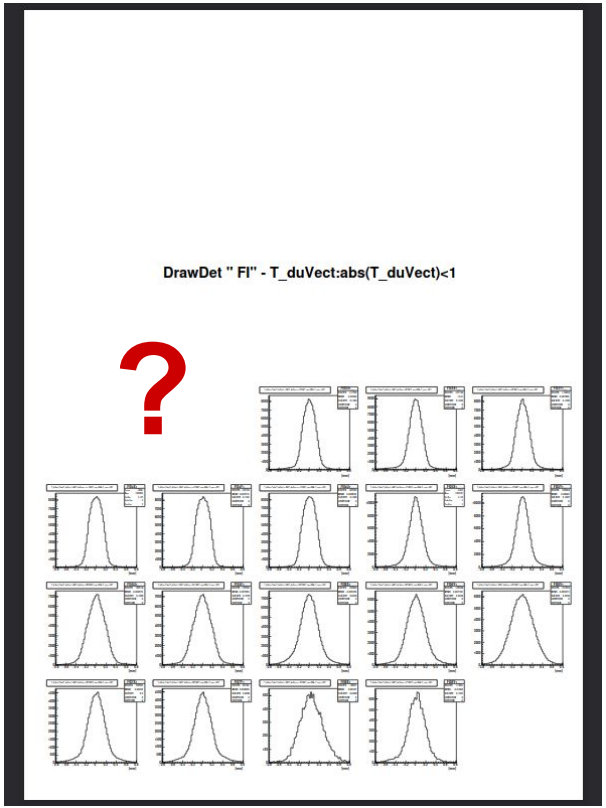
- Provides detectors.dat, DPS & checkTracks plots sorted by year/period/revision/type/run
- Generated automatically (items are bound to physical FS entries on specific /eos location)
- Intermediate versions and release candidates for finer analysis; symlinks interpreted as aliases (e.g. 1.14.rc2 -> 1.15)



Expected features:

- diff-like comparison of detectors.dat of different versions
- advanced residuals
- .root file browsing
- automated householding and integration with the alignment lifecycle

