First look at Pilot Run with MFT

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Pilot Run List:

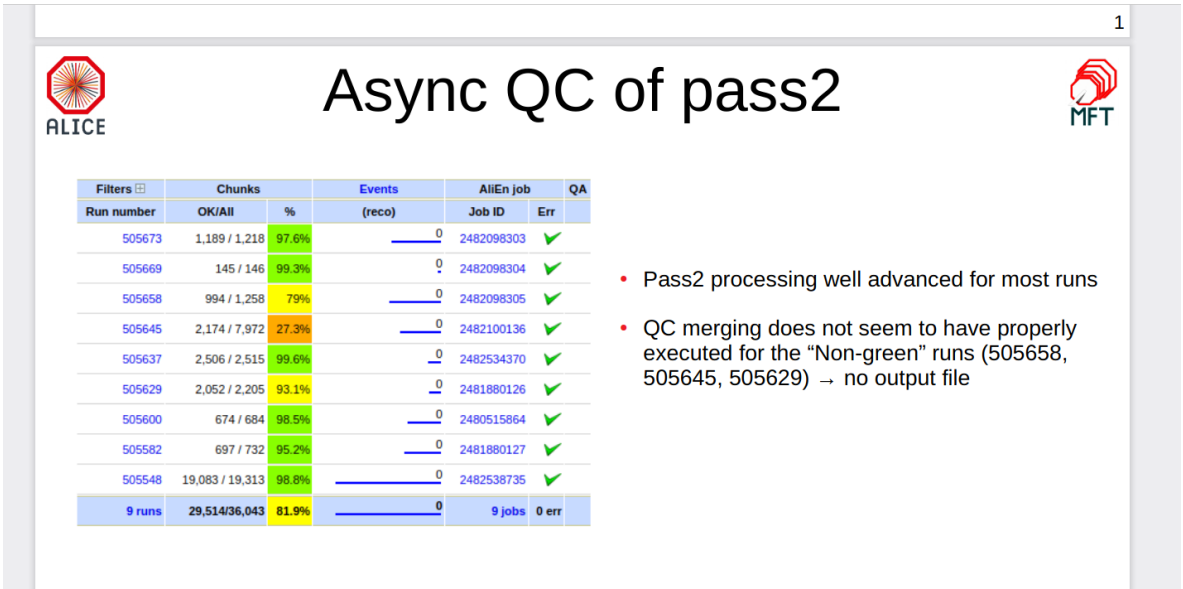
Run List with pass 2 : 505548, 505582, 505600, 505629, 505637, 505645, 505658, 505669, 505673

https://indico.cern.ch/event/1109433/contributions/4668866/attachments/2369058/4045906/S_n_P_meeting_05012022.pdf

https://indico.cern.ch/event/1102749/contributions/4639150/attachments/2364912/4037798/MFT_PB_assess.pdf

MFT Software and Physics meeting, 5-Jan 2022

Slide screenshot from talk of Maurice Coquet:



1

ALICE

Async QC of pass2

MFT

Filters	Chunks		Events	AliEn job		QA
Run number	OK/All	%	(reco)	Job ID	Err	
505673	1,189 / 1,218	97.6%	0	2482098303	✓	
505669	145 / 146	99.3%	0	2482098304	✓	
505658	994 / 1,258	79%	0	2482098305	✓	
505645	2,174 / 7,972	27.3%	0	2482100136	✓	
505637	2,506 / 2,515	99.6%	0	2482534370	✓	
505629	2,052 / 2,205	93.1%	0	2481880126	✓	
505600	674 / 684	98.5%	0	2480515864	✓	
505582	697 / 732	95.2%	0	2481880127	✓	
505548	19,083 / 19,313	98.8%	0	2482538735	✓	
9 runs	29,514/36,043	81.9%	0	9 jobs	0 err	

- Pass2 processing well advanced for most runs
- QC merging does not seem to have properly executed for the “Non-green” runs (505658, 505645, 505629) → no output file

Pilot Run I use for these results below : 505548 (pass2): /alice/data/2021/OCT/505548/apass2/AOD/

My Code Snippet used to generate the results:

Pilot Run : **505548 (pass2)**: `/alice/data/2021/OCT/505548/apass2/AOD/`

My Code Snippet:

[Thanks to **Sarah Nina Edwige Herrmann** for the intial code structure and **Robin Caron**, for their help at the beginning of the analysis.]

```
void processMFT(o2::aod::Collision const& collision, o2::aod::MFTTracks const& tracks)//, o2::aod:
{
    auto z = collision.posZ();
    registry.fill(HIST("Zvtx_Colln"), z);
    registry.fill(HIST("hNMFTTracks"), tracks.size());
    if(z> 10 || z< -10) registry.fill(HIST("hNMFTTracks_1"), tracks.size());
    if(z<= 10 && z>= -10) registry.fill(HIST("hNMFTTracks_2"), tracks.size());

    if(z<= 0 ) registry.fill(HIST("hNMFTTracks_neg"), tracks.size());
    if( z>= 0) registry.fill(HIST("hNMFTTracks_pos"), tracks.size());

    registry.fill(HIST("NtrkZvtx"), z, tracks.size());


    TVector3 v;

  for (auto& track : tracks) {
    v.SetXYZ(track.x(),track.y(),track.z());
    registry.fill(HIST("hPhiEtaMFT"), track.phi(), track.eta());
    registry.fill(HIST("hEtaMFT"), track.eta());
    registry.fill(HIST("hPhiMFT"), track.phi());

    registry.fill(HIST("hXYMFT"), track.x(), track.y());
    registry.fill(HIST("hZMFT"), track.z());

    registry.fill(HIST("hClustersMFT"), track.nClusters());

    if(track.z()< -77 && track.z() > -78)  registry.fill(HIST("hXYMFT_1"), track.x(), track.y());
    if(track.z()< -75 && track.z() > -77)  registry.fill(HIST("hXYMFT_2"), track.x(), track.y());
    if(track.z()< -69 && track.z() > -70)  registry.fill(HIST("hXYMFT_3"), track.x(), track.y());
    if(track.z()< -67 && track.z() > -68)  registry.fill(HIST("hXYMFT_4"), track.x(), track.y());


    // LOGP(info, "Track {} has x = {}, y = {}, z = {}", track.index(), track.x(),  track.y(),  tr
  }
  // LOGP(info, "============================");

}
PROCESS_SWITCH(analysemfttracks, processMFT, "Process MFT info", true);
```

Fwd Tracks for Muons: Run 505548

Currently, there are no forward muons tracks (FwdTracks) from the tracking/trigger chambers.

Code Snippet:

```
struct IterateMuons {
  void process(aod::Collisions::iterator const& collision, aod::FwdTracks const& muons)
  {
    LOGF(info, "Vertex = %f has %d muons", collision.posZ(), muons.size());
    for (auto& muon : muons) {
      LOGF(info, "  pT = %.2f", muon.pt());
    }
  }
};
```

