Updates on alignment and other stuff

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FOOT analysis meeting

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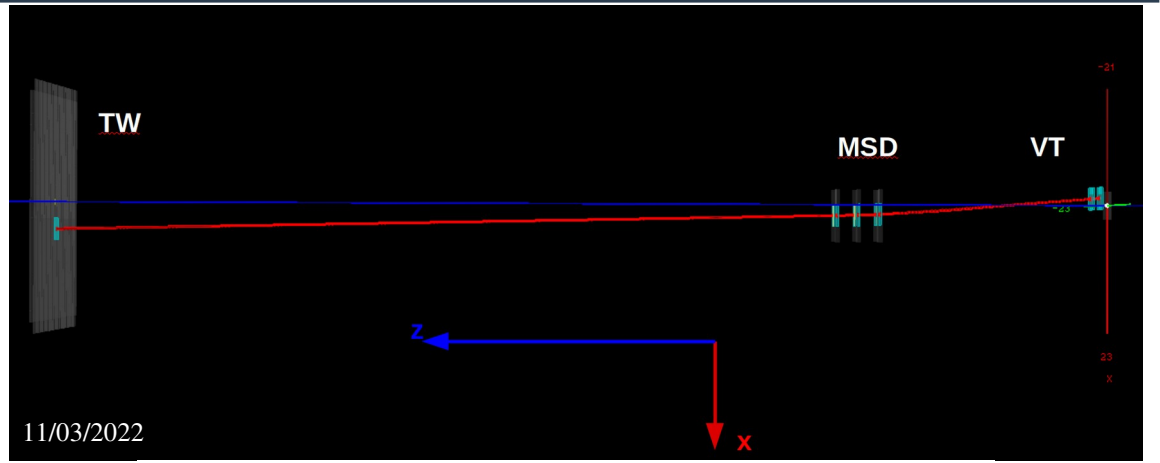
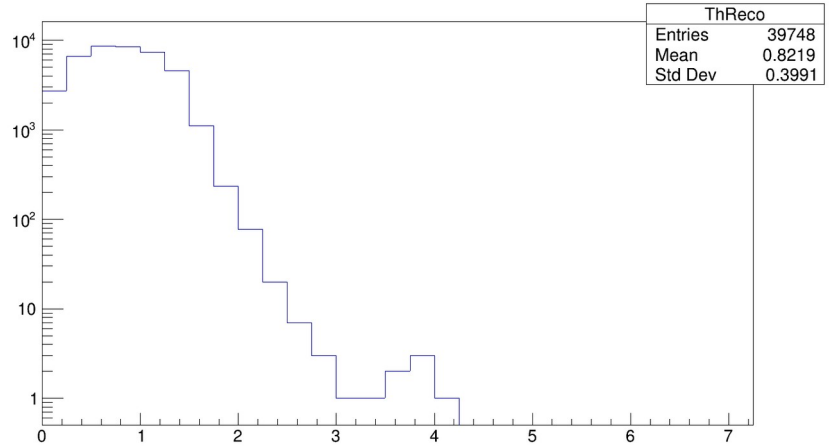
Where were we?

Problem

ALIGNMENT

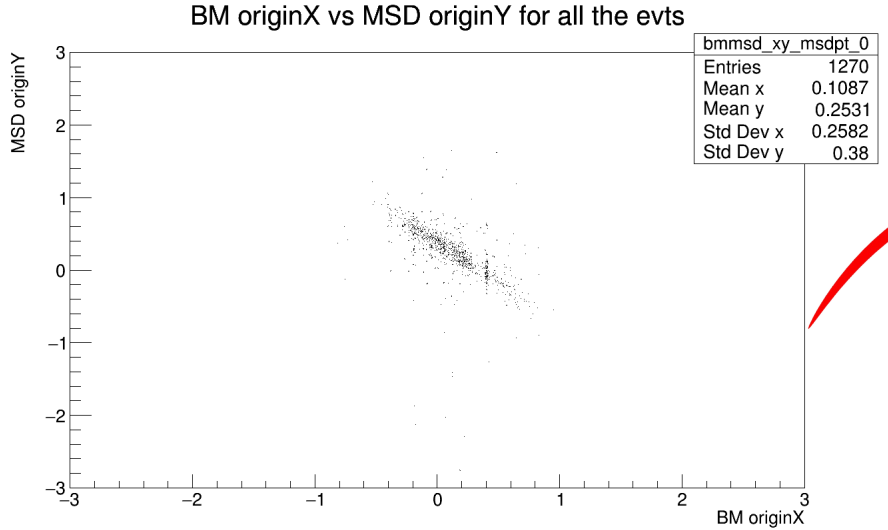
- Alignment not really working
- Straight tracks were never straight
- Alignment macro already there but seemingly “not working”
- No global tracks w/ $\theta > 4°$





