

# Cross POG report on Phase 1 preparation

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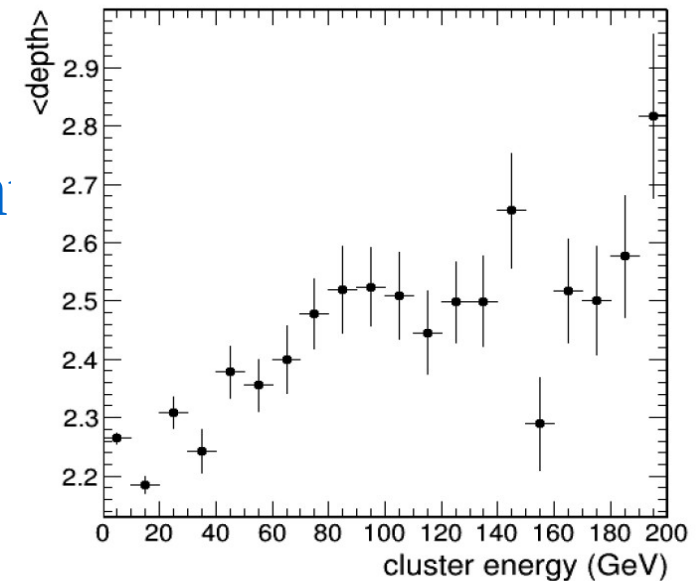
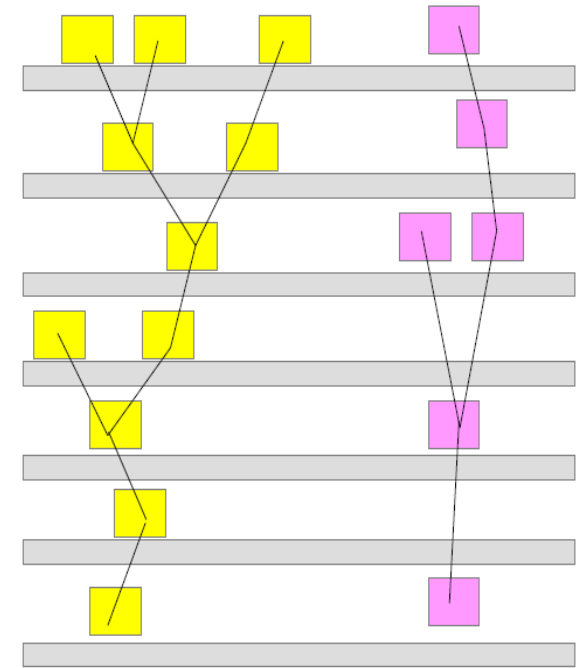
Run Coordination Workshop  
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# Outline

- ▶ Particle flow and Jet-MET
- ▶ B-Tagging
- ▶ Tau
- ▶ E/gamma
- ▶ MiniAOD improvements

# Particle Flow and JetMET

- ▶ Clustering algorithms taking into account depth information developed for Phase II studies
- ▶ Depth information contains additional information to exploit
  - ▶ e.g. correlation with particle energy
- ▶ Software ~ ready, calibrations to be tuned in various steps
- ▶ Anyhow the recent decision on not upgrading the full HE make this irrelevant for Phase1
- ▶ HF changes mostly transparent for downstream
  - ▶ Need to propagate timing information?