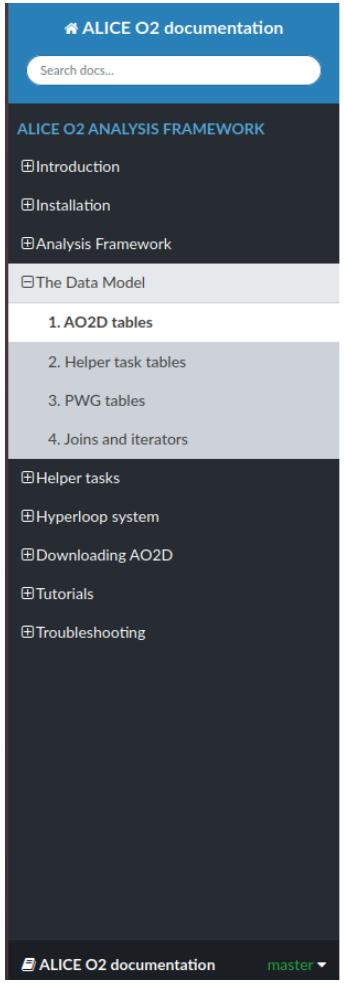
Output: for muon.size() is 0

```
[6169:iterate-muons]: [23:36:22][INFO] Vertex = 1.091749 has 0 muons
[6169:iterate-muons]: [23:36:22][INFO] Vertex = 0.292541 has 0 muons
[6169:iterate-muons]: [23:36:22][INFO] Vertex = 4.122086 has 0 muons
[6169:iterate-muons]: [23:36:22][INFO] Vertex = -4.753242 has 0 muons
[6169:iterate-muons]: [23:36:22][INFO] Vertex = -1.255243 has 0 muons
[6169:iterate-muons]: [23:36:22][INFO] Vertex = -8.860184 has 0 muons
[6169:iterate-muons]: [23:36:22][INFO] Vertex = -3.492493 has 0 muons
[6169:iterate-muons]: [23:36:22][INFO] Vertex = -7.782799 has 0 muons
[6169:iterate-muons]: [23:36:22][INFO] Vertex = -9.027145 has 0 muons
[6169:iterate-muons]: [23:36:22][INFO] Vertex = 0.389809 has 0 muons
[6169:iterate-muons]: [23:36:22][INFO] Vertex = 3.250652 has 0 muons
[6169:iterate-muons]: [23:36:22][INFO] Vertex = -5.210526 has 0 muons
[6169:iterate-muons]: [23:36:22][INFO] Vertex = 1.904003 has 0 muons
[6169:iterate-muons]: [23:36:22][INFO] Vertex = -7.813507 has 0 muons
[6169:iterate-muons]: [23:36:22][INFO] Vertex = -1.184038 has 0 muons
[6169:iterate-muons]: [23:36:22][INFO] Vertex = 0.605447 has 0 muons
[6169:iterate-muons]: [23:36:22][INFO] Vertex = -4.362259 has 0 muons
[6169:iterate-muons]: [23:36:22][INFO] Vertex = 6.347923 has 0 muons
[6169:iterate-muons]: [23:36:22][INFO] Vertex = -7.326019 has 0 muons
[6169:iterate-muons]: [23:36:22][INFO] Vertex = -11.247360 has 0 muons
[6169:iterate-muons]: [23:36:22][INFO] Vertex = -1.469175 has 0 muons
```

Hence, this presentation concentrates on the MFT tracklets (or MFTTracks).

MFT Track Table in AO2D.root files:

Table for "MFTTracks" : `https://aliceo2group.github.io/analysis-framework/docs/datamodel/ao2dTables.html`



o2::aod::StoredTracksExtra

o2::aod::MFTTracks (E)

Header file: Framework/Core/include/Framework/AnalysisDataModel.h

Extends:

o2::aod::StoredMFTTracks

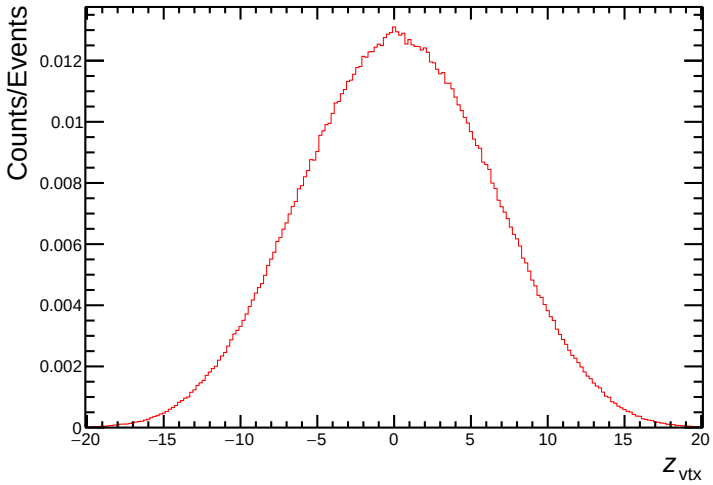
Is used in:

- o2::aod::MFTTrack = o2::aod::MFTTracks::iterator

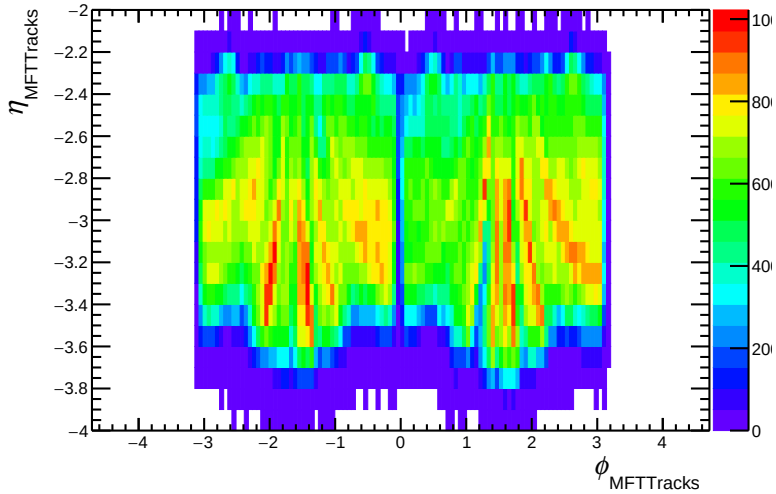
Name		Getter	Type	Comment
o2::soa::Index	GI	globalIndex	int64_t	
o2::aod::fwdtrack::CollisionId	I	collisionId	int32	Pointer into Collisions
o2::aod::fwdtrack::X		x	float	TrackParFwd parameter x
o2::aod::fwdtrack::Y		y	float	TrackParFwd parameter y
o2::aod::fwdtrack::Z		z	float	TrackParFwd propagation parameter z
o2::aod::fwdtrack::Phi		phi	float	TrackParFwd parameter phi; (i.e. pt pointing direction)
o2::aod::fwdtrack::Tgl		tgl	float	TrackParFwd parameter tan(\lamba); (\lambda = 90 - \theta_{polar})
o2::aod::fwdtrack::Signed1Pt		signed1Pt	float	TrackParFwd parameter: charged inverse transverse momentum; (q/pt)
o2::aod::fwdtrack::NClusters		nClusters	int8_t	Number of clusters
o2::aod::fwdtrack::Px	D	px	float	
o2::aod::fwdtrack::Py	D	py	float	
o2::aod::fwdtrack::Pz	D	pz	float	
o2::aod::fwdtrack::Sign	D	sign	short	Sign of the track eletric charge
o2::aod::fwdtrack::Chi2		chi2	float	Track chi^2
o2::aod::fwdtrack::Pt	E	pt	float	
o2::aod::fwdtrack::Eta	E	eta	float	
o2::aod::fwdtrack::P	E	p	float	

Basic Distributions: Run 505548

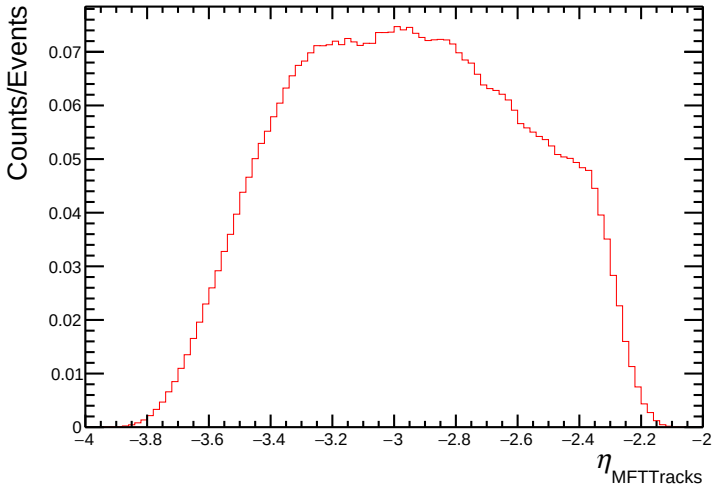
Z-vertex of collisions



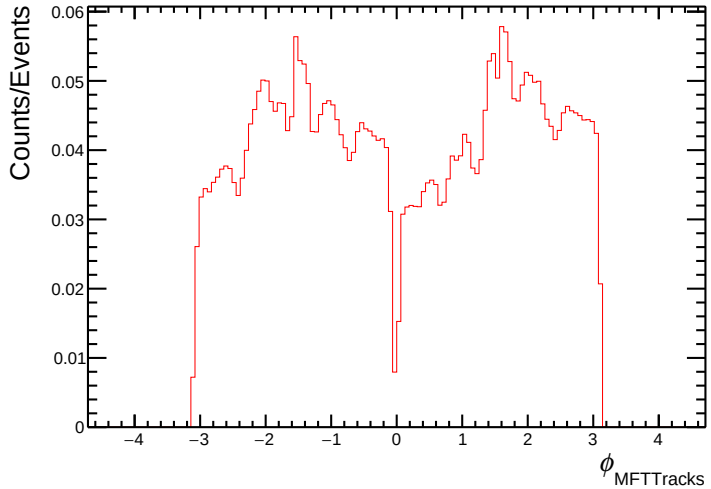
Phi-Eta distribution with "MFTTracks"



