



GMT alignment in DEV:

changes in libs

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Details

For modification I used libraries in star github:

<https://github.com/star-bnl/star-sw/tree/main>

My git repo with modified libs for gmt alignment:

https://gitlab.com/aspovarov/gmt_aligment_for_stardev

And my dir on RACF:

/star/data01/pwg/aspovarov/gmt_aligment_for_stardev

Libs are successfully compiled in stardev:

>>> stardev

>>> cons

Adding new files

```
rcas6015 /<2>pwg/aspovarov/gmt_aligment_for_stardev/StRoot/> ll
total 1029
drwxr-xr-x 2 aspovarov rhstar 512 Jan 14 10:01 StAnalysisMaker
drwxr-xr-x 3 aspovarov rhstar 262144 Jan 14 10:01 StBFChain
drwxr-xr-x 3 aspovarov rhstar 262144 Jan 14 10:01 StEvent
drwxr-xr-x 2 aspovarov rhstar 512 Jan 14 13:00 StGmtAligner
drwxr-xr-x 2 aspovarov rhstar 512 Jan 14 10:01 StGmtClusterMaker
drwxr-xr-x 2 aspovarov rhstar 512 Jan 14 10:01 StGmtRawMaker
drwxr-xr-x 3 aspovarov rhstar 512 Jan 14 10:01 StGmtUtil
```

Added GMT classes in my StRoot dir

Also GMT classes were added in StRoot/StEvent directory:

- StGmtCollection.cxx, StGmtCollection.h
- StGmtHitCollection.cxx, StGmtHitCollection.h
- StGmtHit.cxx, StGmtHit.h
- StGmtPointCollection.cxx, StGmtPointCollection.h
- StGmtPoint.cxx, StGmtPoint.h
- StGmtStripCollection.cxx, StGmtStripCollection.h
- StGmtStrip.cxx, StGmtStrip.h

StContainers changes

StRoot/StEvent/StContainers.h

```
...    ...    @@ -214,6 +214,9 @@ class StTrackNode;
214    214    class StTrackPidTraits;
215    215    class StV0Vertex;
216    216    class StXiVertex;
217    + class StGmtHit;
218    + class StGmtStrip;
219    + class StGmtPoint;
217    220
218    221    StCollectionDef(BTofHit)
219    222    StCollectionDef(BTofRawHit)
...    ...    @@ -293,6 +296,9 @@ StCollectionDef(TrackNode)
293    296    StCollectionDef(TrackPidTraits)
294    297    StCollectionDef(V0Vertex)
295    298    StCollectionDef(XiVertex)
299    + StCollectionDef(GmtHit)
300    + StCollectionDef(GmtStrip)
301    + StCollectionDef(GmtPoint)
296    302
297    303
298    304    #endif
```

StRoot/StEvent/StContainers.cxx

```
...    ...    @@ -198,6 +198,9 @@
198    198    #include "StTrackPidTraits.h"
199    199    #include "StV0Vertex.h"
200    200    #include "StXiVertex.h"
201    + #include "StGmtHit.h"
202    + #include "StGmtPoint.h"
203    + #include "StGmtStrip.h"
201    204
202    205    StCollectionImp(BTofHit)
203    206    StCollectionImp(BTofRawHit)
...    ...    @@ -277,3 +280,6 @@ StCollectionImp(TrackNode)
277    280    StCollectionImp(TrackPidTraits)
278    281    StCollectionImp(V0Vertex)
279    282    StCollectionImp(XiVertex)
283    + StCollectionImp(GmtHit)
284    + StCollectionImp(GmtStrip)
285    + StCollectionImp(GmtPoint)
```