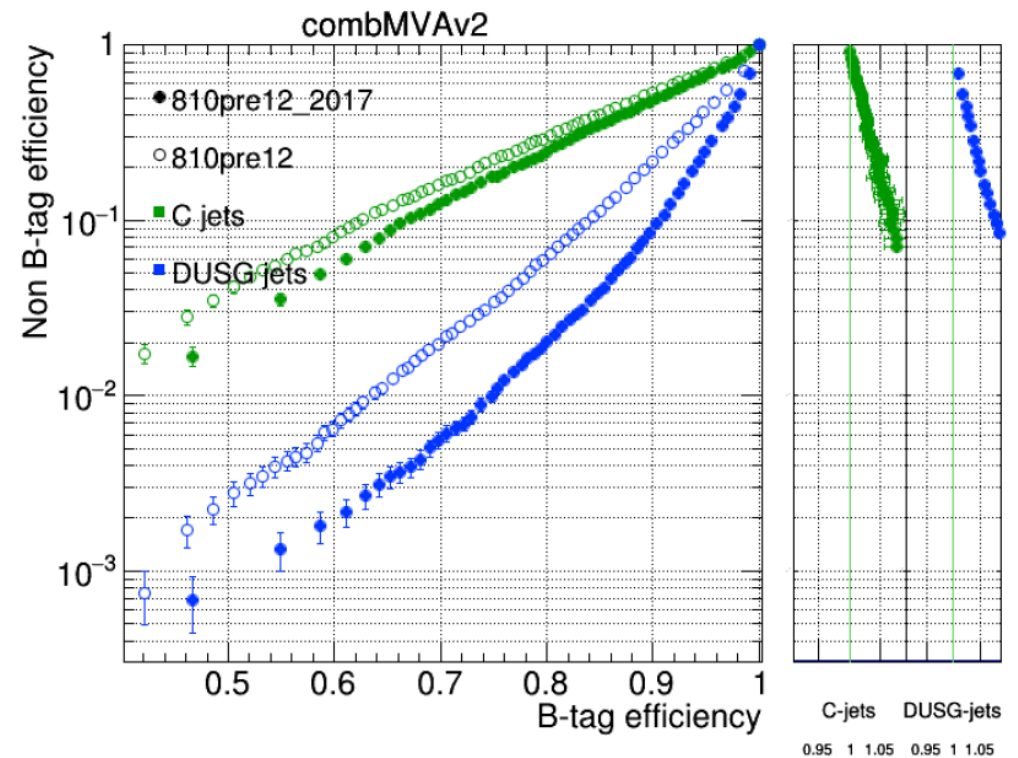
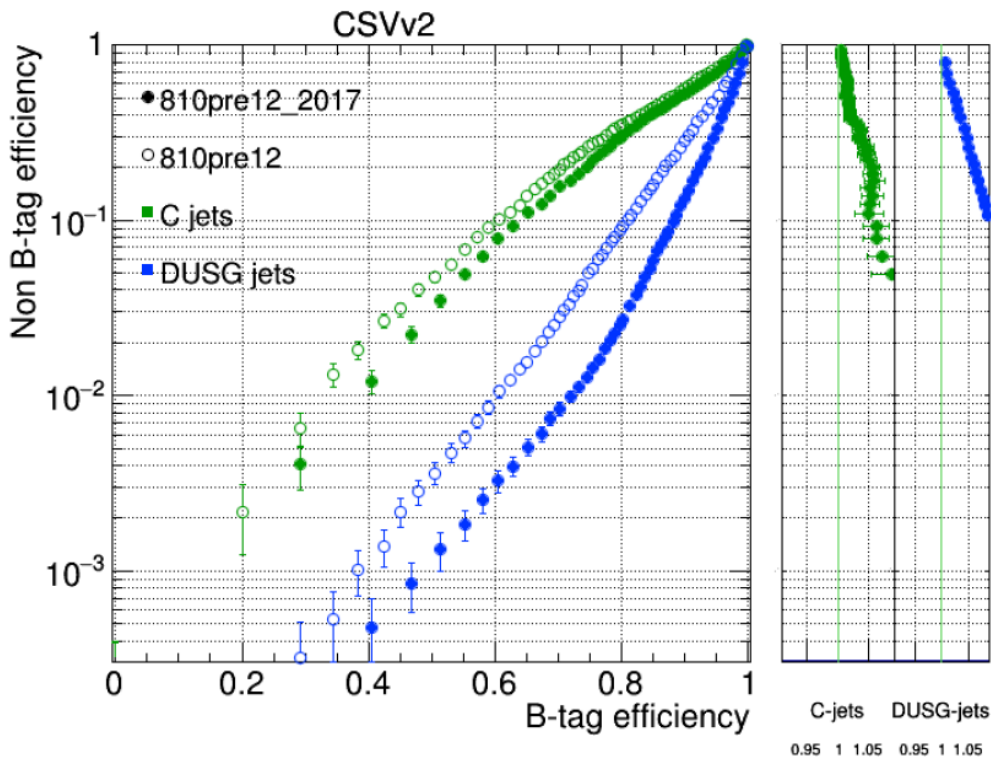


