



Intermittency update

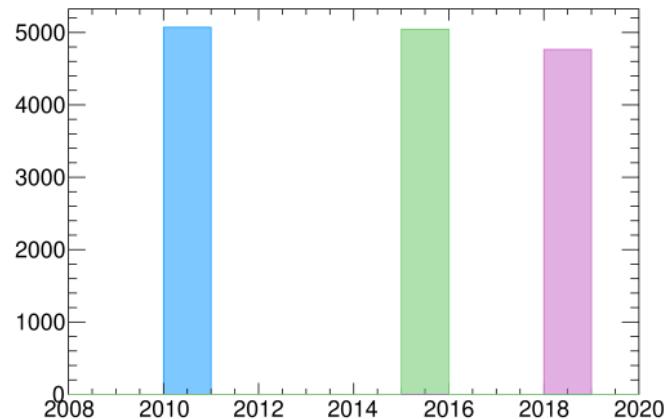
PAG-EbyE - 2025-10-27

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Department of Physics, University of Jammu

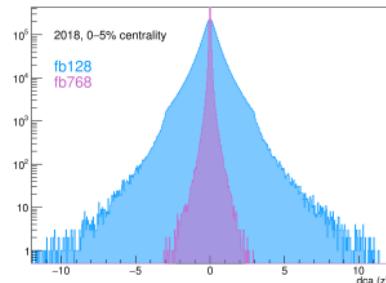
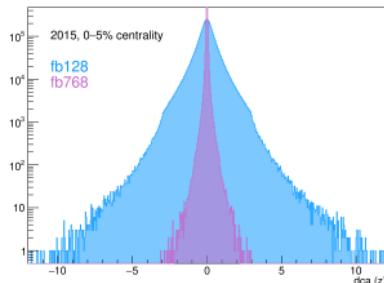
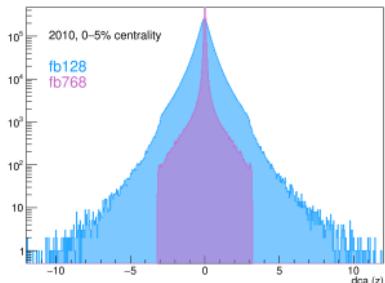
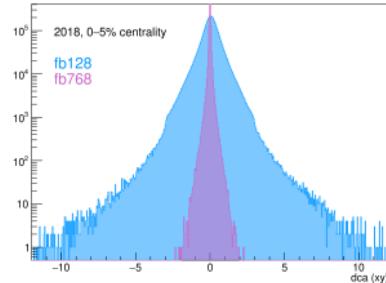
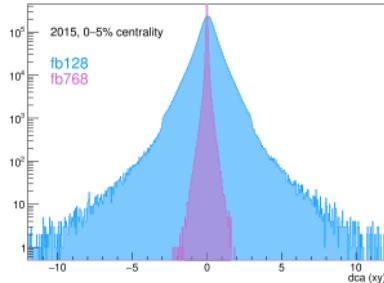
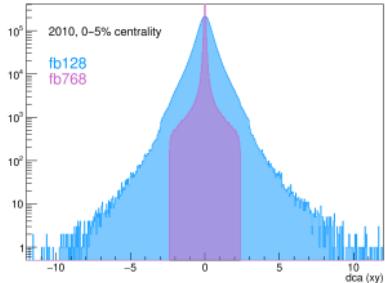
Filterbits QA

Dataset

- Comparison of filterbit QA results.
- HIJING three datasets: **2010 (2.76 TeV)**: LHC11a10a_bis, **2015 (5.02 TeV)**: LHC20j6a, **2018 (5.02 TeV)**: LHC20e3a.
- ~ 5000 events for each dataset.
- Centrality: 0–10%.
- $|v_z| < 10$, $|\eta| < 0.8$.



DCA_{*xy*, *z*} comparison



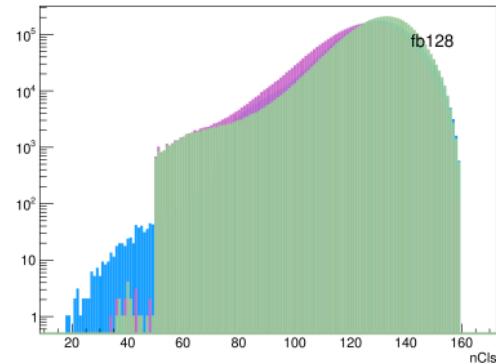
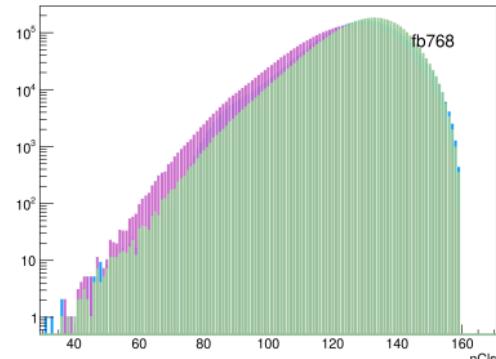
TPC #clusters comparison

Definition of fb128.

