

O2-DQ tutorial : pp filter & the Zorro tool

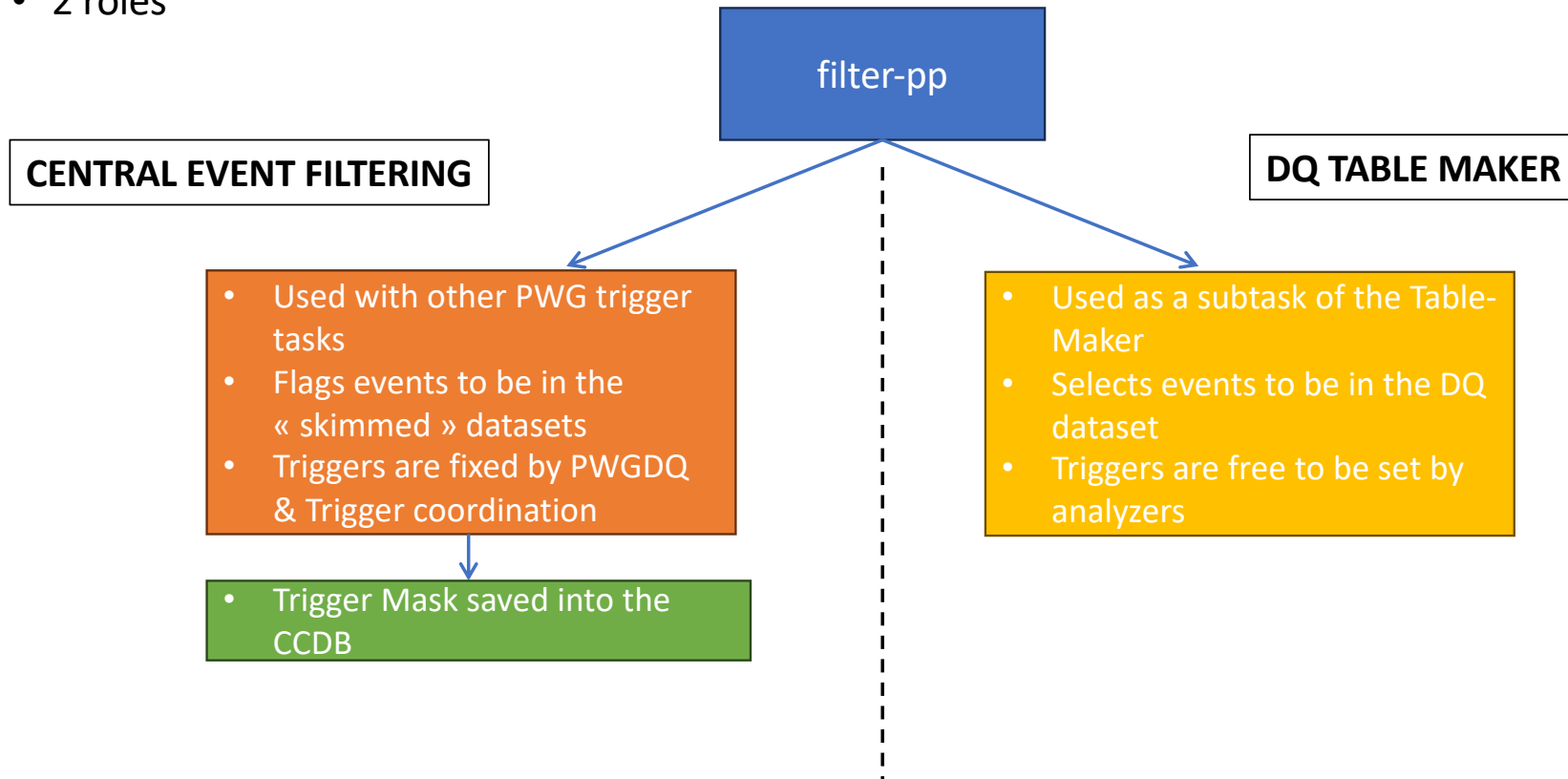
O2 Analysis Tutorial 4.0 – DQ framework

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Introduction

- The task is O2Physics/PWGDQ/Tasks/filterPPwithAssociation.cxx
- 2 roles



Filter Subtasks

AOD.root

DQEventSelectionTask: preselect the events to be examined

Example : *eventStandardNoINT7*

DQBarrelTrackSelection : preselect the electron tracks to be examined

Example : *jpsiO2MCdebugCuts2_Corr; jpsiO2MCdebugCuts4_Corr*

DQMuonsSelection : preselect the muon tracks to be examined

Example : *muonLowPt, muonLowPt*

DQFilterPPTask :