# HE Plan1: JetMET issues

- ▶ The proposal to go with a single upgraded sector in HE has several consequences on offline software
  - ▶ Need to handle different geometry, topology, depth
  - ▶ Need to present to downstream algorithm a coherent input
    - ▶ i.e. collapse upgraded detector information into “Phase0 like” format
  - ▶ Provide uniform in phi/eta calibration at the boundary of new/old sectors
  - ▶ Understand if the uniformity can be guarantee versus pt
    - ▶ i.e. can we make the response of the new sector look like the old sectors?
- ▶ The HB/HE transition is already (Run2) critical for JetMET
  - ▶ i.e. “as good as run2” could be “not good enough”
- ▶ Tests from HCAL just started, time line very compressed

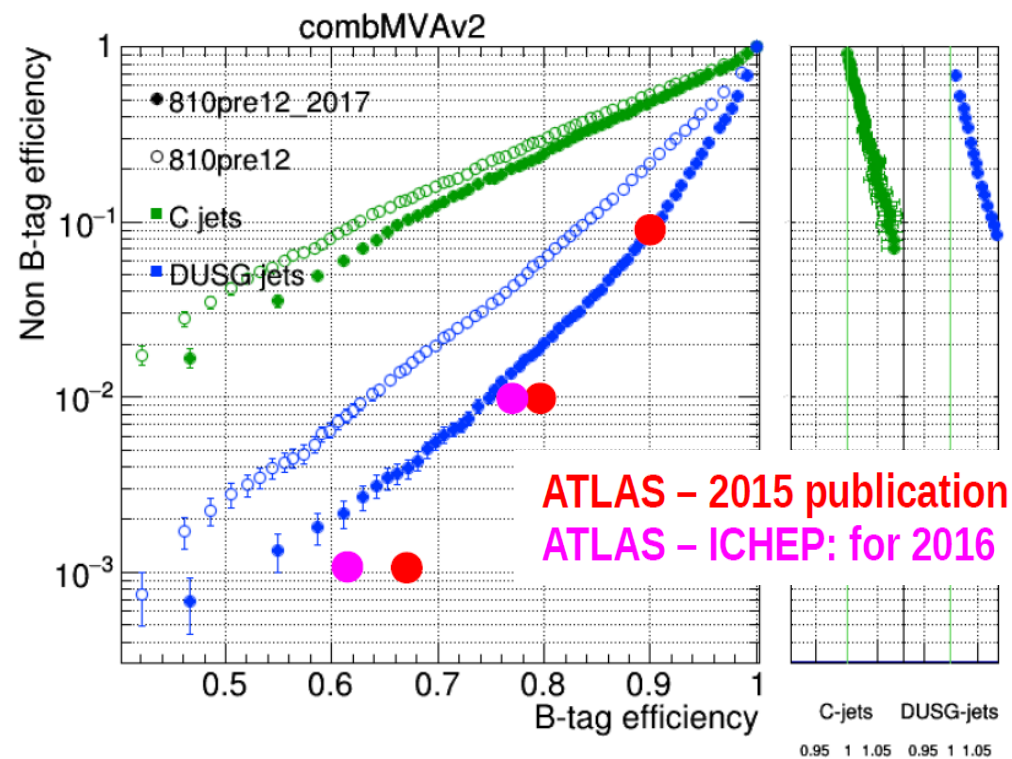
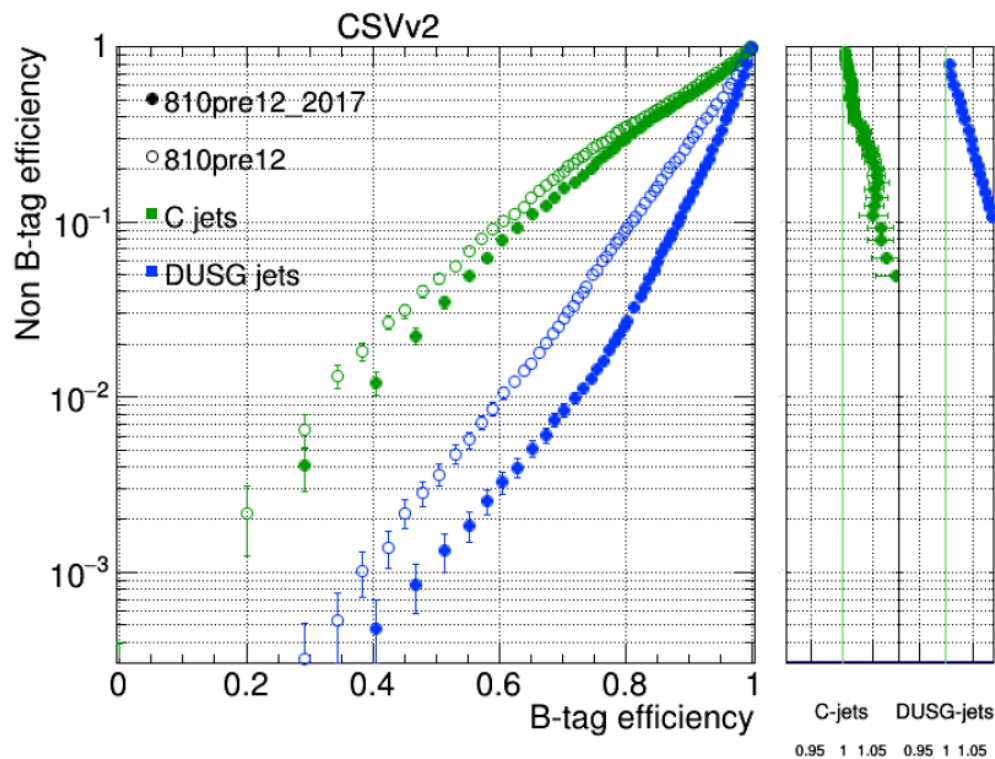
# B-Tagging

