O2DQ Tutorials: Global muons

16/10/2024

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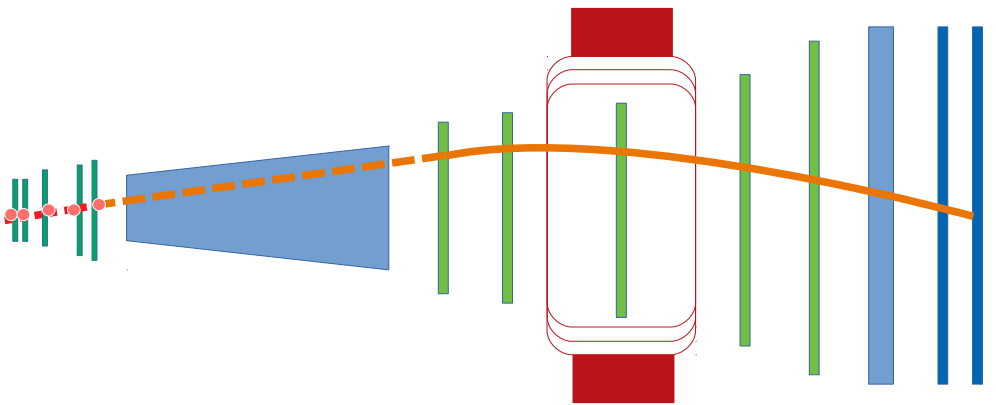
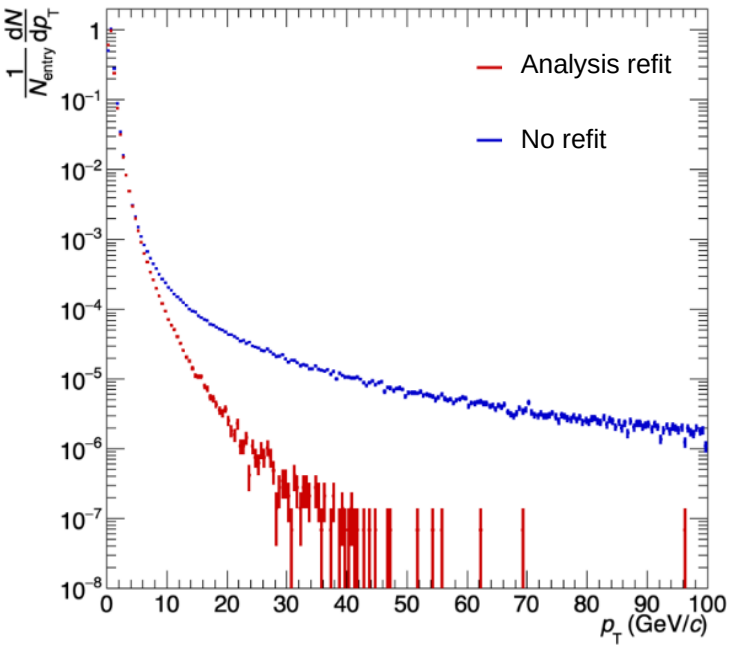
Global muon refit at analysis level

- Option in O2-DQ to recompute track parameters instead of using reco track fitting:

$$p_x = p_{MCH} \sin(\theta_{MFT}) \cos(\phi_{MFT})$$
$$p_y = p_{MCH} \sin(\theta_{MFT}) \sin(\phi_{MFT})$$
$$p_z = p_{MCH} \cos(\theta_{MFT})$$

