Release Validation Report

CMSSW 8_0_0_pre5

PPD General Meeting (virtual)

11th February 2016

(written report)

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Goals

- Compare 8_0_0_pre5 wrt. 8_0_0_pre4 [1]
  - ✓ Verify new developments and fixes added between the two releases from various groups. MiniAOD validation is always required by default.
  - ✓ DPGs/POGs/PAGs validators checking the right impact on the physics performance, and if there are any unexpected changes.
  - ✓ relval DQM gui is fixed with the inconsistent root version issue that experienced in the 800pre4 relval campaign. The production relval DQM gui link [2]. (Thanks Broen/DQM Team)
  - ✓ there is a problem of the GT reference for 50ns fullSim PU workflows, therefore validators only looked at the 25ns scenarios for fullSim PU validation (The issue will be fixed in pre6)
- For fullSim and fastSim compare 8_0_0_pre5 premixing PU vs classical PU [3]

[1] https://cms-pdmv.cern.ch/relmon/#CMSSW_8_0_0_pre5VSCMSSW_8_0_0_pre4
[2] https://cmsweb.cern.ch/dqm/relval/
[3] https://cms-pdmv.cern.ch/relmon/#CMSSW_8_0_0_pre5_pmxVSCMSSW_8_0_0_pre5

CMSSW 8_0_0_pre5 description

- Available for the following architectures:
  slc6_amd64_gcc493 (production)
  slc7_amd64_gcc493
  slc6_amd64_gcc530 (not yet installed)
- Release available: 22nd January
- Validation campaign started: 4th February
- Validation campaign deadline: 9th February

- for more info…
https://twiki.cern.ch/twiki/bin/view/CMS/PdmVRelVals2016 (Requests)
https://twiki.cern.ch/twiki/bin/view/CMS/PdmVRelValInstruction (for L3)
https://twiki.cern.ch/twiki/bin/view/CMS/PdmVRelValValidatorInstruction (for DPG/POG/PAG Validators)

Workflows parameters

CMSSW 8_0_0_pre4	CMSSW 8_0_0_pre5
fullSim noPU/PU25ns GT: 76X_mcRun2_asymptotic_v13 HLT: 25ns14e33_v4	**fullSim noPU/PU25ns:** GT: 80X_mcRun2_asymptotic_v1 HLT: GRun
data 2015b 50ns GT: 80X_dataRun2_v0 GT for HLT step: 76X_dataRun2_HLT_frozen_v10 HLT: 50ns_5e33_v3	**data 2015b 50ns:** GT: 80X_dataRun2_v2 GT for HLT step: 80X_dataRun2_HLT_frozen_v1 HLT: Fake
data 2015c/d 25ns: GT: 80X_dataRun2_v0 GT for HLT step: 76X_dataRun2_HLT_frozen_v10 HLT: 25ns14e33_v4	**data 2015c/d 25ns:** GT: 80X_dataRun2_v2 GT for HLT step: 80X_dataRun2_HLT_frozen_v1 HLT: GRun

****GT reference for 50ns fullSim PU will be fixed in pre6****

- for more info…
RevVal HN : https://hypernews.cern.ch/HyperNews/CMS/get/relval.html
800pre5: https://github.com/cms-sw/cmssw/releases/CMSSW_8_0_0_pre5
800pre4: https://github.com/cms-sw/cmssw/releases/CMSSW_8_0_0_pre4

Some issues @pre5 and @pre5_premix

- **Exit code 139 (segmentation fault)**:

  @[fastsim PU with premix] => still affecting SMS-T1tttt and ZEE_13 workflows; will be fixed in PR#13125, expected to be merged for next pre-release (Thanks Lukas and Hengne).

  @[HI data] => affecting RunHI2011 workflow; very low statistics; initialization checks for VirtualJetProducer being fixed in PR#13152 (Thanks David Lange and Slava Krutelyov).

- for more info…
https://hypernews.cern.ch/HyperNews/CMS/get/relval.html
https://hypernews.cern.ch/HyperNews/CMS/get/relval/4391/1/1.html
https://hypernews.cern.ch/HyperNews/CMS/get/recoDevelopment/1419.html

Preview

Data

Release Name	Tracker	Ecal	Hcal	CASTOR	DT	CSC	RPC	L1	Tracking	Electron	Photon	Muon	Jet	MET	bTag	Tau	Info	RelMon
8_0_0_pre5	✓	◎	✓	–	✓	✓	✓	–	◎	✓	✓	–	✓	✓	✓	–	i	