StEvent changes

StRoot/StEvent/StEvent.h

```
...   ...   @@ -228,6 +228,7 @@ class StIstHitCollection;
228   228   class StFstEvtCollection;
229   229   class StFstHitCollection;
230   230   class StFwdTrackCollection;
231   231   + class StGmtCollection;

231   232
232   233   class StEvent : public StXRefMain {
233   234   public:
...   ...   @@ -318,6 +319,8 @@ public:
318   319       const StTriggerIdCollection*      triggerIdCollection() const;
319   320       StTriggerData*                    triggerData();
320   321       const StTriggerData*              triggerData() const;
322   322   +   StGmtCollection*                   gmtCollection();
323   323   +   const StGmtCollection*             gmtCollection() const;

321   324
322   325       StSPtrVecTrackDetectorInfo&        trackDetectorInfo();
323   326       const StSPtrVecTrackDetectorInfo&  trackDetectorInfo() const;
...   ...   @@ -412,6 +415,7 @@ public:
412   415       void removePsd(StPsd*);
413   416       void addHitCollection(StSPtrVecHit* p, const Char_t *name);
414   417       void removeHitCollection(const Char_t *name);
418   418   +   void setGmtCollection(StGmtCollection*);
```

StRoot/StEvent/StEvent.cxx

```
258   258   #include "StFwdTrackCollection.h"
259   259   + #include "StGmtCollection.h"

259   260
260   261   #ifndef ST_NO_NAMESPACES
261   262   using std::swap;
...   ...   @@ -988,6 +989,23 @@ StEvent::fgtCollection() const
988   989       return fgtCollection;
989   910   }

910   911
912   912   + StGmtCollection*
913   913   + StEvent::gmtCollection()
914   914   + {
915   915   +   StGmtCollection *gmtCollection = 0;
916   916   +   _lookup(gmtCollection, mContent);
917   917   +   return gmtCollection;
918   918   + }
919   919   +
920   920   + const StGmtCollection*
921   921   + StEvent::gmtCollection() const
922   922   + {
923   923   +   StGmtCollection *gmtCollection = 0;
924   924   +   _lookup(gmtCollection, mContent);
925   925   +   return gmtCollection;
926   926   + }
927   927   +
928   928   +

911   929   StIstHitCollection*
912   930   StEvent::istHitCollection()
913   931   {
...   ...   @@ -1456,6 +1474,12 @@ StEvent::setFgtCollection(StFgtCollection* val)
1456   1474       _lookupAndSet(val, mContent);
1457   1475   }
1458   1476

1477   1477   + void
1478   1478   + StEvent::setGmtCollection(StGmtCollection* val)
1479   1479   + {
1480   1480   +   _lookupAndSet(val, mContent);
1481   1481   + }
1482   1482   +
```

StEventTypes and StEventClusteringHints changes

StRoot/StEvent/StEventTypes.h

```
...    ...    @@ -169,6 +169,8 @@
169    169    *****
170    170    #ifndef StEventTypes_hh
171    171    #define StEventTypes_hh
172    172    +
173    173    + #include "StContainers.h"
```

StRoot/StEvent/StEventTypes.h

```
...    ...    @@ -330,6 +330,8 @@
330    330    #include "StFgtHitCollection.h"
331    331    #include "StFgtPoint.h"
332    332    #include "StFgtPointCollection.h"
333    333    + #include "StGmtHit.h"
334    334    + #include "StGmtCollection.h"
335    335    #include "StIstHit.h"
336    336    #include "StIstSensorHitCollection.h"
337    337    #include "StIstLadderHitCollection.h"
...    ...
```

StRoot/StEvent/StEventClusteringHints.cxx

```
...    ...    @@ -202,6 +202,7 @@ StEventClusteringHints::StEventClusteringHints()
202    202    setBranch("StRpsCollection", "evt_aux", 7);
203    203    setBranch("StFttCollection", "evt_aux", 7);
204    204    setBranch("StFstEvtCollection", "evt_aux", 7);
205    205    + setBranch("StGmtCollection", "evt_aux", 7);
206    206    setBranch("StSsdHitCollection", "evt_hits", 8);
207    207    setBranch("StSstHitCollection", "evt_hits", 8);
208    208    setBranch("StSvtHitCollection", "evt_hits", 8);
...    ...    @@ -211,6 +212,7 @@ StEventClusteringHints::StEventClusteringHints()
211    212    setBranch("StTpcHitCollection", "evt_hits", 8);
212    213    setBranch("StFtpcHitCollection", "evt_hits", 8);
213    214    setBranch("StRnDHitCollection", "evt_hits", 8);
215    215    + setBranch("StGmtHitCollection", "evt_hits", 8);
216    216    setBranch("StHltEvent", "evt_hlt", 9);
217    217    setBranch("StFgtCollection", "evt_fgt", 9);
218    218
...    ...
```