Eta distribution with "MFTTracks"



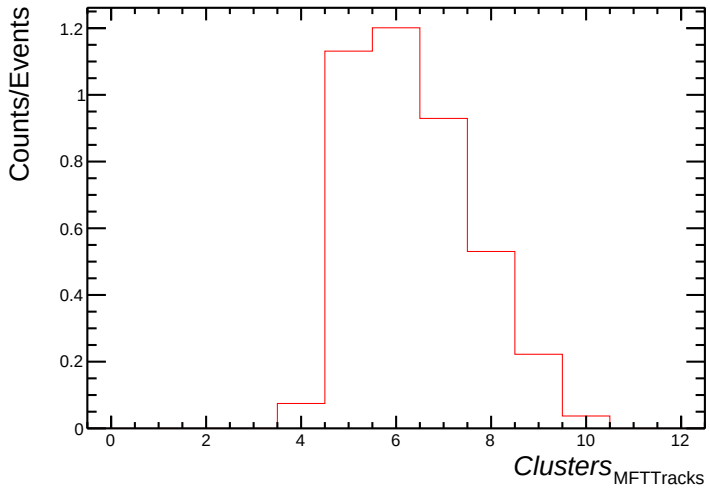
Phi distribution with "MFTTracks"



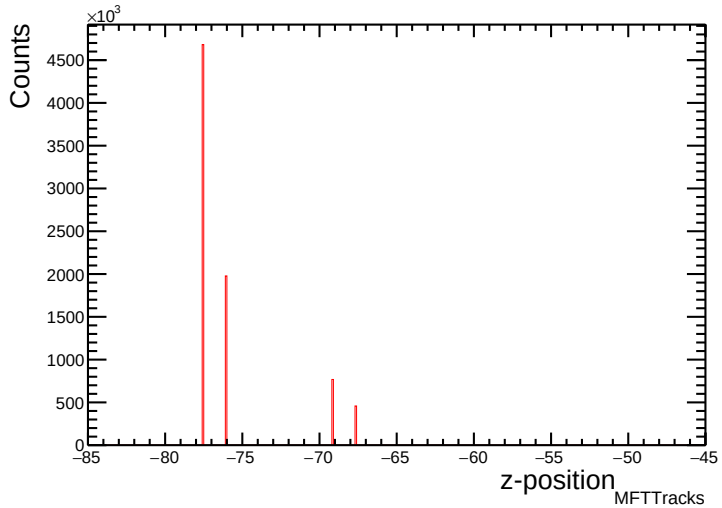
η coverage of MFT (from MFT-TDR): -3.6 $< \eta <$ -2.45

Basic Distributions: Run 505548

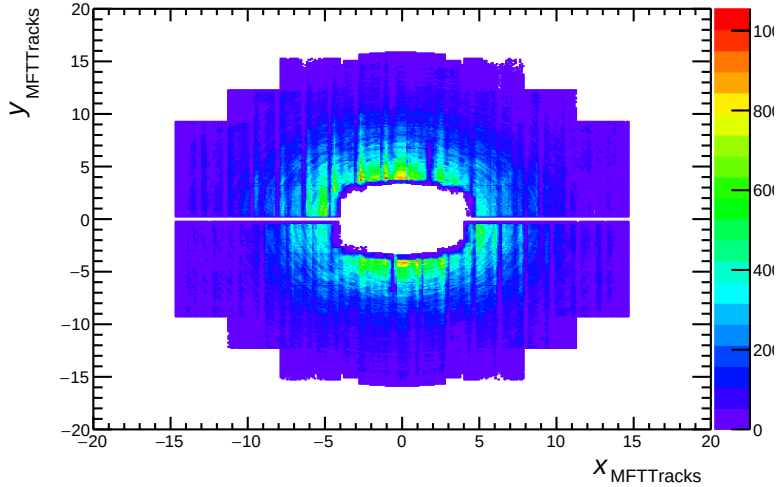
Number of Clusters of "MFTTracks"



z-position with "MFTTracks"



x-y distribution with "MFTTracks"