- ▶ The largest benefit in POG performances is clearly on b-tag thanks to Phase1
  - ▶ 1 additional layer
  - ▶ Layer1 closer to beam pipe



# B-Tagging: re-training

- ▶ Even if performances are much better “out of the box” there is a long way to go
  - ▶ We need to retune track selection (pixel information more robust now)
  - ▶ We need to retrain multi variate taggers
- ▶ We must close the gap with Atlas performance post IBL installation



# B-Tagging status

- ▶ Re-tuning of the track selection started
  - ▶ Using 100k ttbar events made available in december
- ▶ Track re-training needs larger sample (in fact not that large, just few millions)
  - ▶ Samples being requested already with 810pre12 (october) but not yet available
  - ▶ Being (finally) in production from last week
- ▶ Additional task on BTV POG is the update of HLT b-tag related tools
  - ▶ FastPrimaryVertex (FPV) reconstruction → adapt to 4 layers
  - ▶ Rethink the btag chain for HLT (complex combination of regional and PV region restricted tracking)

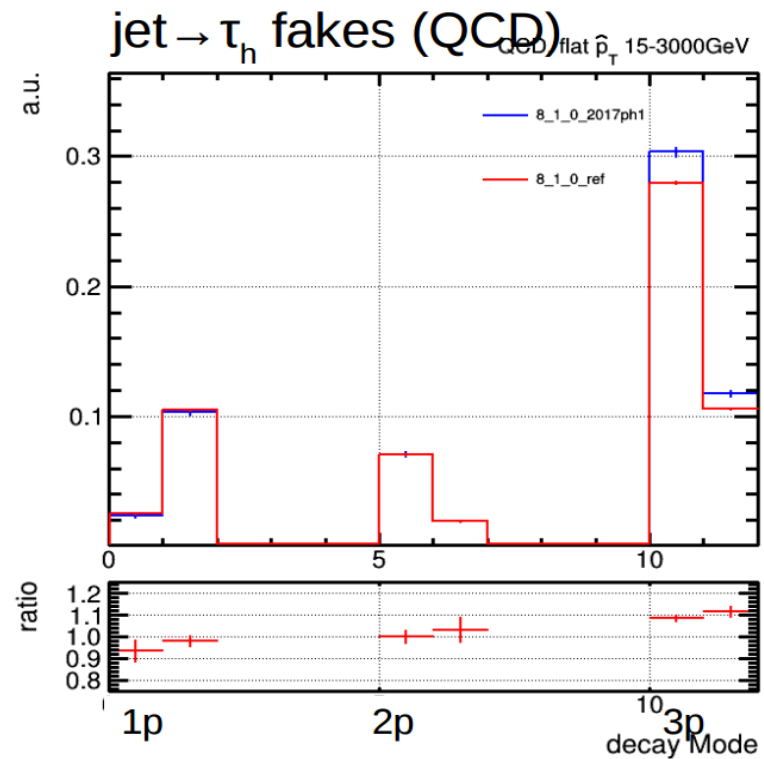
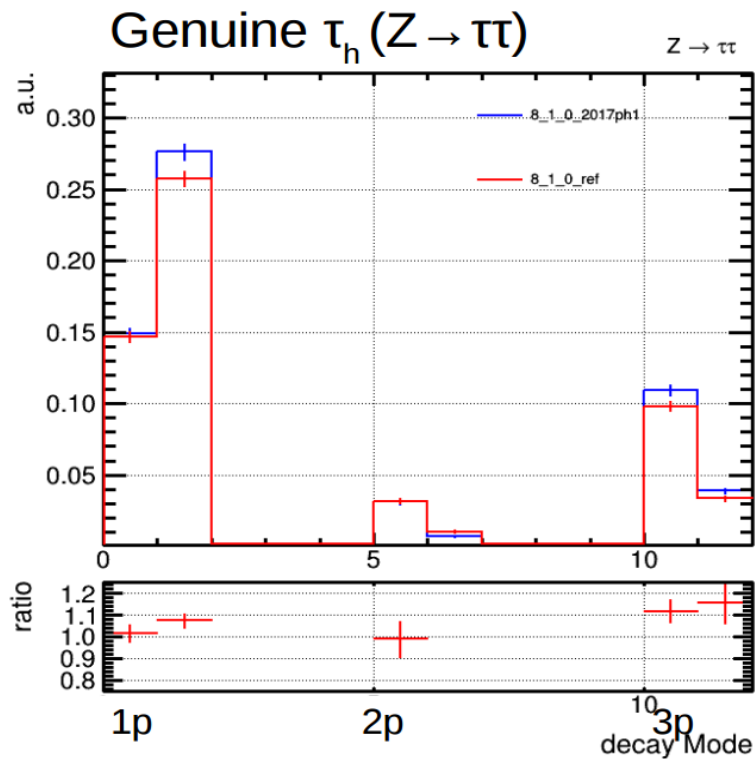
# B-tag: additional TRK changes

- ▶ Few TRK developments were delayed to 90X such as the CA seeding as new default
- ▶ Regression in BTV performance observed during PR integration
  - ▶ 4% lower efficiency in secondary vertex reconstruction
- ▶ Problems:
  - ▶ No dedicated BTV manpower pre-allocated for this
  - ▶ Many people busy with SF measurement and soon with algo re-training
  - ▶ Validity of training could be limited if large differences in track properties introduced by CA seeding (not expected from TRK validation, but something must be different given the observed performance)
  - ▶ We cannot hold the TRK PR too long!