$|dca_{xy}| < 2.4, |dca_z| < 3.0,$
 $TPCNClusters > 50,$
 $\chi^2_{\text{per TPC cluster}} \leq 4.$

- The method used to check filterbits in AODs:

```
AliAODTrack *track =  
    static_cast<AliAODTrack  
*>(fAOD->GetTrack(i));  
track->TestFilterBit(128);
```

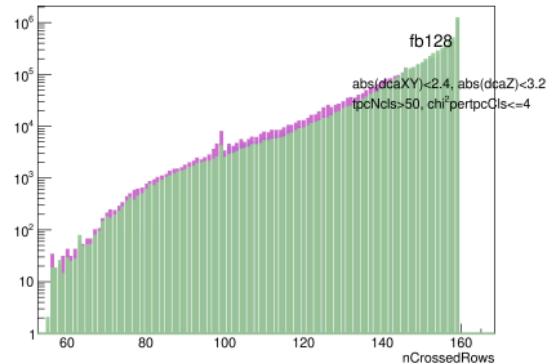
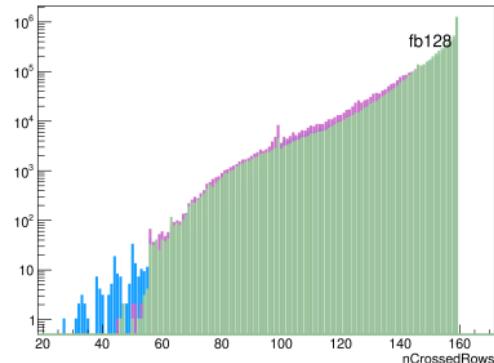


TPC #crossed rows comparison

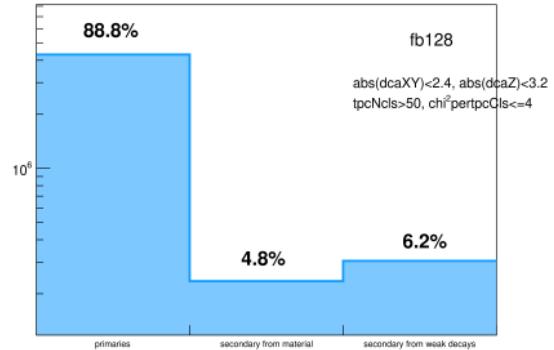
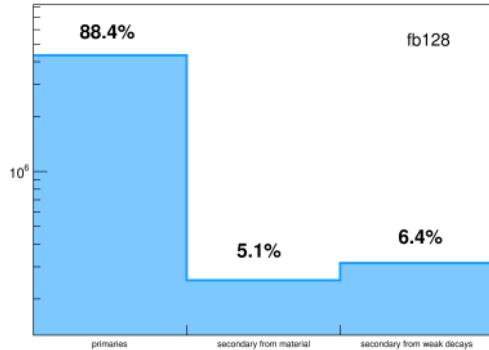
- The method used to check filterbits in AODs:

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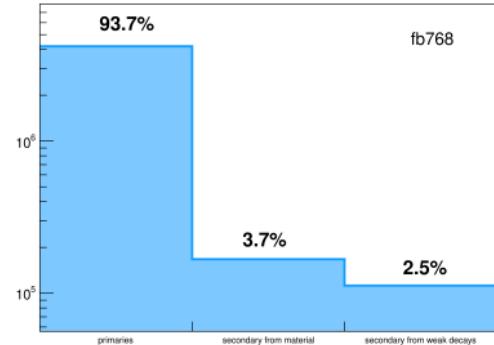
- does not work for 128.
- Applying cuts manually does work.



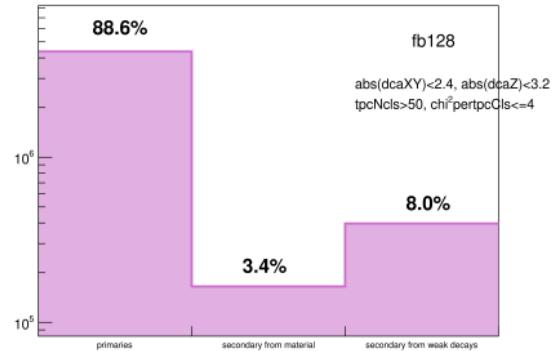
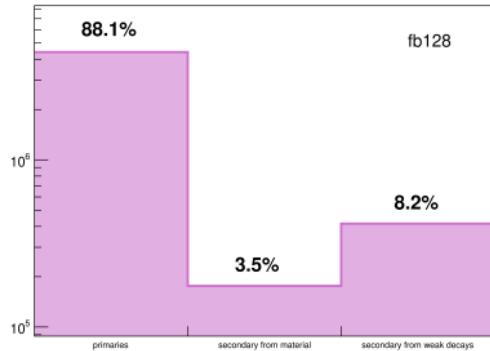
Contamination in filterbits



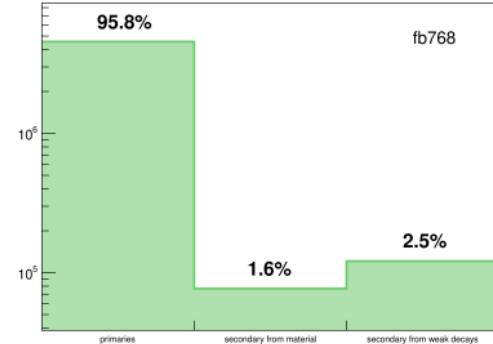
- for 2010 dataset.
- secondaries from material and weak decays both larger in fb128.



Contamination in filterbits



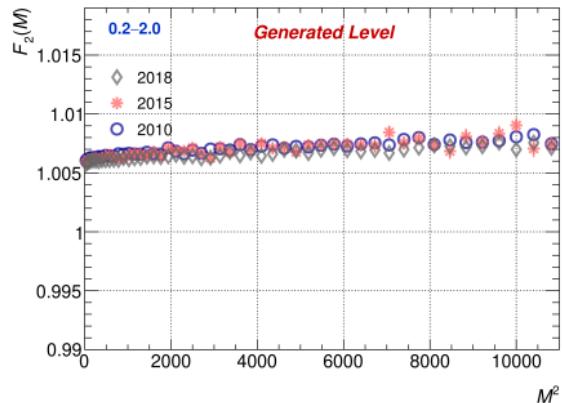
- for 2015/2018 dataset.
- secondaries from material and weak decays both larger in fb128.
- fb768 works fine with less contamination.