BigFullChain changes

Added GMT options in BigFullChain.h

```
StRoot/StBFChain/BigFullChain.h

... @@ -1381,6 +1381,13 @@ Bfc_st BFC[] = { // standard chains
1381 1381 , "MTD hit maker",kFALSE},
1382 1382 {"mtdTrkMask", "", "", "db", "StMtdTrackingMaskMaker", "StMtdEvtFilterMaker", "MTD track masking",kFALSE},
1383 1383
1384 + // GMT
1385 + {"gmt", "", "", "gmtDat, gmtClu", "", "", "Gmt data Chain",kFALSE},
1386 + {"gmtDat", "", "", "event", "StGmtRawMaker", "StGmtRawMaker", "GMT Data reader",kFALSE},
1387 + {"gmtClu", "", "", "gmtutil", "StGmtClusterMaker", "Spectrum, StGmtClusterMaker", "GMT cluster maker",kFALSE},
1388 + {"gmtCosmics", "", "", "Cosmics, gmt", "", "", "Save only events with GMT clusters and Cosmic tracks",kFALSE},
1389 + {"gmtClusTree", "", "", "", "", "", "WARNING *** Option is OBSOLETE ***",kFALSE},
1390 +
1384 1391 // EPD
1385 1392 {"epdHit", "", "", "epdDb, event", "StEpdHitMaker", "StEpdHitMaker", "EPD hit maker", kFALSE},
1386 1393
... @@ -1782,6 +1789,10 @@ Bfc_st BFC[] = { // standard chains
1782 1789 {"mtdCalib", "", "", "db", "StMtdCalibMaker", "StMtdCalibMaker", "MTD calibration",kFALSE},
1783 1790 {"mtdEvtFilt", "", "", "db", "StMtdEvtFilterMaker", "StMtdEvtFilterMaker", "MTD event filter", kFALSE},
1784 1791
1792 + // GMT
1793 + {"gmtMatch", "", "", "", "", "WARNING *** Option is OBSOLETE ***",kFALSE},
1794 + {"gmtPlotter", "", "", "", "", "WARNING *** Option is OBSOLETE ***",kFALSE},
1795 +
1785 1796 {"FindVtxSeed", "FindVtxSeed", "", "gLOBT, MuDSTDepS, picoDst", "StVertexSeedMaker",
1786 1797 , "StPass0CalibMaker", "Performs vertex seed finding",kFALSE},
1787 1798 {"FindEvtVtxSeed", "FindEvtVtxSeed", "", "MuDSTDepS, picoDst", "StEvtVtxSeedMaker"
... @@ -1911,6 +1922,10 @@ Bfc_st BFC[] = { // standard chains
1911 1922 , "Creates tree in minimc.root file",kFALSE},
1912 1923 {"SvtMatTree", "", "", "", "SvtMatchedTree",
1913 1924 , "StSvtPoolEventT, StSvtPoolSvtMatchedTree", "Create SvtMatchedTree",kFALSE},
1925 +
1926 + // GMT
1927 + {"gmtAligner", "", "", "detDb", "StGmtAligner", "StGmtAligner", "GMT cluster plotting",kFALSE},
1928 +
```

StBFChain changes

StRoot/StBFChain/StBFChain.cxx

```
...    ...    @@ -550,6 +550,11 @@ Int_t StBFChain::Instantiate()
550    550        if (GetOption("Cosmics")) mk->SetAttr("Cosmics"    ,kTRUE);
551    551        mk->PrintAttr();
552    552    }
553    553    +
554    554    +   if (maker== "StGmtClusterMaker") {
555    555    +       if (GetOption("gmtCosmics")) mk->SetAttr("gmtCosmics", kTRUE);
556    556    +   }
557    557    +
553    558        if (maker=="StKFVertexMaker" && GetOption("laserIT")) mk->SetAttr("laserIT"    ,kTRUE);
554    559        //      sti(ITTF) end
555    560        if (maker=="StGenericVertexMaker") {
...    ...
```