MSD

- First thing to do → check MSD
  - Found out MSD planes were considered in an hardcoded XY order in ADC decoding (**fixed**)
  - MSD points were constructed assuming (again) an hardcoded XY/row-column order (**fixed**)
- After these changes we checked the correlation btw detectors

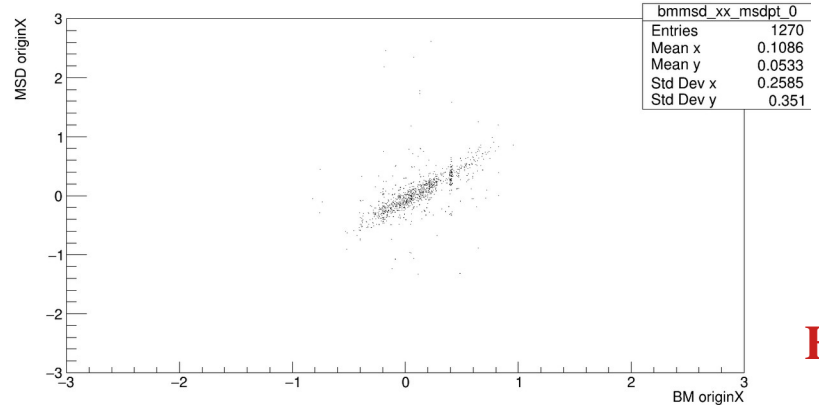


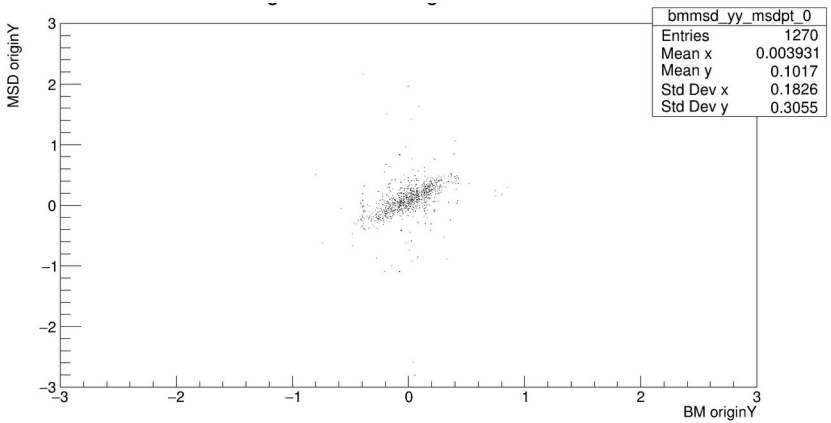
BM x anti-correlated w/ MSD y

Problem w/ spatial orientation of strips