DPG/POGs

FastSim

Release Name	Tracker	Ecal	Hcal	CASTOR	DT	CSC	RPC	L1	Tracking	Electron	Photon	Muon	Jet	MET	bTag	Tau	Info	RelMon
8_0_0_pre5	–	–	–	–	–	–	–	–	✗	✓	–	✓	◆	–	✓	✓	i	
8_0_0_pre5_premix	–	–	–	–	–	–	–	–	✓	–	–	✓	–	–	✓	✓	i	

FullSim

Release Name	Tracker	Ecal	Hcal	CASTOR	DT	CSC	RPC	L1	Tracking	Electron	Photon	Muon	Jet	MET	bTag	Tau	Info	RelMon
8_0_0_pre5	✓	✓	✓	–	✓	✓	✓	–	◎	✓	–	✓	◆	✓	✓	✓	i	
8_0_0_pre5_premix	✓	✓	✓	–	✓	✓	–	–	✓	✓	–	✓	–	✓	✓	✓	i	

Data

Release Name	SMP	Higgs	Top	Susy	Exotica	B2G	B	Fwd	HIN	Info	RelMon
8_0_0_pre5	◎	–	✓	–	–	✓	✓	–	◆	i	

PAGs

FastSim

Release Name	SMP	Higgs	Top	Susy	Exotica	B2G	B	Fwd	HIN	Info	RelMon
8_0_0_pre5	–	–	–	–	–	✓	–	–	–	i	
8_0_0_pre5_premix	–	–	–	–	–	✓	–	–	–	i	

FullSim

Release Name	SMP	Higgs	Top	Susy	Exotica	B2G	B	Fwd	HIN	Info	RelMon
8_0_0_pre5	◎	–	◆	–	–	✓	✓	–	◆	i	
8_0_0_pre5_premix	◎	–	–	–	–	✓	–	–	–	i	

- Most reports arrived, including many PAGs;
- HLT/L1 menu different from reference release;
- Premix shows good agreement with classical mixing;
- Changes are expected due the different deployments between the releases;
- Some in progress;
- Some failures in FastSim domain;

DPG/POGs

Data

Release Name	Tracker	Ecal	Hcal	CASTOR	DT	CSC	RPC	L1	Tracking	Electron	Photon	Muon	Jet	MET	bTag	Tau	Info	RelMon
8_0_0_pre5	✓	◎	✓	–	✓	✓	✓	–	◎	✓	✓	–	✓	✓	✓	–	i	

FastSim

Release Name	Tracker	Ecal	Hcal	CASTOR	DT	CSC	RPC	L1	Tracking	Electron	Photon	Muon	Jet	MET	bTag	Tau	Info	RelMon
8_0_0_pre5	–	–	–	–	–	–	–	–	✗	✓	–	✓	◈	–	✓	✓	i	✂
8_0_0_pre5_premix	–	–	–	–	–	–	–	–	✓	–	–	✓	–	–	✓	✓	i	✂

FullSim

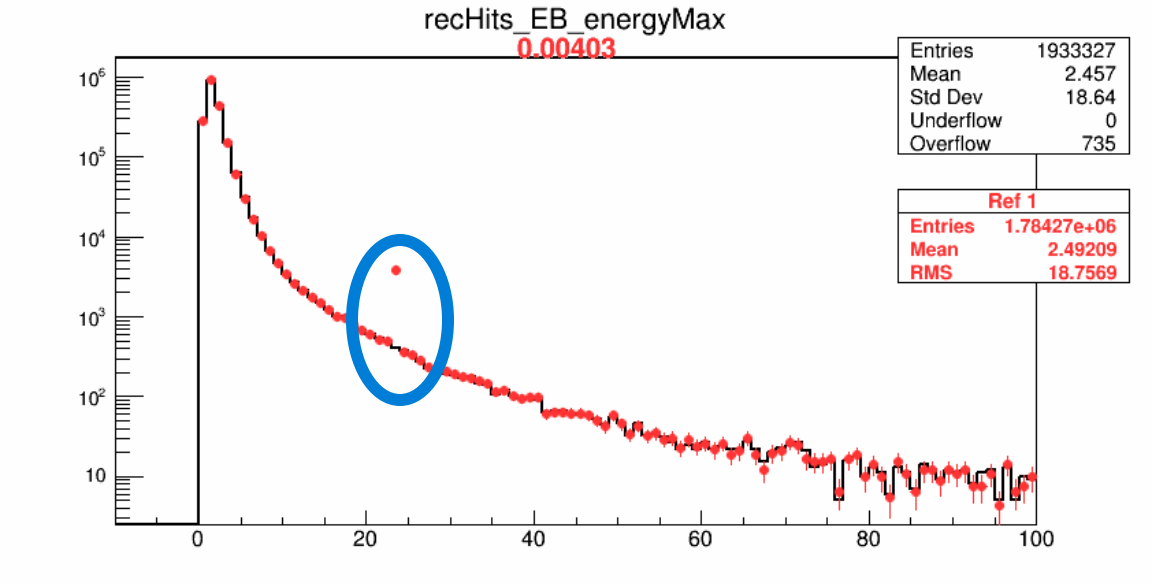
Release Name	Tracker	Ecal	Hcal	CASTOR	DT	CSC	RPC	L1	Tracking	Electron	Photon	Muon	Jet	MET	bTag	Tau	Info	RelMon
8_0_0_pre5	✓	✓	✓	–	✓	✓	✓	–	◎	✓	–	✓	◈	✓	✓	✓	i	✂
8_0_0_pre5_premix	✓	✓	✓	–	✓	✓	–	–	✓	✓	–	✓	–	✓	✓	✓	i	✂