Added gmtCosmics option in StBFChain.cxx

StAnalysisMaker changes

StRoot/StAnalysisMaker/StAnalysisMaker.cxx

```
...    ...    @@ -1141,13 +1141,14 @@ void StAnalysisMaker::summarizeEvent(StEvent *event, Int_t mEventCount
1141 1141    if (event->numberOfPsds()) {
1142 1142        LOG_QA << "# PSDs:           " << event->numberOfPsds() << endm;
1143 1143    }
1144 1144    - #ifdef _ST_GMT_HIT_H_
1145 1144    + // #ifdef _ST_GMT_HIT_H_
1146 1145        if (event->gmtCollection() && event->gmtCollection()->getNumHits()) {
1147 1146            LOG_QA << "# GMT hits:           " << event->gmtCollection()->getNumHits()
1148 1147            - << " points: " << event->gmtCollection()->getNumPoints()
1149 1147            + << ", points: " << event->gmtCollection()->getNumPoints()
1150 1148            + << ", strips: " << event->gmtCollection()->getNumStrips()
1151 1148            << endm;
1152 1149        }
1153 1150    - #endif /* _ST_GMT_HIT_H_ */
1154 1151    + // #endif /* _ST_GMT_HIT_H_ */
1155 1152        if (event->rpsCollection()) {
1156 1153            LOG_QA << "# RPS hits:           " << event->rpsCollection()->clusters().size() << endm;
1157 1154        }
...    ...
```

Commented out directives and added some logging for GMT

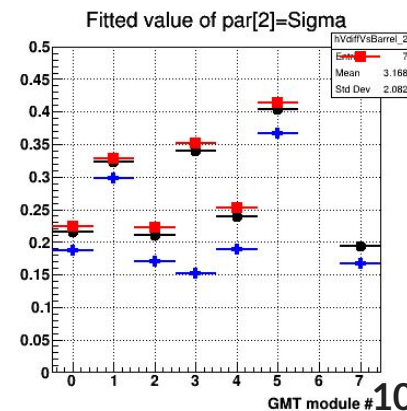
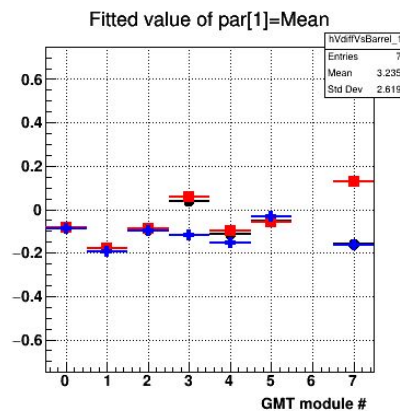
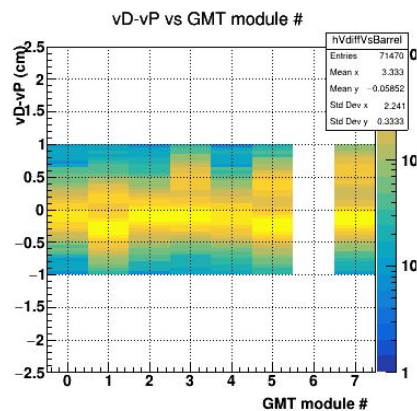
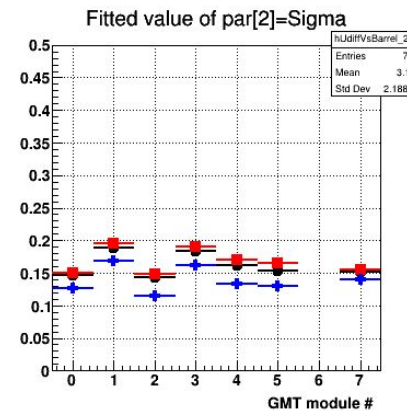
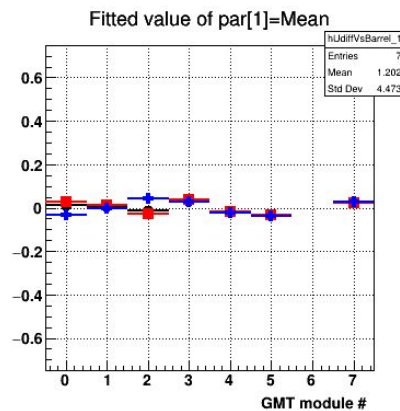
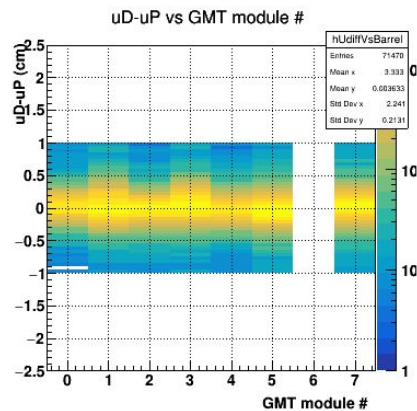
GMT alignment in stardev