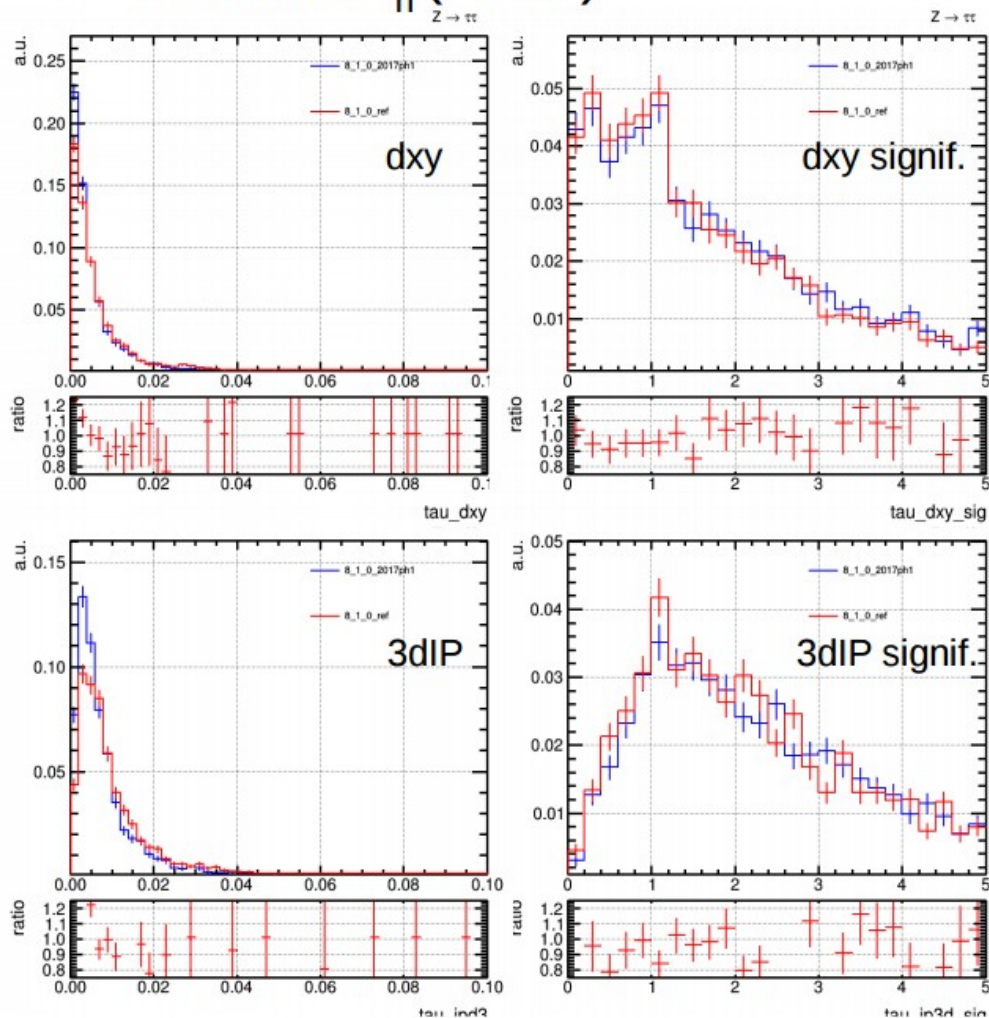
# Tau

- ▶ So far only studies on existing Phase1 relvals
  - ▶ No optimization yet
  - ▶ Just out of the box performance studies