- Checks if event is selected
- Looks at the list of provided cuts (electron + muon)
- Looks if a pair selection is added to the condition
 - Single track selection : *trackSelection::1*
 - Pair selection : *trackSelection:pairSelection:1*
- IMPORTANT : the list of cuts must be the same in the **DQBarrelTrackSelection** & **DQMuonsSelection** and in the **DQFilterPPTask** AND IN THE SAME ORDER
- Runs over the events to see if there are tracks matching the given criteria
- Example : *"jpsiO2MCdebugCuts2_Corr::1, jpsiO2MCdebugCuts4_Corr:pairNoCut:1, muonLowPt::1, muonLowPt:pairNoCut:1"*



Bitmap of selection attached to the event (+ eventual QA histograms)
With this example : [*Single electron ; Electron pair ; Single muon ; Muon pair*]

Instructions : cut configuration

- Line 2-7 : Event Selection subtask :

```
"d-q-event-selection-task": {  
    "cfgEventCuts": "eventNoTFBorder",  
    "cfgWithQA": "1",  
    "processEventSelection": "1",  
    "processDummy": "0"  
},
```

->Defines the event selection
->Plot control histograms (or not)

- The list of available cuts can be found in :
<https://github.com/AliceO2Group/O2Physics/blob/master/PWGDQ/Core/CutsLibrary.cxx>

Instructions : cut configuration

- Line 8-17 : barrel track selection subtask :

```
"d-q-barrel-track-selection": {  
  "cfgBarrelTrackCuts": "jpsiO2MCdebugCuts7_noCorr",    ->Defines the cuts for barrel track  
  "ccdb-path-tpc": " EventFiltering/PWGDQ/TPCPID/PostCalib » -> path to the postcalibration TPC PID maps  
  "cfgTPCpostCalib": "0",                                -> use the postcalibration TPC PID maps (if needed)  
  "ccdb-url": "http://alice-ccdb.cern.ch",  
  "ccdb-no-later-than": "-1",  
  "cfgWithQA": "1",                                       ->Plot control histograms (or not)  
  "processSelection": "1",  
  "processDummy": "0"  
},
```

- The list of available cuts can be found in :
<https://github.com/AliceO2Group/O2Physics/blob/master/PWGDQ/Core/CutsLibrary.cxx>

Instructions : cut configuration

- Line 18-23 : forward track selection subtask :

```
"d-q-muons-selection": {  
    "cfgMuonsCuts": "MuonLow2023", ->Defines the cuts for forward track selection  
    "cfgWithQA": "1", ->Plot control histograms (or not)  
    "cfgPropMuon": "1", ->Repropagate the muon tracks to vertex  
    "processSelection": "1",  
    "processDummy": "0"  
},
```

- The list of available cuts can be found in :
<https://github.com/AliceO2Group/O2Physics/blob/master/PWGDQ/Core/CutsLibrary.cxx>

Instructions : cut configuration

- Line 24-32 : trigger subtask :

```
"d-q-filter-p-p-task": {  
  "cfgBarrelSels": "jpsiO2MCdebugCuts7_noCorr:pairMassLow5:1", ->List of barrel selections  
  "cfgWithBarrelLS": "false", ->Include like sign pairs in the e+e- trigger  
  "cfgMuonSels": "MuonLow2023 :pairMassLow5:1", ->List of muon selections  
  "cfgWithMuonLS": "false", ->Include like sign pairs in the mu+mu- trigger  
  "cfgPropMuon": "1",  
  "cfgWithQA": "1", ->Plot control histograms (or not)  
  "processFilterPP": "1",  
  "processDummy": "0"  
},
```