I used data of 14.5 GeV Run14. Path to files:

/star/data01/pwg_tasks/TF_TrkEff/gmt_qa/manukhov/daq/2014/*/*/*.daq

300 files were processed, and
I used 294 files

Total events number: 268125
Events after cuts: 71470



Summary

- GMT codes are successfully compiled and run in **stardev**
- All changes are included in the git repository
https://gitlab.com/aspovarov/gmt_alignment_for_stardev
- GMT results were received in stardev



Thank you for your attention!

Details

I used data of 14.5 GeV Run14. Path to files:

/star/data01/pwg_tasks/TF_TrkEff/gmt_qa/manukhov/daq/2014/**/*.*.daq

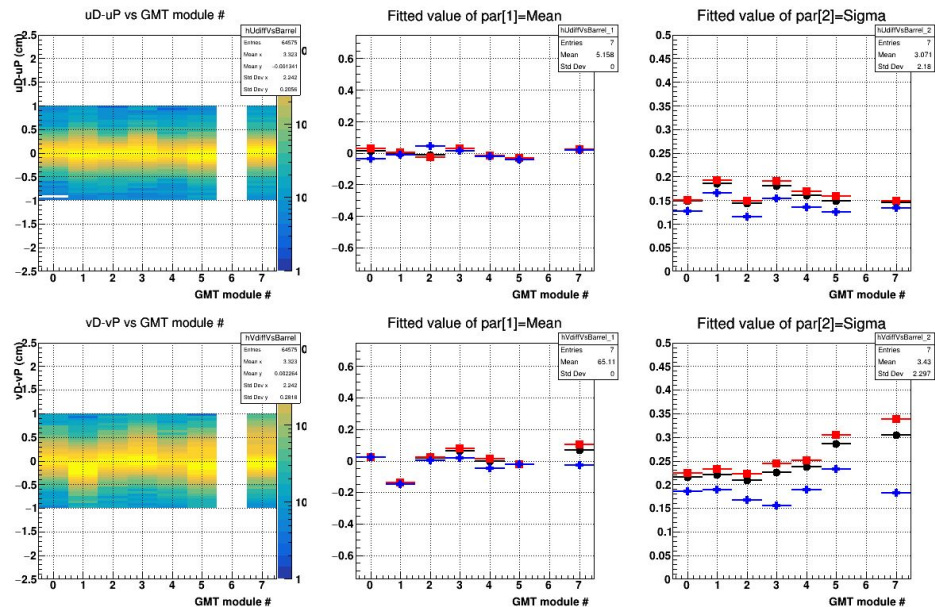
300 files were processed, and I used 294 files