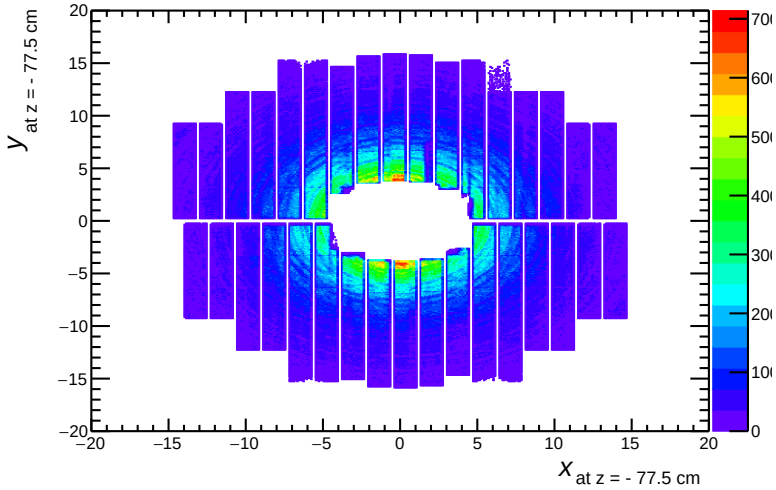
On the panel above, there are hits at definite z. Are they hits at the **2 different faces of the disks**: Disk 4 *(at -68.7 cm)* and Disk 5 *(at -76.8 cm)* ?

The 5 half-disks/stations of MFT are at:
z = -76.8 cm, -68.7 cm, -53.1 cm, -49 cm, -46 cm (MFT-TDR)

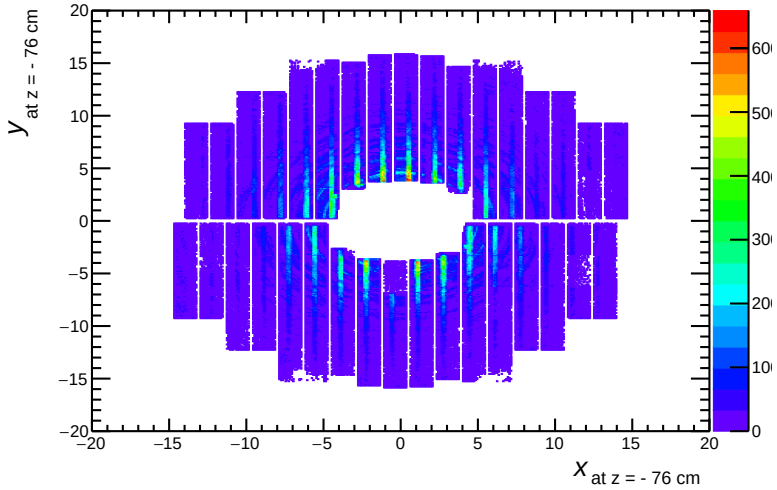
Discussion: Each "MFTTrack" tracks have a definite x, y, z value. Each of the z-position of a track correspond to station hit closest to the MUON chamber.