Missed plots on checkTracks output



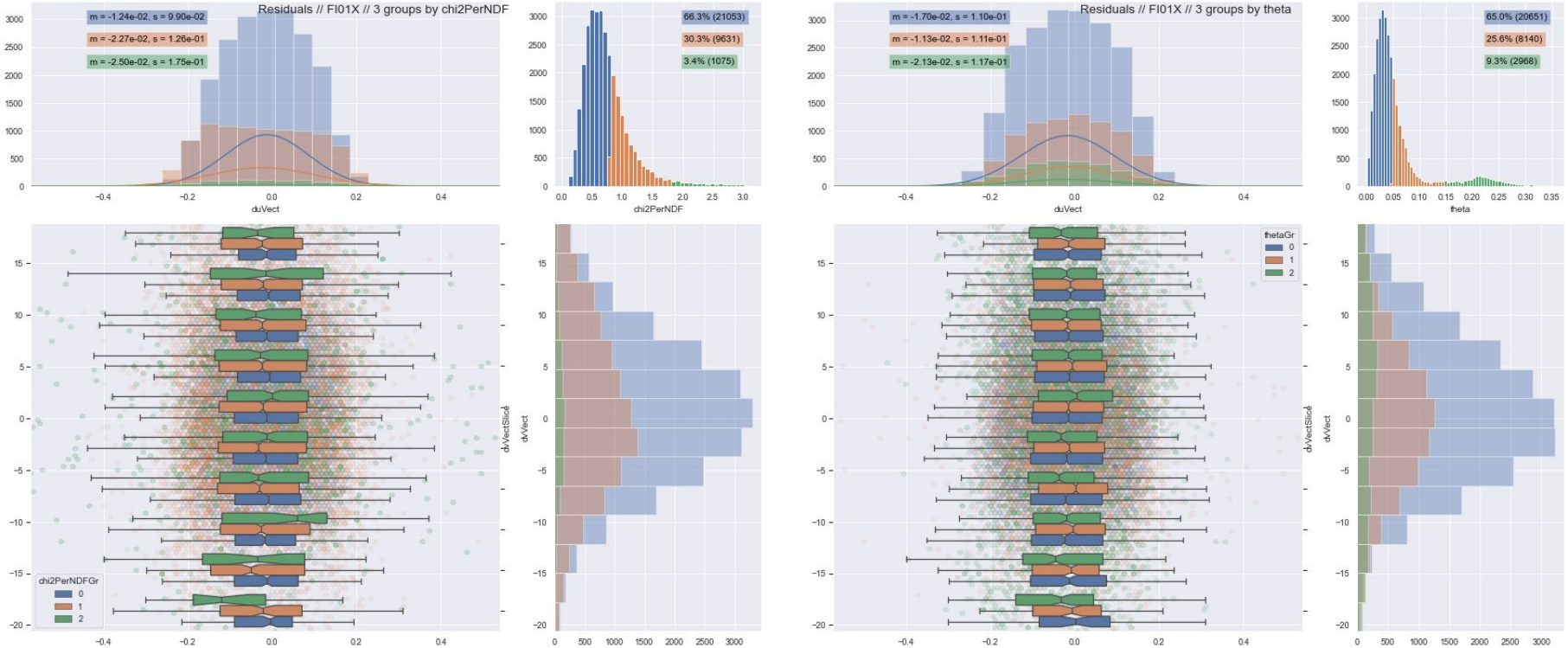

```
5241 `Too many bad flux scaler readings: 501 bad readings and only 501 good re
     adings. Probably your FluxScaler option is set incorrectly. Present bad r
     eading is from SCFI01Y6.'
5242 ^[[0m^[[31m
5243  Severity level: ERROR
5244  Date:           Thu, 22/Oct/2020 07:57:53.169296 (GMT)
5245  File/Facility:  doFitting.cc
5246  Line/Code:      1303
5247  Message:
5248 `Wrong (not best pVertex') T0 used in track fitting: 0.00 instead of -5.0
     6 ns => Re-tracking requested'
```

```
273 CheckTracks::DrawDet - var "T_duVect" det "MP03MY__": 114057 entries.
274 CheckTracks::DrawDet - var "T_duVect" det "MP03MY__": 114019 entries.
275 CheckTracks::DrawDet - 24 detector(s) selected.
276 CheckTracks::DrawDet - var "T_duVect" det "FI01X1__": 0 entries.
277 CheckTracks::DrawDet - var "T_duVect" det "FI01Y1__": 0 entries.
278 CheckTracks::DrawDet - var "T_duVect" det "FI15U1__": 0 entries.
279 CheckTracks::DrawDet - var "T_duVect" det "FI15X1__": 0 entries.
280 CheckTracks::DrawDet - var "T_duVect" det "FI15Y1__": 0 entries.
281 CheckTracks::DrawDet - var "T_duVect" det "FI02Y1__": 0 entries.
282 CheckTracks::DrawDet - var "T_duVect" det "FI02X1__": 0 entries.
283 CheckTracks::DrawDet - var "T_duVect" det "FI03U1__": 78962 entries.
284 CheckTracks::DrawDet - var "T_duVect" det "FI03X1__": 85691 entries.
```

Some planes (FIs, SIs, STs) are missed on checkTracks util output for 2016, but they do exist on the traf output and relevant information can be extracted from alignment tree.

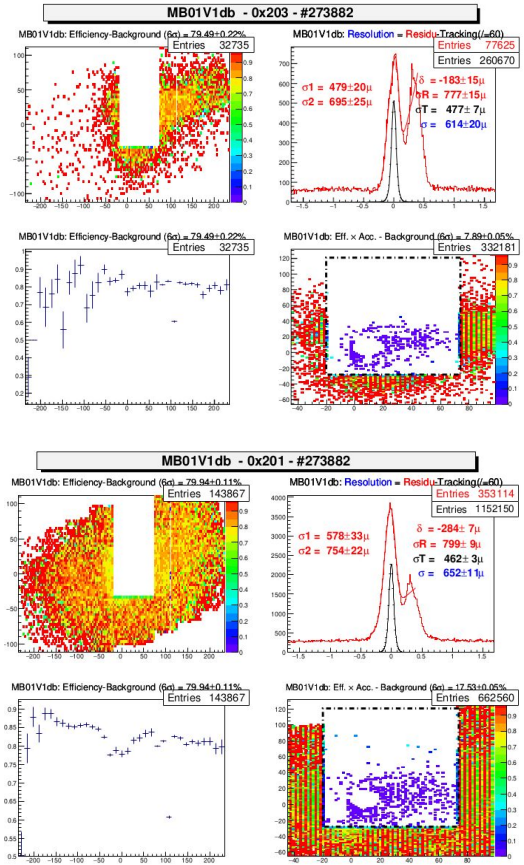
?: Debugging the checkTracks is feasible, but for now we would prefer to postpone this in favor of making another util for similar purpose.