Total events number: 268125

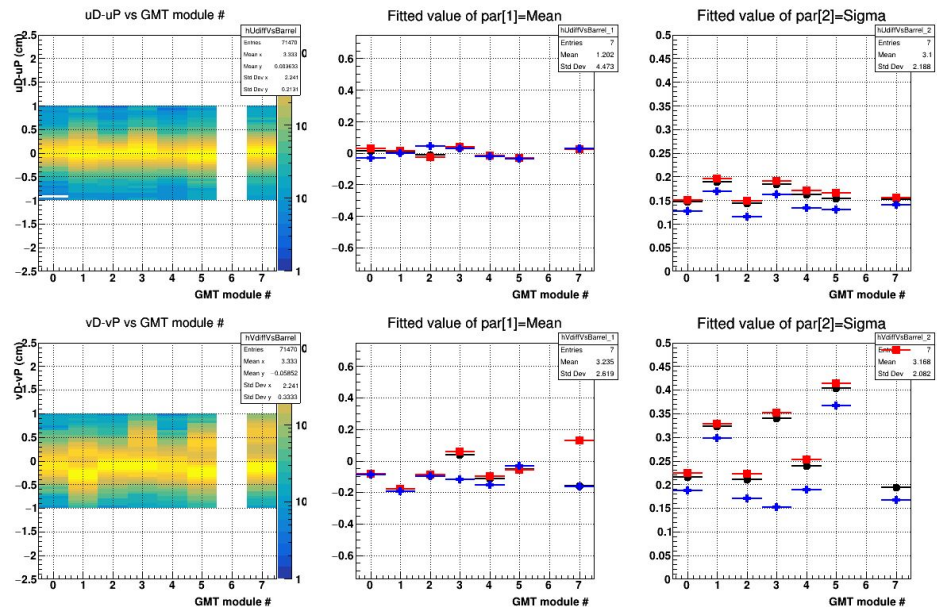
Events after cuts: 71470

Comparison GMT alignment for old results and stardev

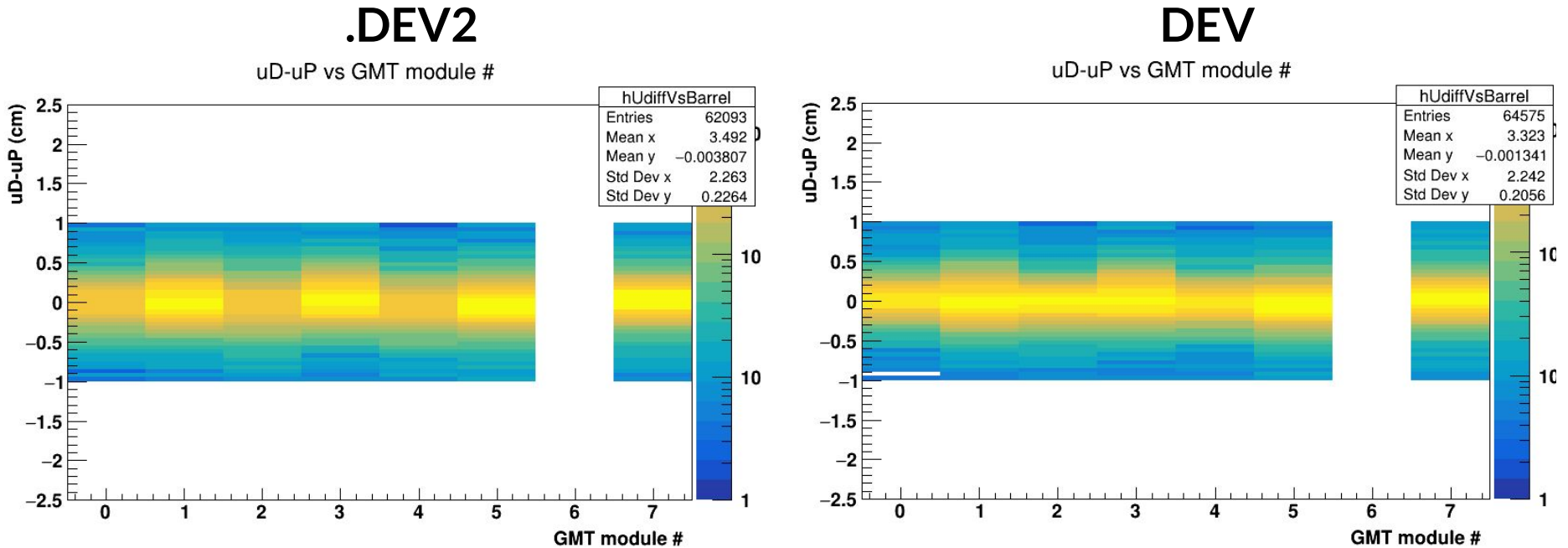
Old results in dev



stardev



Comparison GMT alignment for DEV and .DEV2



Different number of entries, but this distributions were obtained by the same macro