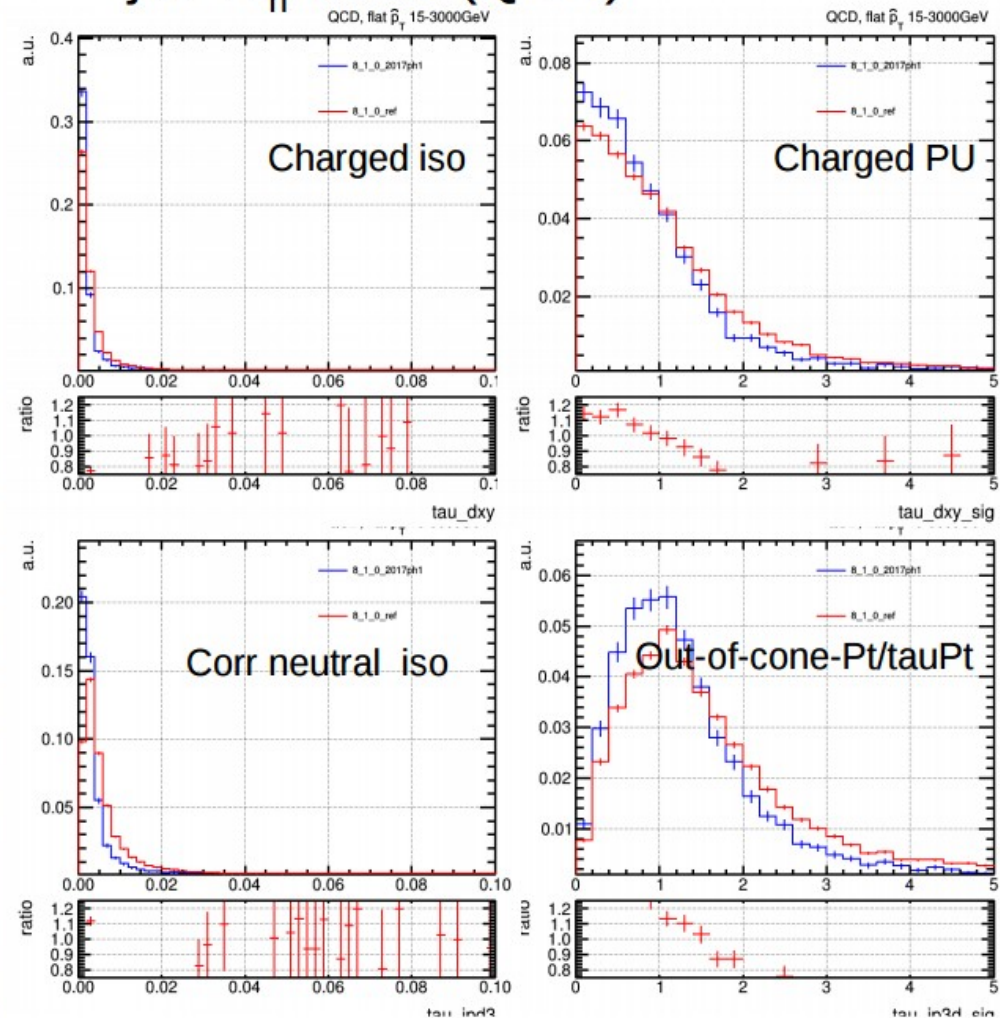


# Tau

## Genuine $\tau_h$ ( $Z \rightarrow \tau\tau$ )



## jet $\rightarrow \tau_h$ fakes (QCD)



⊙ Clearly better resolution of reconstructed impact parameters (esp. 3d)

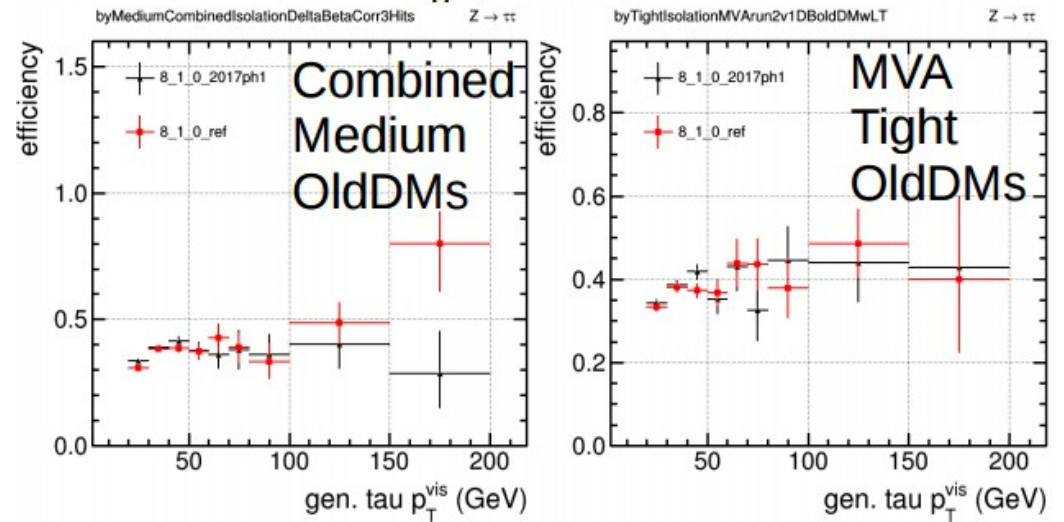
⊙ Information explored in combined MVA-Id