HIJING Closure

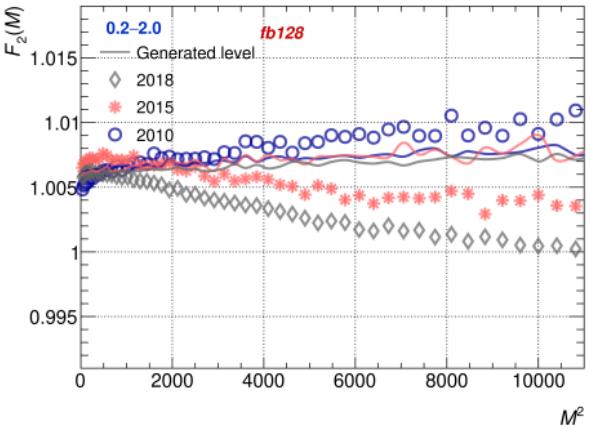
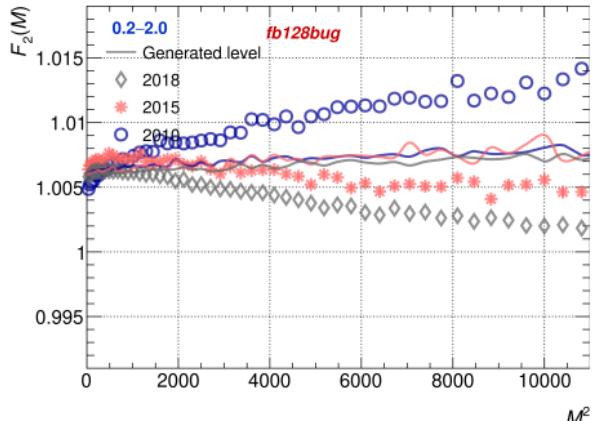
Dataset

- HIJING:
 - **2010 (2.76 TeV)**: LHC11a10a_bis,
 - **2015 (5.02 TeV)**: LHC20j6a,
 - **2018 (5.02 TeV)**: LHC20e3a.
- 0–5% centrality, $|v_z| < 10$, $|\eta| < 0.8$.

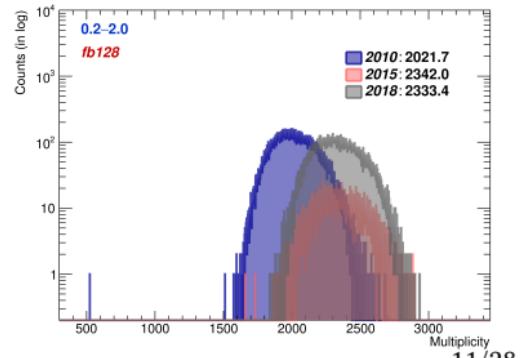


Generated Level ($0.2 \leq p_T \leq 2.0$)

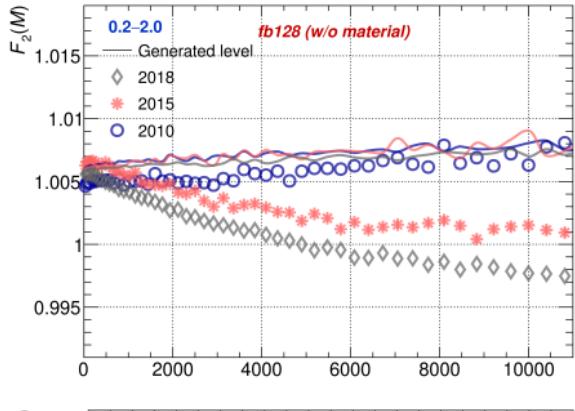
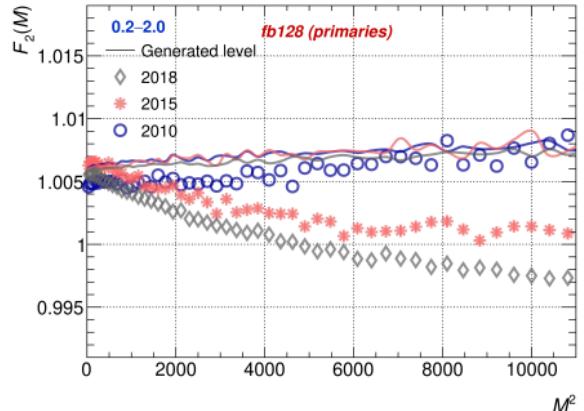
fb128 ($0.2 \leq p_T \leq 2.0$)



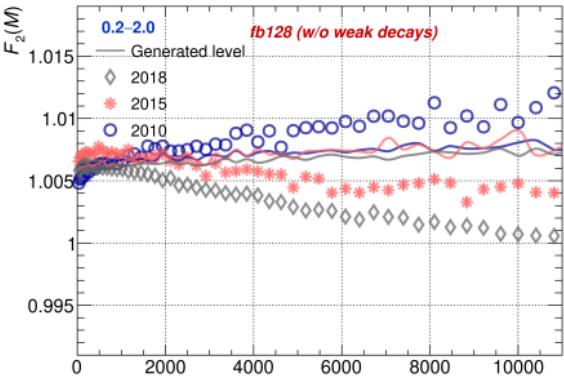
- fb128 (right) is the actual closure (with cuts in fb128 applied manually).
- Closure for 2010 better than 2015/2018.