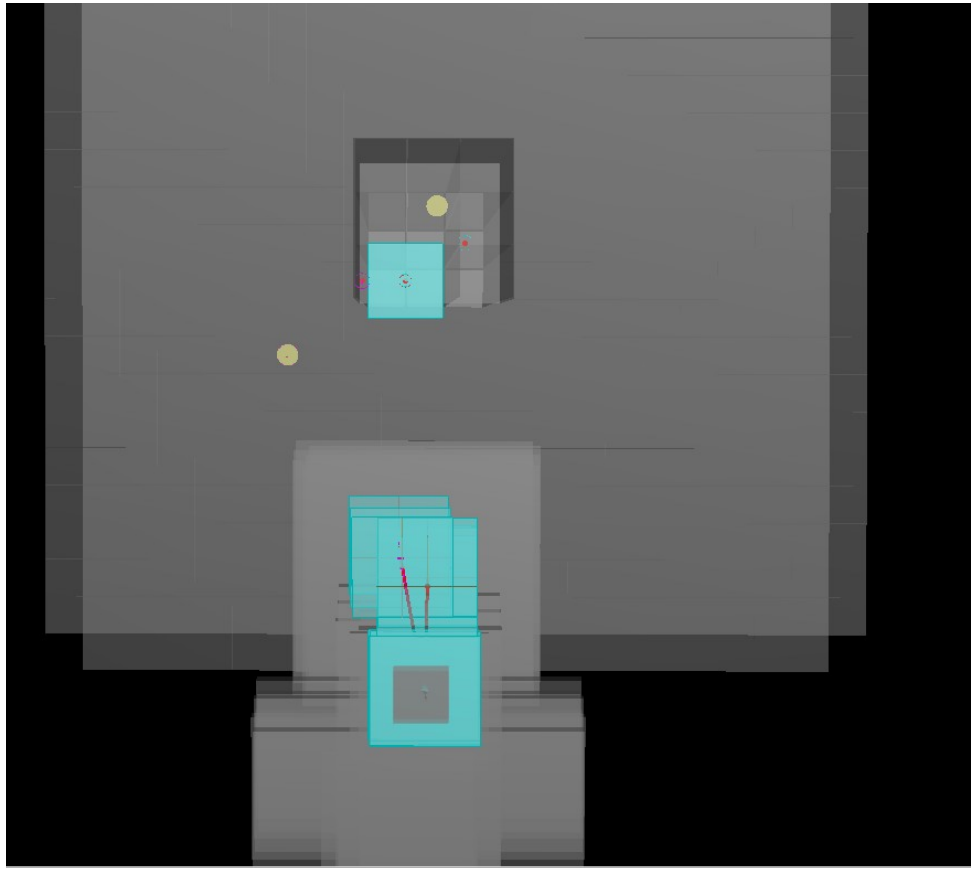
MSD

MSD rotated to regain the correlation in x & y





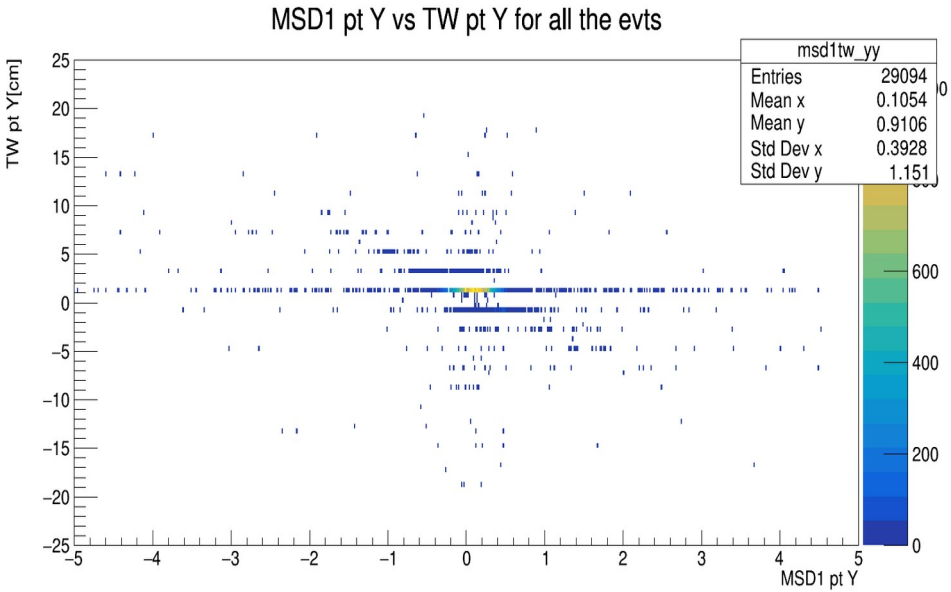
However…



MSD

So… Get back to something 100% certain (to me) → TW!

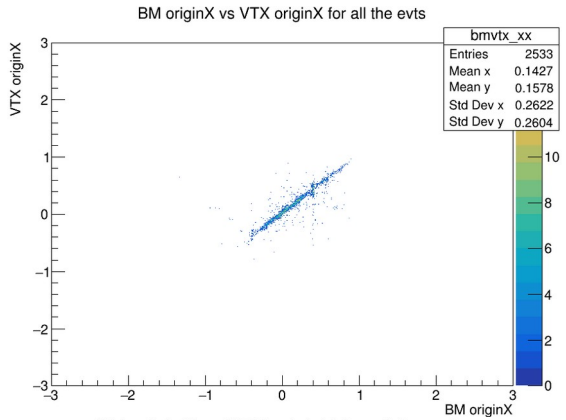
- Checked TW bars positions one-by-one, compliant w/ real setup
- MSD-TW anti-correlated in Y!! But TW is right...
- Asked Gianluigi for actual orientation of MSD strips
  → compliant w/ TW measurements after fix