Basic Distributions: Run 505548

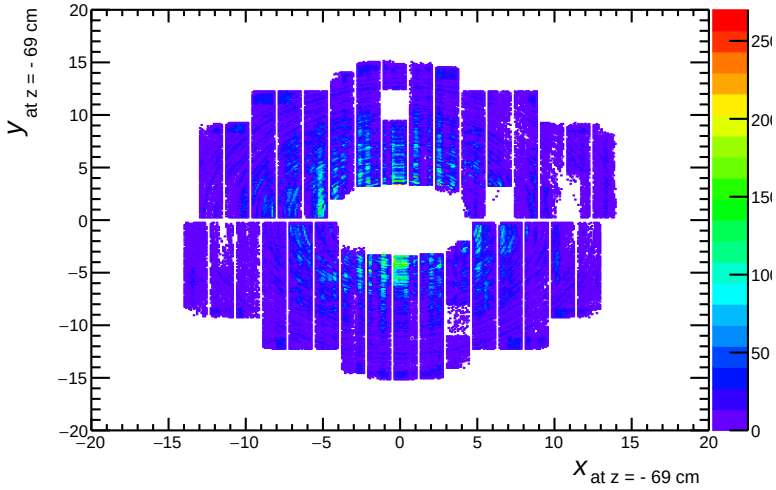
x-y dist. at z = -77.5 cm



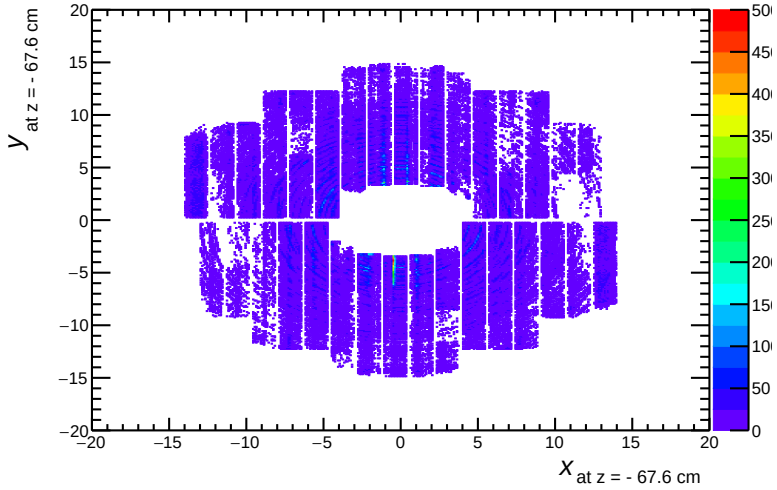
x-y dist. at z = -76 cm



x-y dist. at z = -69 cm



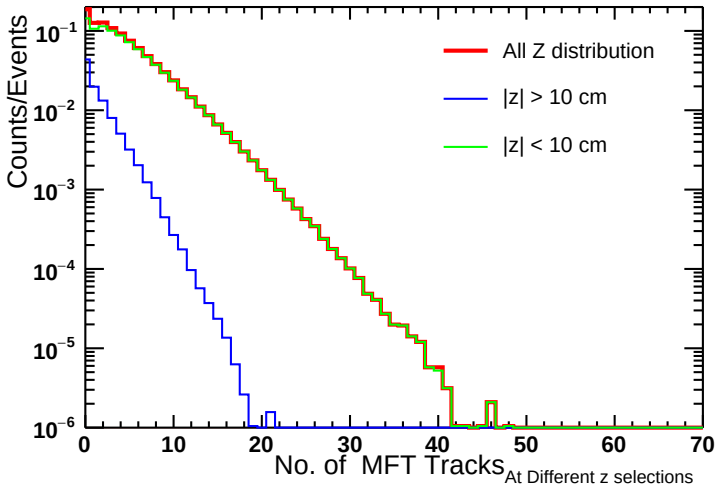
x-y dist. at z = - 67.5 cm



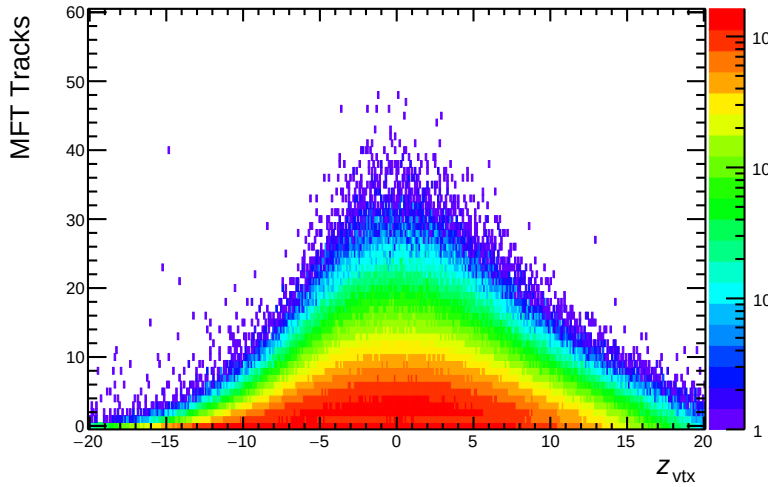
Basic Distributions: Run 505548

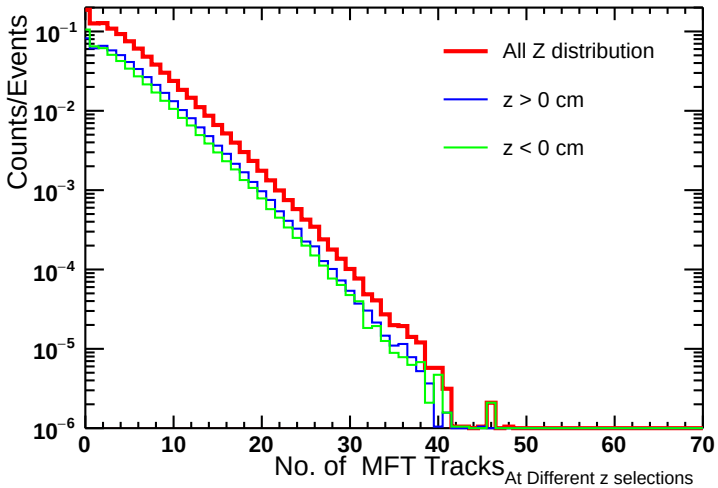
MFT Track Distribution:

"Events" = Number of events for $|z| < 20$ cm for all distributions in these slides.



z_{vtx} vs. MFTTracks





The z_{vtx} vs MFTTracks is not symmetric on postive and negative z_{vtx} *[top right plot]*.

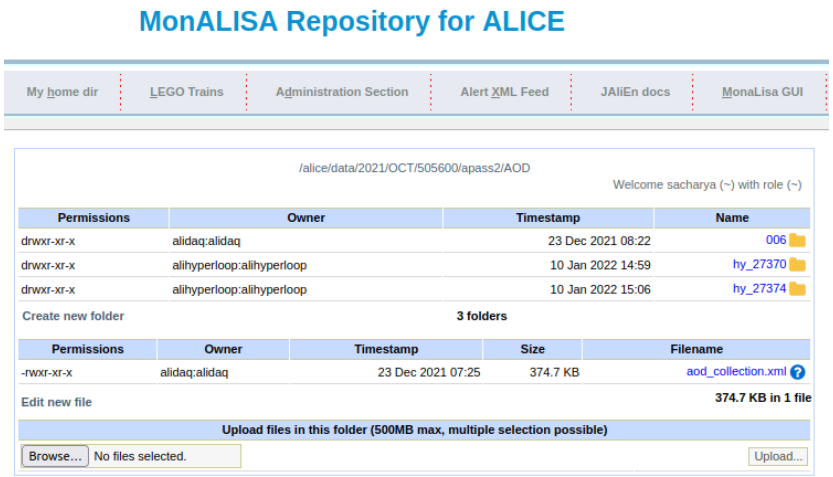
Unsymmetrical correlation related to the nominal centre since eta-acceptance varies with z_{vtx}