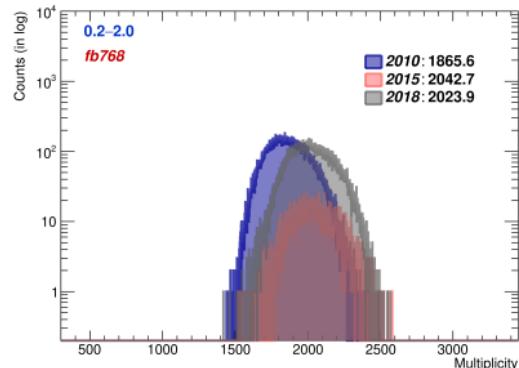
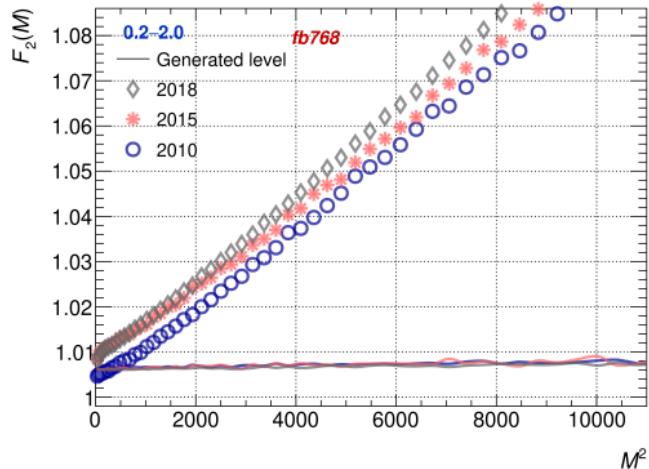
$\text{fb128} (0.2 \leq p_T \leq 2.0)$



- Closure for 2010 better than 2015/2018.

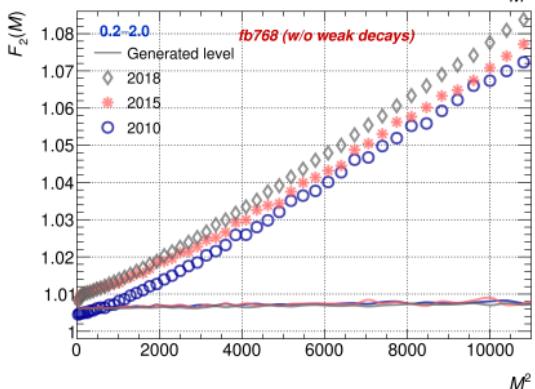
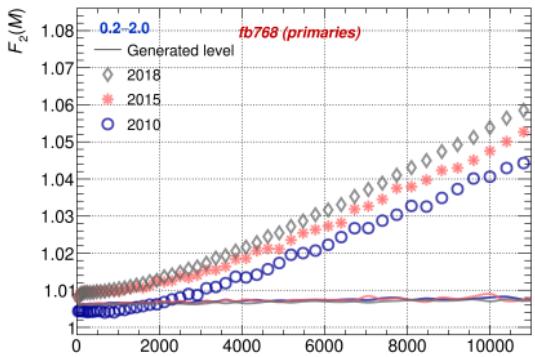
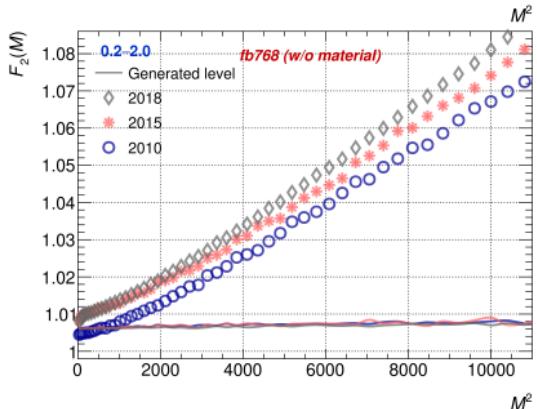
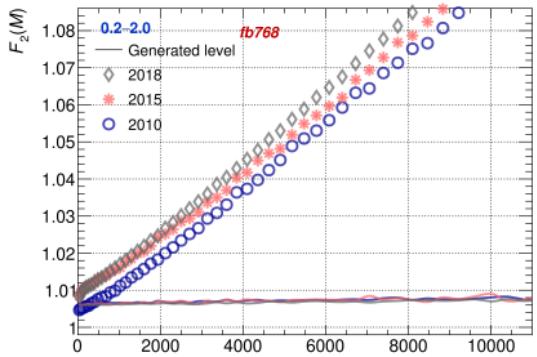


$fb768$ ($0.2 \leq p_T \leq 2.0$)



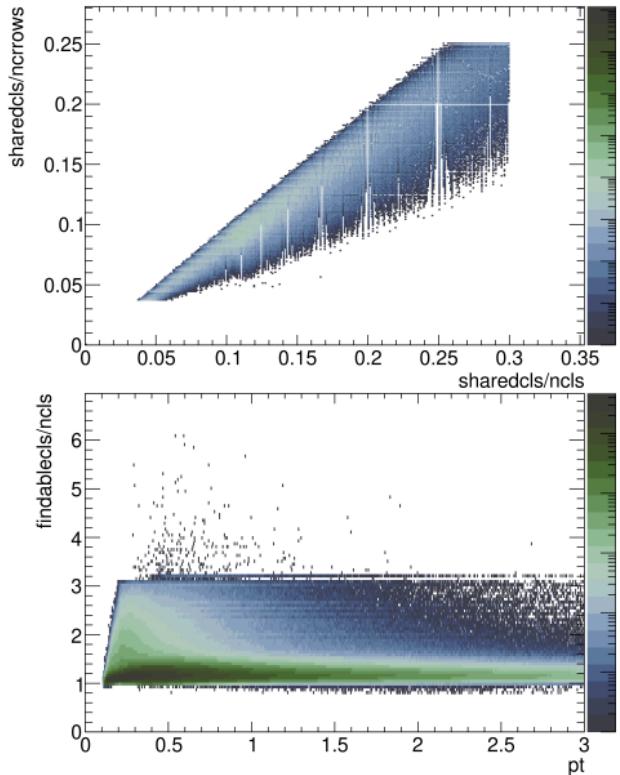
- $fb768$ does not show good closure for 2010, 2015/2018.
- the trends for all the datasets are alike.
- stricter cuts can improve the closure.