- The list of available pair cuts can be found in :
<https://github.com/AliceO2Group/O2Physics/blob/master/PWGDQ/Core/CutsLibrary.cxx>

Exercise : dq-filter-pp

- Run the filter-pp with the configurationFilterPP.json file:

```
o2-analysis-dq-filter-pp-with-association -b --configuration json://configurationFilterPP.json
| o2-analysis-timestamp -b --configuration json://configurationFilterPP.json
| o2-analysis-track-propagation -b --configuration json://configurationFilterPP.json
| o2-analysis-trackselection -b --configuration json://configurationFilterPP.json
| o2-analysis-pid-tof-full -b --configuration json://configurationFilterPP.json
| o2-analysis-multiplicity-table -b --configuration json://configurationFilterPP.json
| o2-analysis-fwdtrackextension -b --configuration json://configurationFilterPP.json
| o2-analysis-event-selection -b --configuration json://configurationFilterPP.json
| o2-analysis-fwdtrack-to-collision-associator -b --configuration json://configurationFilterPP.json
| o2-analysis-track-to-collision-associator -b --configuration json://configurationFilterPP.json
| o2-analysis-pid-tpc -b --configuration json://configurationFilterPP.json
| o2-analysis-pid-tof-base -b --configuration json://configurationFilterPP.json
| o2-analysis-pid-tpc-base -b --configuration json://configurationFilterPP.json
| o2-analysis-ft0-corrected-table -b --configuration json://configurationFilterPP.json
--aod-file AO2D.root
```


- Open the **AnalysisResults.root** file. Check the «*d-q-filter-p-p-task*» folder. Look at the «*Statistics*» histogram to see the number of selected events
- Change the list of triggers in the configuration and run the task again. Compare the results

The Zorro tool

- Central skimming produces trigger masks that are saved into ccdb
- Temporary repository : Users/m/mpuccio/EventFiltering/OTS/
- Zorro (Zorro.h, Zorro.cxx) is the tool to manage the trigger masks stored into ccdb
- Configurables added to the table-maker

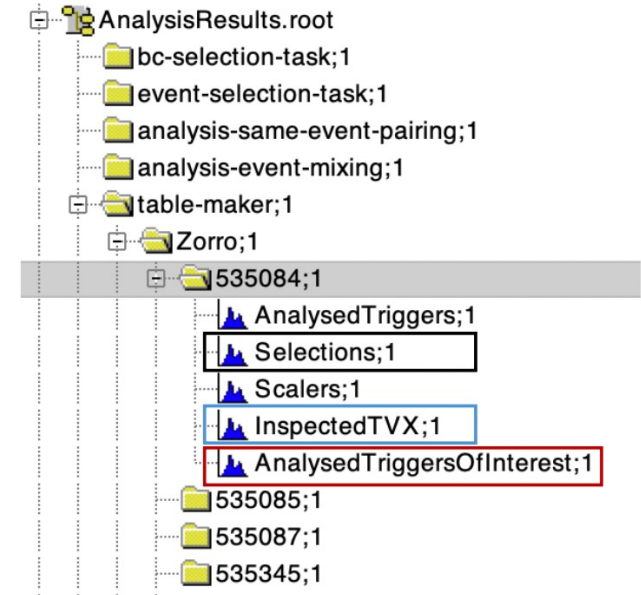


```
Configurable<bool> fConfigRunZorro{"cfgRunZorro", false, "Enable event selection with zorro [WARNING: under debug, do not enable!]"};  
Configurable<string> fConfigZorroTrigMask{"cfgZorroTriggerMask", "fDiMuon", "DQ Trigger masks: fSingleE, fLMeeIMR, fLMeeHMR, fDiElectron, fSingleMuLow, fSingleMuHigh, fDiMuon"};  
Configurable<string> fConfigCcdbPathZorro{"ccdb-path-zorro", "Users/r/rlietava/EventFiltering/OTS/", "base path to the ccdb object for zorro"};
```

-  Warning:
 - The usage of zorro excludes the usage of the filter-pp task, you cannot use both the tools together
 - User can combine more triggers (e.g. fDiMuon, fSingleMuLow)
 - Be sure that the dataset you are using contains the « skimmed » keyword, otherwise it will break (no ccdb)