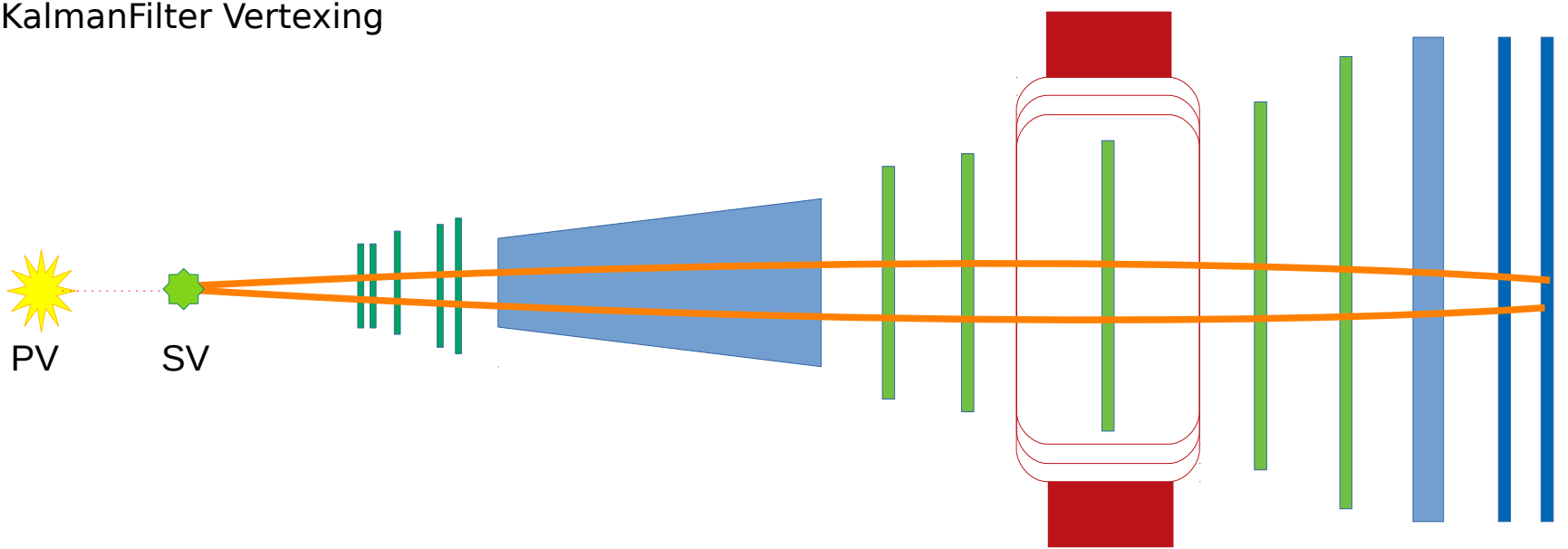




See Maolin's presentation

Secondary vertexing

- Global muon tracks contain MFT information and can be used for secondary vertexing
- Two different secondary vertexing algorithm are currently implemented in DQ:
  - DCAFitter
  - KalmanFilter Vertexing



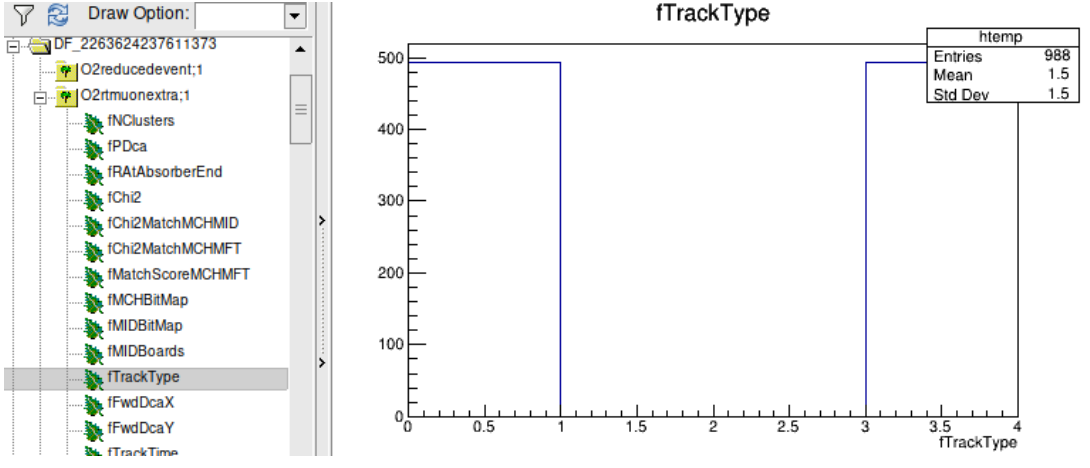
TableMaker_withAssoc config: global MUON