$\text{fb768 } (0.2 \leq p_T \leq 2.0)$



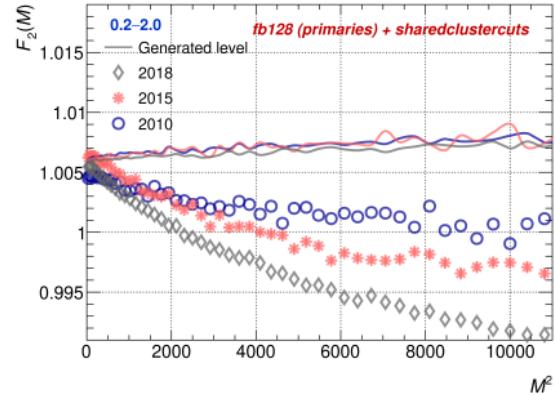
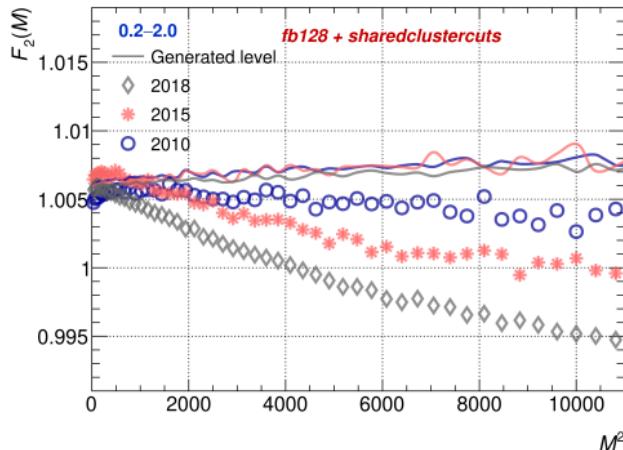
TPC clusters cuts

- An additional set of cuts to reduce track splitting/merging effects.
- $\#\text{sharedclusters}/\#\text{clusters} \leq 0.3$.
- $\#\text{sharedclusters}/\#\text{crossedRows} \leq 0.25$.
- $\#\text{findableclusters}/\#\text{clusters} \geq 0.8$.



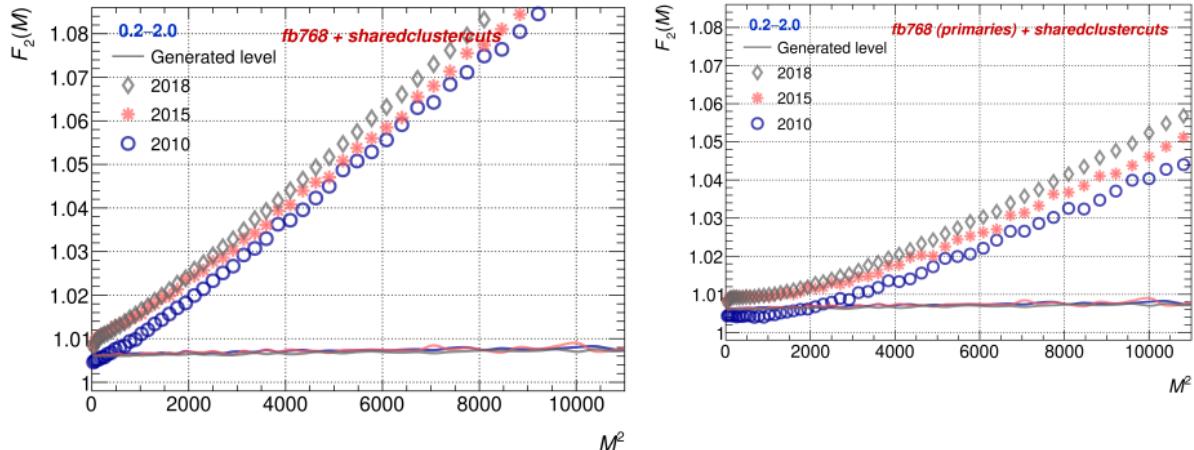
cuts taken from analysis note: <https://alice-notes.web.cern.ch/node/1653>.