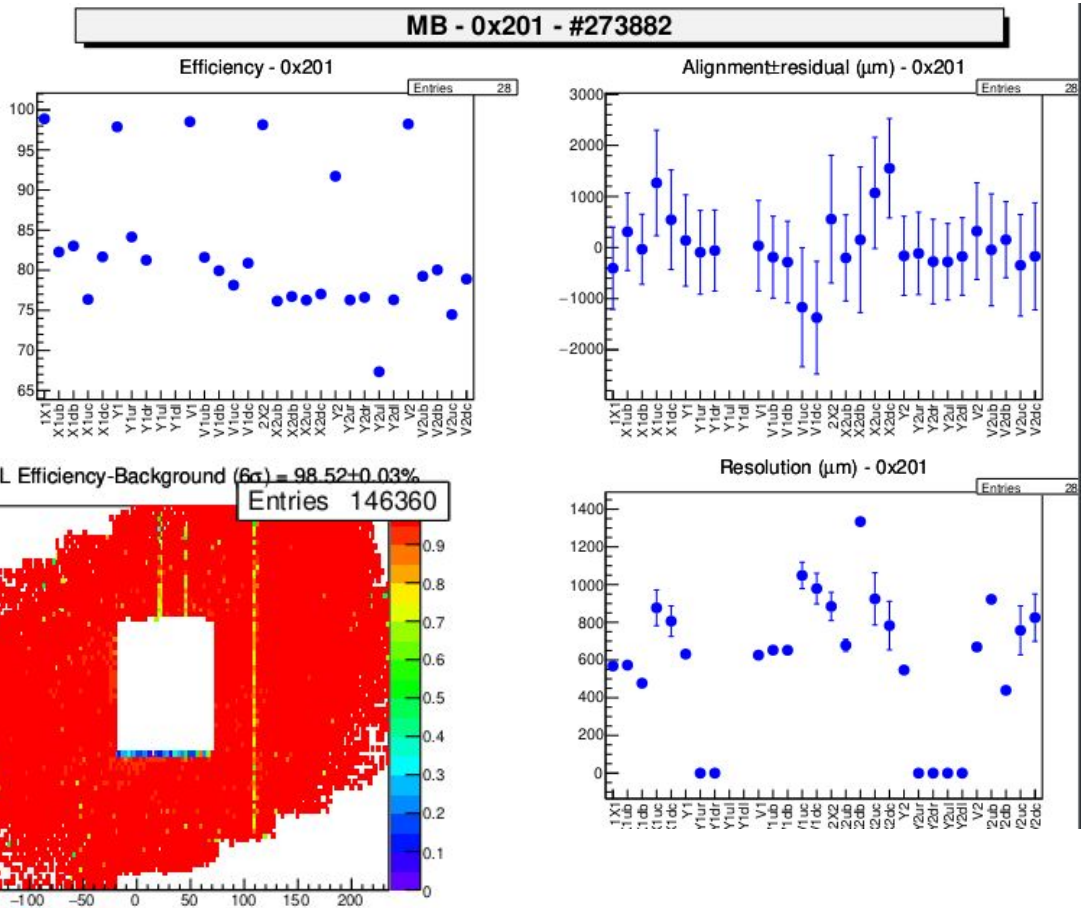
New Plots Example Study



MB: double peak

(just to make sure)





GM04Y at P02 and P03 (pivot; -> GM05[X/Y])