In file **configs/configTableMakerData_withAssoc_globalmuon.json**

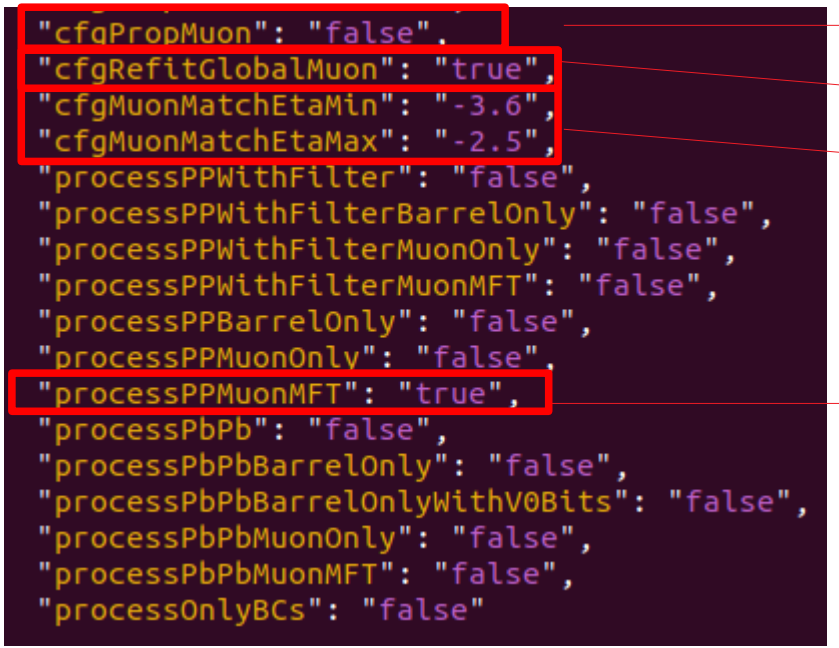
```
"table-maker": {
    "cfgEventCuts": "eventStandardSel8NoTFBorder",
    "cfgBarrelTrackCuts": "jpsiPID1",
    "cfgMuonCuts": "matchedQualityCuts",
    "cfgRunZorro": "false",
```

→ Selection for global muons

When global muon tracks are kept, the corresponding MFT and standalone muons used for the matching are also kept in the reduced AOD tables, even when requiring only global muon tracks (e.g. w/ “matchedQualityCuts” or “matchedGlobal”)



TableMaker_withAssoc config: global MUON



Muon propagation to PV must be disabled if one wants to use the tracks for secodnary vertexing

Enable global muon refit

Exclude muons outside the MFT acceptance

Processes both Muon and MFT tracks

TableReader_withAssoc config: global MUON

```
"analysis-same-event-pairing": {
    "cfgTrackCuts": "jpsiO2MCdebugCuts2",
    "cfgMuonCuts": "matchedGlobal",
    "cfgPairCuts": "",
```

Now require only global muons in the output

```
"cfgAddSEPHistogram": "dimuon,barrel,vertexing",
"cfgFlatTables": "true",
"cfgUseKFVertexing": "false",
```

False: use DCAFitter, True: use Kalman Filter

```
"processAllSkimmed": "false",
"processBarrelOnlySkimmed": "false",
"processBarrelOnlyWithCollSkimmed": "false",
"processBarrelOnlySkimmedNoCov": "false",
"processMuonOnlySkimmed": "true",
"processMixingAllSkimmed": "false",
"processMixingBarrelSkimmed": "false",
"processDummy": "false"
```

Hyperloop operations

Wagon	LHC23_pass4_...	LHC24e5	Last run
fwdtrack-collision-associator	✗	✗	
TableMaker_globalmuon_pp	✗	✗	
TableMaker_muon_pp	✗	✗	
TableReader_globalmuon_pp	✓	✓	
TableReader_muon_pp	✓	✓	

Run TableMaker_withAssoc

In the O2DQTutorials/:

- Enter local O2Physics environment (ideally not older than 12th October),
  or on lxplus: **/cvmfs/alice.cern.ch/bin/alienv enter VO_ALICE@O2sim::v20241014-1**
- **python3 O2DQworkflows/runTableMaker_withAssoc.py configs/configTableMakerData_withAssoc_globalmuon.json -runData**

- **o2-analysis-dq-table-reader-with-assoc** -b --configuration **json://configs/configAnalysisData_withAssoc_globalmuon.json** --aod-file reducedAod.root (**--aod-writer-json configs/writerTableReaderFlatTable.json**)