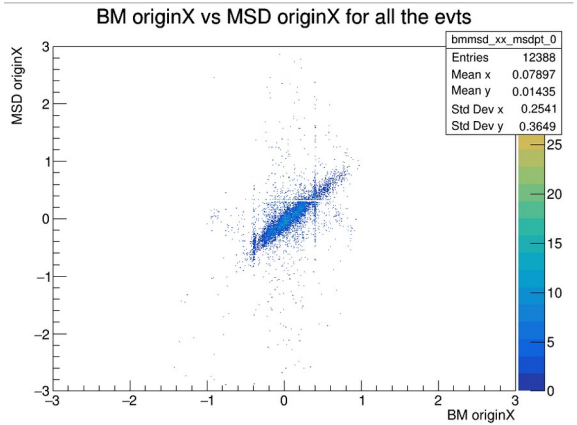


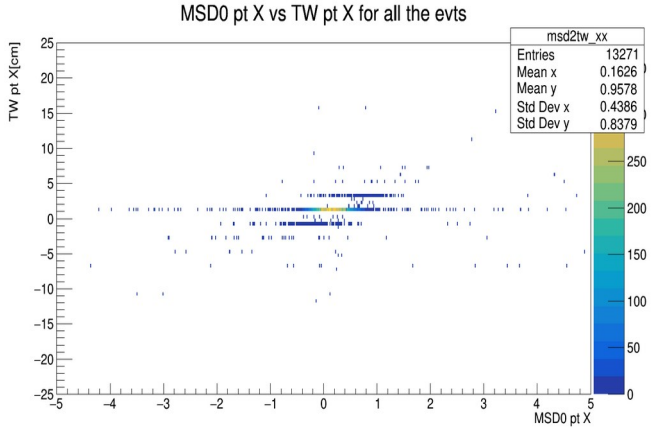
All of the other detectors (BM+VT) are inverted in Y!

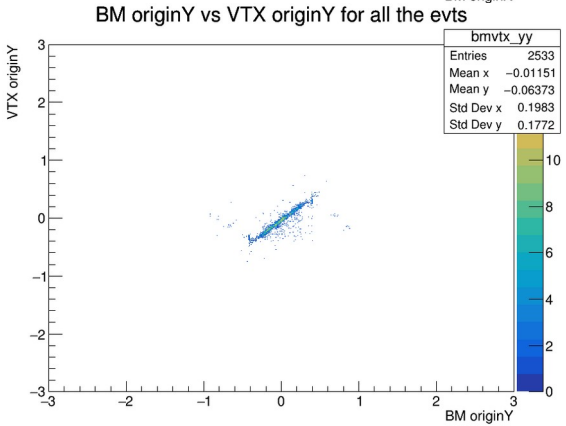
New alignment

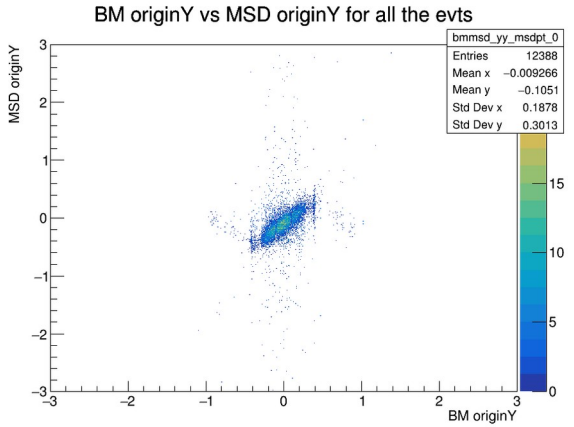
Re-gained all correlations!