$\rightarrow$ reflected by the projections shown on the *left*.

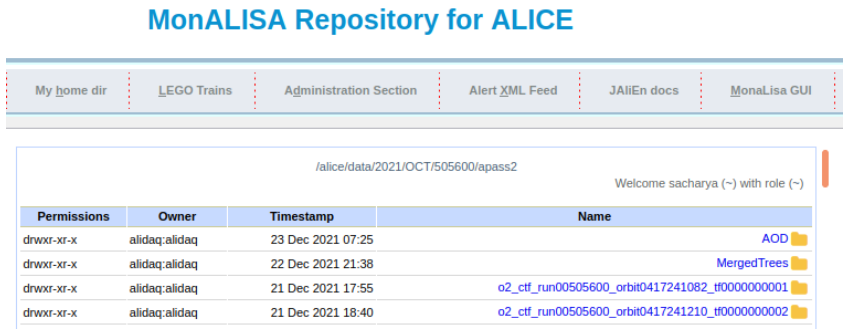
Othe Runs (pass2): Basic Distributions:

I could find very few AO2D's in the other merged folder of AOD for other runs.

E.g. : 505600 (pass2): `/alice/data/2021/OCT/505600/`

Has only one root file in the /AOD folder.





The statistics of these runs is low compared to 505548.

Outlook:

- Explore the pilot run anchored (b$\rightarrow$ J/psi) dedicated MC, which contains the reconstructed muon tracks, for knowing:
  - Is the MFT-MUON matching implemented?
  - Is there the improved kinematics resolution due to precisely knowing the track position at the interaction point?
- Prepare/require HFm dedicated simulations for testing the separation power on charm and beauty components

THANK YOU.....