Information in the CCDB

- For each analysed run you get:
 - The number of analysed triggers in your hyperloop train (both trigger of interest and other triggers)
 - The T0TVX triggers inspected originally by the skimming
 - The originally selected number of events per triggers (the Selections histogram)
- To know the equivalent T0TVX triggers sampled you need to do:
 - Sum all the originally inspected T0TVX triggers
 - Sum all the originally selected events for your trigger of interest
 - Sum the number of analysed triggers of interest



$$N_{TVX} = (\text{Inspected TVX}) \frac{\text{Analyzed Triggers Of Interest}}{\text{Number of Triggers Of Interest in the Skimming}}$$

- It is done to avoid double counting in the normalisation as more than one collision can be compatible with the triggered BC

List of DQ Triggers

- The DQ triggers are : fSingleElectron, fDiElectron, fSingleMuonLow, fSingleMuonHigh, fDimuon

Electron Trigger		
	2022	2023 & 2024
Single e p_T	$> 1.0 \text{ GeV/c}$	$> 1.0 \text{ GeV/c}$
Single e η	$[-0.9 ; 0.9]$	$[-0.9 ; 0.9]$
Is SPD Any	yes	yes
TPC χ^2	< 4.0	< 4.0
TPC N Clusters	$[70 ; 160]$	$[70 ; 160]$
n- σ_e	$[-4.0 ; 4.0]$	$[-4.0 ; 4.0]$
n- σ_π	> 2.5	> 2.5
n- σ_p	> 2.5	> 2.5
PID post-calibration	Yes	No
Track-collision association	No	Yes
m_{ee}	$> 0 \text{ GeV/c}^2$	$> 1.8 \text{ GeV/c}^2$

Muon Trigger		
	2022	2023 & 2024
Single μp_T	$> 0.7 (4.0) \text{ GeV/c}$	$> 0.7 (20.0) \text{ GeV/c}$
Single $\mu \eta$	$[-4.0 ; -2.5]$	$[-4.0 ; -2.5]$
R_{abs}	$[17.6 ; 89.5]$	$[17.6 ; 89.5]$
$p \times \text{DCA}$	$\sim 6 \sigma_{p \times \text{DCA}}$	$\sim 6 \sigma_{p \times \text{DCA}}$
Matching MCH-MID	No	Yes
Track-collision association	No	Yes
$m_{\mu\mu}$	$> 1.8 \text{ GeV/c}^2$	$> 1.8 \text{ GeV/c}^2$

Exercise : Zorro tool

- Run the table-maler with the configurationZorro.json file:

o2-analysis-dq-table-maker -b --configuration json://configurationZorro.json

```
| o2-analysis-timestamp -b --configuration json://configurationZorro.json  
| o2-analysis-track-propagation -b --configuration json://configurationZorro.json  
| o2-analysis-trackselection -b --configuration json://configurationZorro.json  
| o2-analysis-pid-tof-full -b --configuration json://configurationZorro.json  
| o2-analysis-pid-tof-beta -b --configuration json://configurationZorro.json  
| o2-analysis-multiplicity-table -b --configuration json://configurationZorro.json  
| o2-analysis-event-selection -b --configuration json://configurationZorro.json  
| o2-analysis-fwdtrackextension -b --configuration json://configurationZorro.json  
| o2-analysis-fwdtrack-to-collision-associator -b --configuration json://configurationZorro.json  
| o2-analysis-track-to-collision-associator -b --configuration json://configurationZorro.json  
| o2-analysis-pid-tpc -b --configuration json://configurationZorro.json  
| o2-analysis-pid-tof-base -b --configuration json://configurationZorro.json  
| o2-analysis-pid-tpc-base -b --configuration json://configurationZorro.json  
| o2-analysis-ft0-corrected-table -b --configuration json://configurationZorro.json  
--aod-file AO2D.root
```

- Open the **AnalysisResults.root** file. Check the «*table-maker*» folder. Look at the histograms in the «*Zorro*» subFolder to see the triggered of events
- Change the Zorro triggers in the configuration and run the task again. Compare the results