$\text{fb128} (0.2 \leq p_T \leq 2.0) \text{ with TPC clusters cuts}$



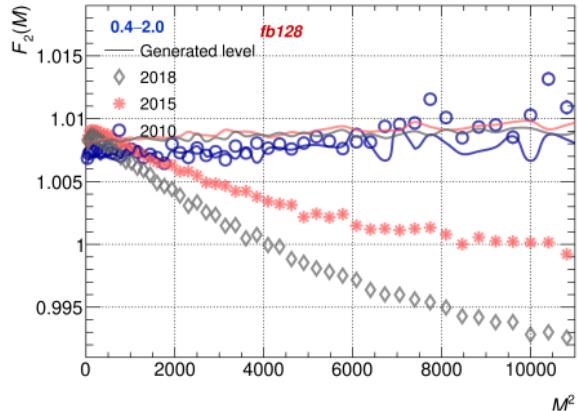
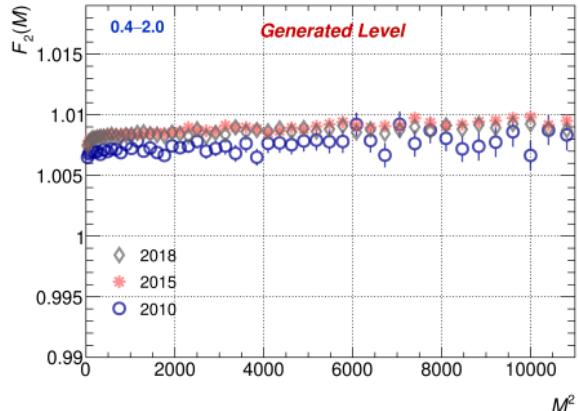
- Closure worsens for all the datasets.

fb768 ($0.2 \leq p_T \leq 2.0$) with TPC clusters cuts

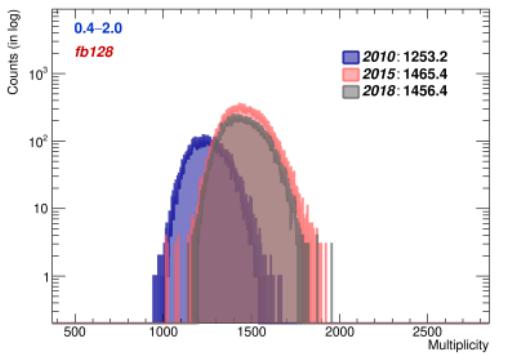


- Closure improves for all the datasets.
- Similar trend across datasets.
- $0.2 \leq p_T \leq 0.4$ has different efficiency for 2.76 TeV and 5.02 TeV.
- Should check $0.4 \leq p_T \leq 2.0$.

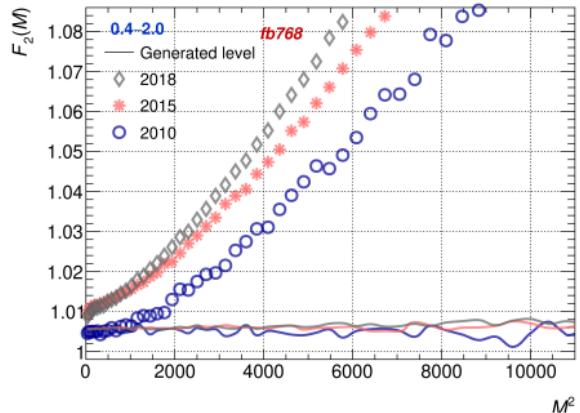
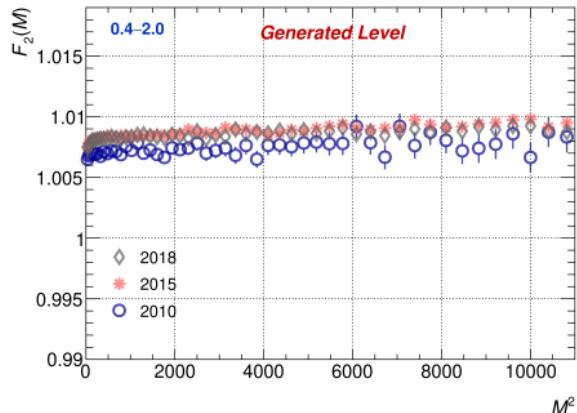
Generated and fb128 ($0.4 \leq p_T \leq 2.0$)



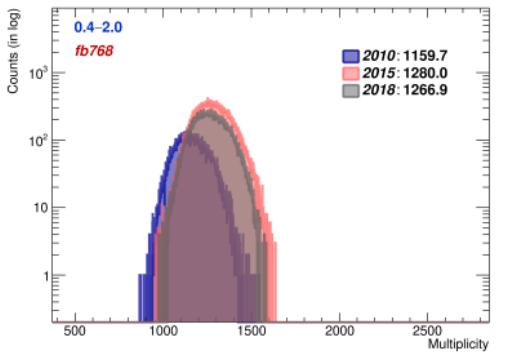
- Closure for 2010 better than 2015/2018.



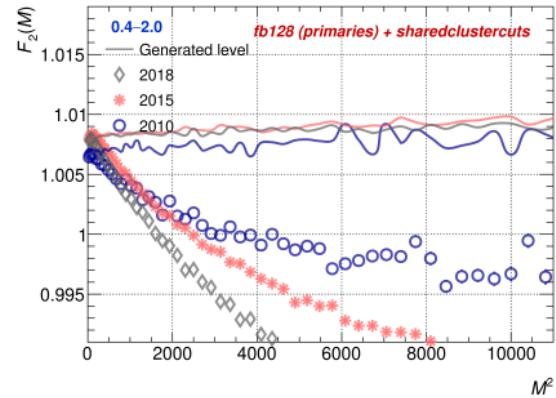
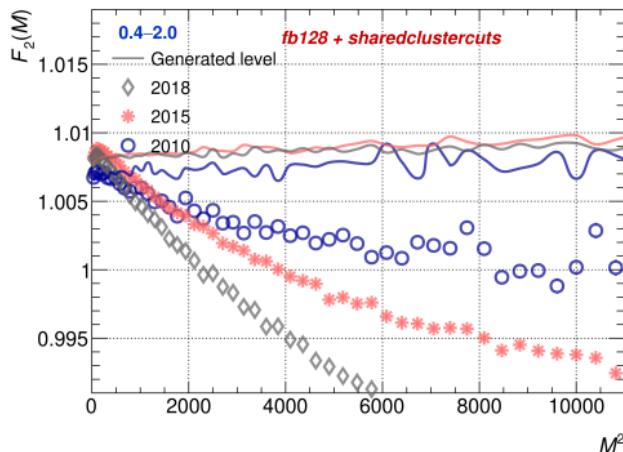
Generated and fb768 ($0.4 \leq p_T \leq 2.0$)



- Closure not good for all datasets.