- New MVA training of tau-id needed (MC samples) to fully exploit improved resolution

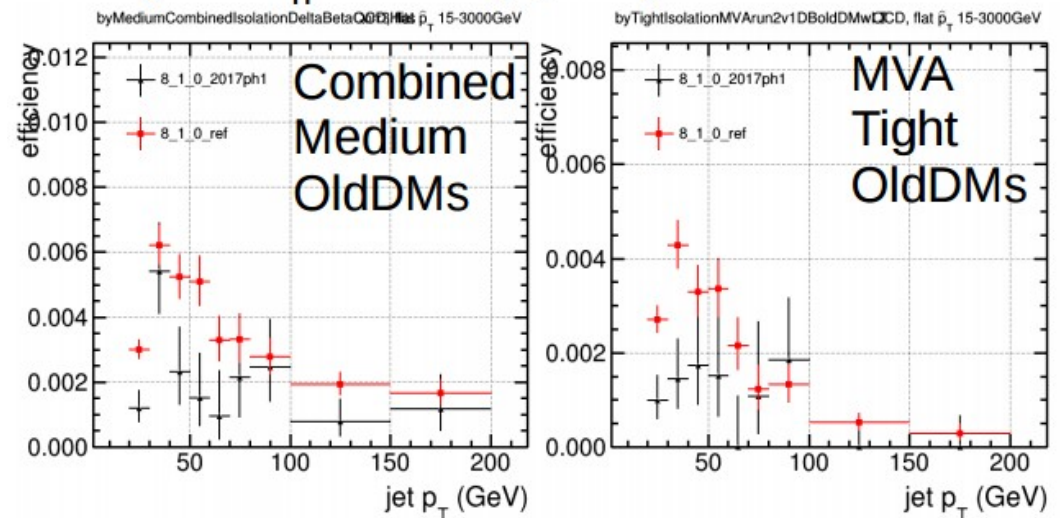
# Tau

- ▶ Before retraining performance already look improved:
  - ▶ Similar efficiency
  - ▶ **Reduced** fake rate
- ▶ Expect further improvement after re-tuning/re-training

## Genuine $\tau_h$ ( $Z \rightarrow \tau\tau$ )



## jet $\rightarrow \tau_h$ fakes (QCD)



# E/Gamma and Muon

- ▶ Egamma: plan a review of electron algorithm
  - ▶ Seeding (re-tuning of matching windows)
  - ▶ Tracking (GSF track parameters?)
  - ▶ Conversion reconstruction
  - ▶ Studies of new(reduced) material
- ▶ Waiting for samples...
  
- ▶ Muon POG plans no update, just regularly checking performance with new tracking

# MiniAOD changes

- ▶ MiniAOD content undergoing a review/update in order to be able to accommodate more analysis use cases
  - ▶ e.g. rethinking the way track uncertainty covariance matrix is stored
- ▶ In principle we have the possibility to store in packed candidate more information such as
  - ▶ Depth
  - ▶ Timing
  - ▶ ... but it seems not much interest/need for this so far
  - ▶ ... plus the depth information in HE is not going to be there

# Conclusions

- ▶ The POGs more affected by Phase1 are TRK, BTV and JME
- ▶ JetMET largely affected by decisions of Plan1 vs Plan36
- ▶ Interplay between TRK and BTV is critical
- ▶ Lack of sample availability currently blocking the work of BTV, EGM and TAU
  - ▶ Hopefully to be solved in the very next days
- ▶ HLT also critical for JME and BTV
- ▶ No specific phase1 related change in miniAOD