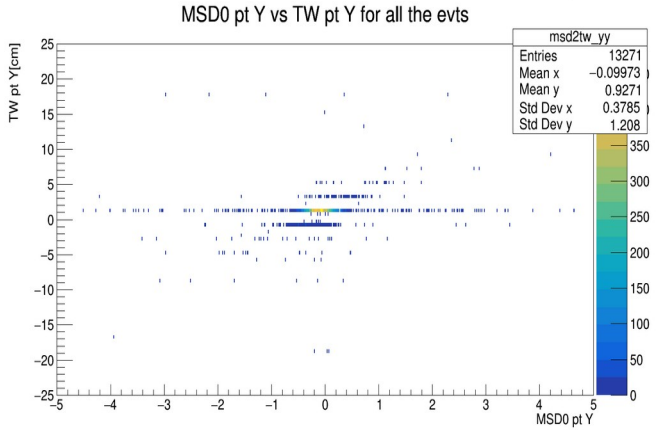










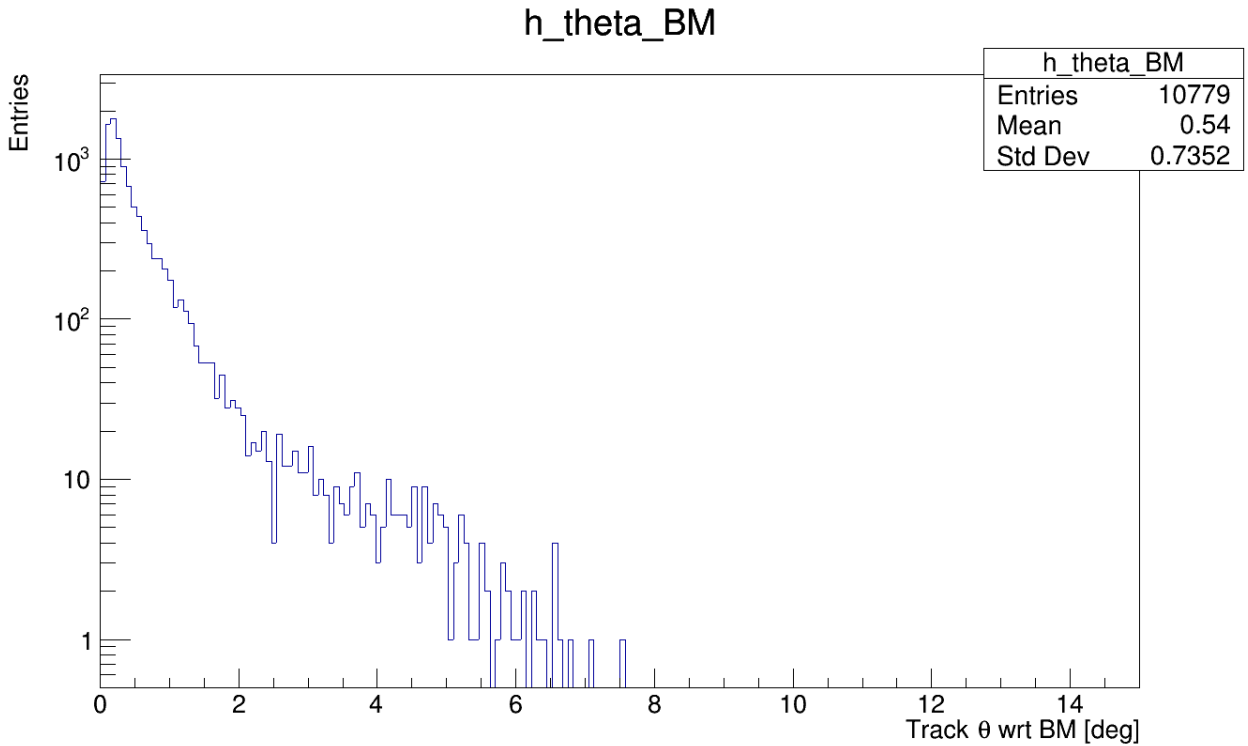


New alignment

Launched again alignment macro
→ now high-angle fragments!!

Still a lot to do:

- Few events w/ >1 global track
- Re-check detector inter-alignment
- Check MSD tracking (now all inherited form VT)
- Think about moving TG in SHOE to be compliant w/ VT position



Other improvements

Global reco:

- Global tracks w/out TW points can now be found in the output (HasTwPoint flag)
- Added global tracks residual plots for all sensors of FOOT (thanks to Yun!)
- Added CALO cluster matching in global tracks

Alignment:

- Added BM-VT-MSD-TW correlation plots in alignment macro

Other:

- ST pile-up flagging re-introduced
- Changed ST “SuperHit” construction algorithm (30% speed-up
- GetEntries fix! (50% speed-up)
- Started checking SHOE performance w/ profiling tools