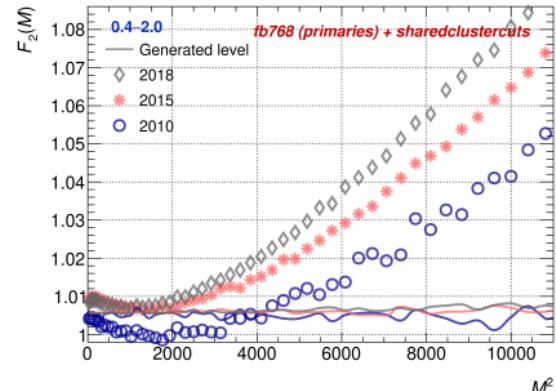
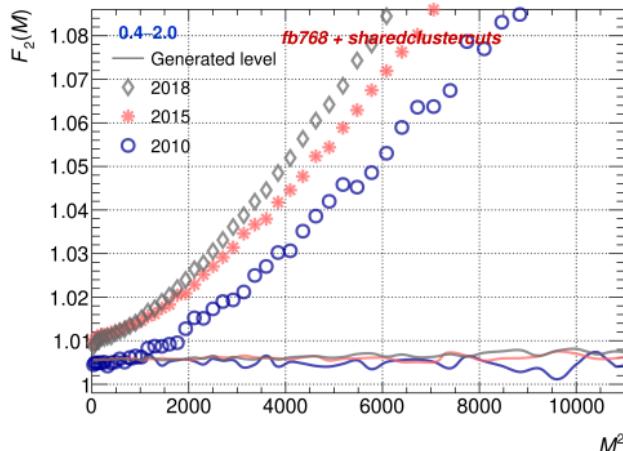


fb128 ($0.4 \leq p_T \leq 2.0$) with TPC clusters cuts



- Closure deteriorates for all the datasets.

fb768 ($0.4 \leq p_T \leq 2.0$) with TPC clusters cuts



- Closure improves with TPC clusters cuts for fb128

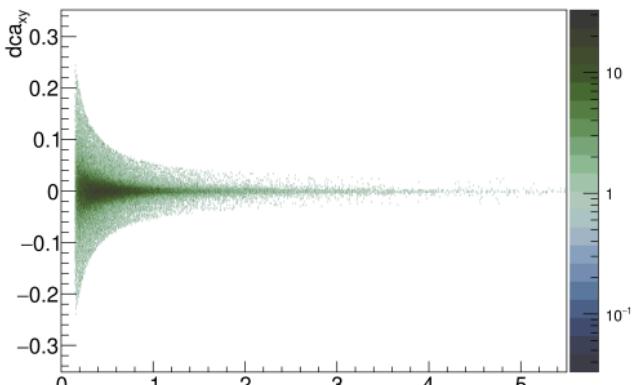
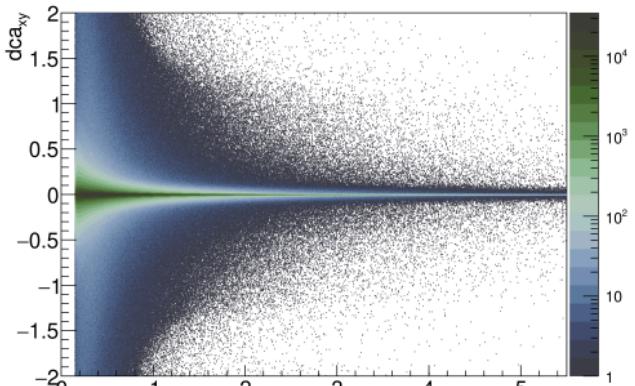
p_T dependent DCA cuts

- An additional set of cuts to improve the closure.
- 2015/2018 data: Maximum DCA_{xy} cut: $0.028 + 0.04 * p_T^{(1.01)}$

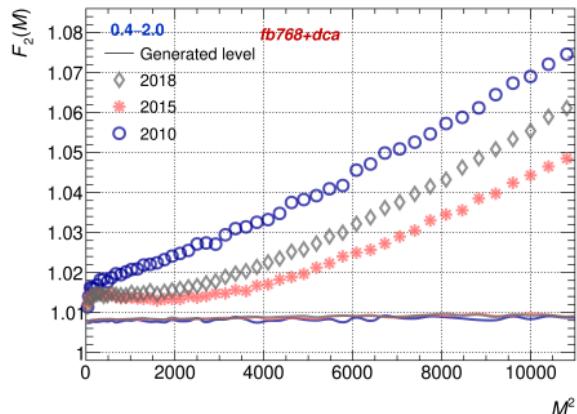
cut taken from analysis note: <https://alice-notes.web.cern.ch/node/1653>.

- 2010 data: Maximum DCA_{xy} cut:
 $0.0182 + \frac{0.035}{p_T^{(1.01)}}$

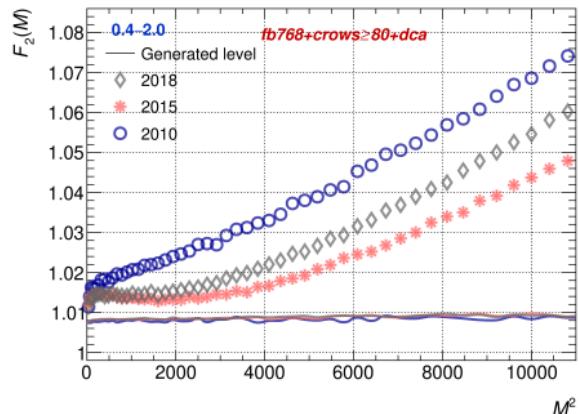
cut taken from analysis note: <https://alice-notes.web.cern.ch/node/736>.



fb768 ($0.4 \leq p_T \leq 2.0$) with multiple cuts

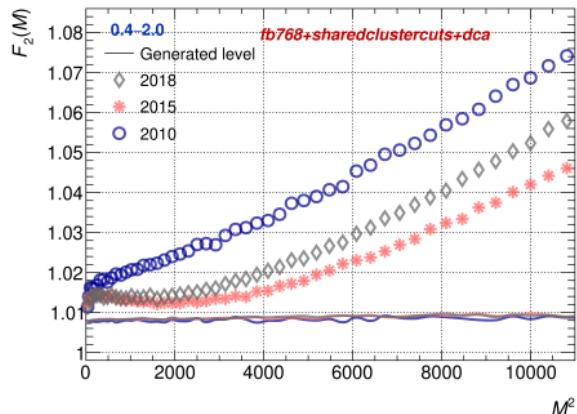


fb768 with DCA cut

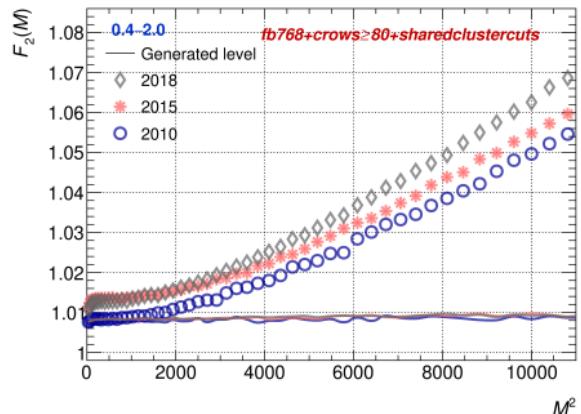


fb768 wih DCA cut and tpc #crossed rows ≥ 80

fb768 ($0.4 \leq p_T \leq 2.0$) with multiple cuts

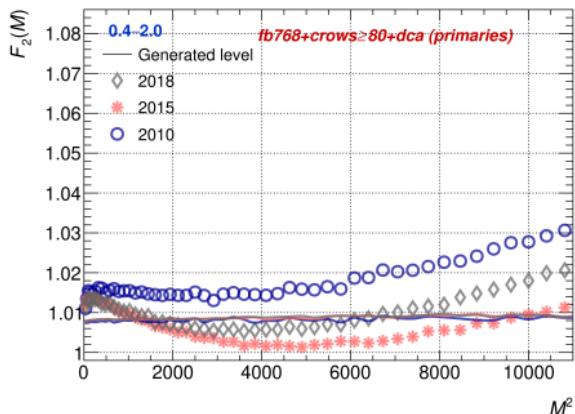


fb768 with DCA cut and
sharedclusters cuts

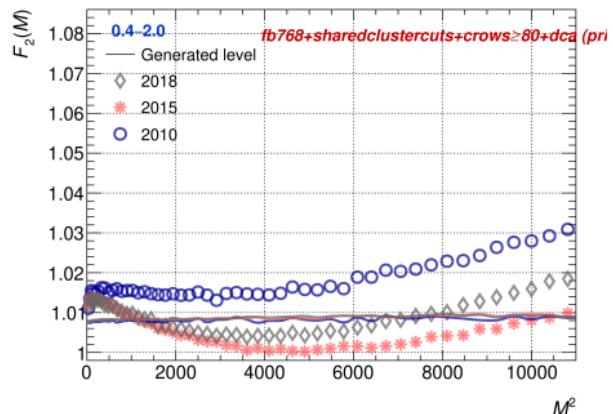


fb768 wih shared clusters cuts and tpc
#crossed rows ≥ 80

fb768 ($0.4 \leq p_T \leq 2.0$) with multiple cuts (primaries only)



fb768 with DCA cut and tpc #crossed rows ≥ 80



fb768 with DCA cut, shared clusters cuts and tpc #crossed rows ≥ 80

Conclusions

Conclusions

- filterbits (128 and 768) studied for Pb–Pb HIJING datasets of 2010 (2.76 TeV), 2015 (5.02 TeV) and 2018 (5.02 TeV):
 - QA within $|v_z| < 10$, $|\eta| < 0.8$, 0–10% central events of each dataset.
 - closure behaviour of $F_q(M)$ within $|v_z| < 10$, $|\eta| < 0.8$, p_T ranges: 0.2–2.0 and 0.4–2.0, and most central 0–5% events.
- fb128 method unreliable in AODs. Manual cuts work but show higher contamination (material + weak decays) across datasets. Good baseline closure for 2010 but trends alike.
- fb768 cleaner but poorer closure baseline.
- TPC shared cluster cuts used to mitigate track splitting/merging effects:
 $\#sharedclusters/\#clusters \leq 0.3$, $\#sharedclusters/\#crossedRows \leq 0.25$, and
 $\#findableclusters/\#clusters \geq 0.8$. fb768 closure improves consistently with TPC clusters cuts, worsens for fb128.
- p_T dependent DCA_{xy} cuts used:
 - Combined with $\#crossedRows \geq 80$ and shared-clusters cuts → best performance for fb768.

Thank you