-for more info…
https://goo.gl/gR8v8h

Ecal Data (by Badder Marzocchi)

Expected:

- Difference in the recHits_EB_energyMax plot due the exclusion of channels with unstable pedestals (PR #12824).

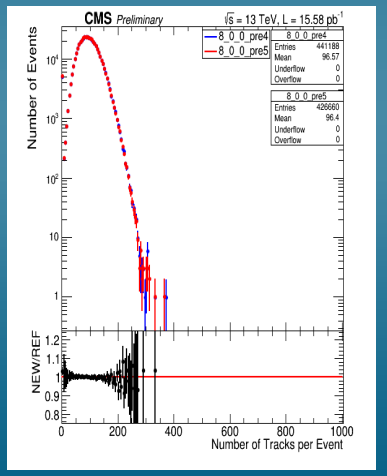


-for more info…
https://github.com/cms-sw/cmssw/pull/12824

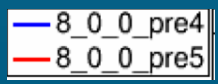
Tracking Data (by Kevin McDermott)

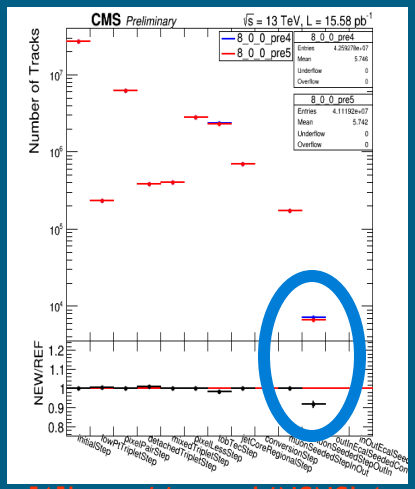
Expected:

- JetHT and ZeroBias: (run 256677, 25ns), (run 251251,50ns);
- small changes are expected from PRs: 12843, 12846, 12882;
- #tracks per iteration shows some changes (1% level); Muon OutIn with real change [1];
- negligible change in the #tracks per event; [2];
- in the nRecHits/trk: decrease in tracks with ≥ 4,3,8 hits per track for the PixBarrel [3], PixEndcap[4], TOB[5] respectively

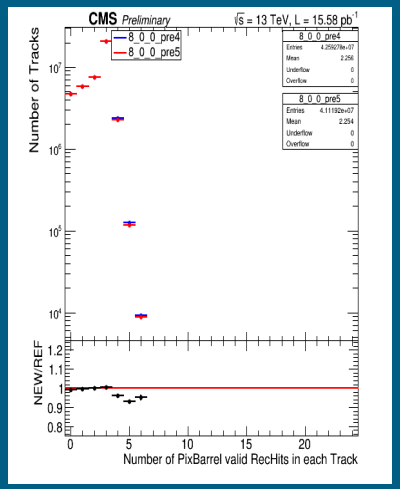


[2]http://goo.gl/Kjrl2u

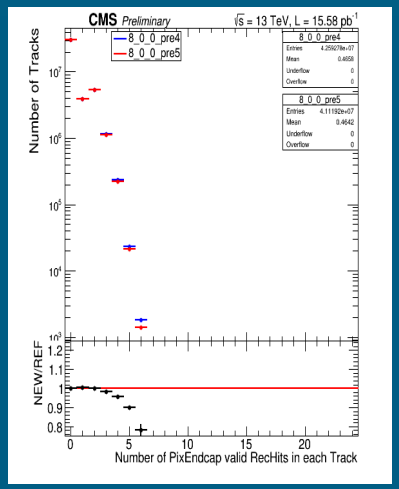




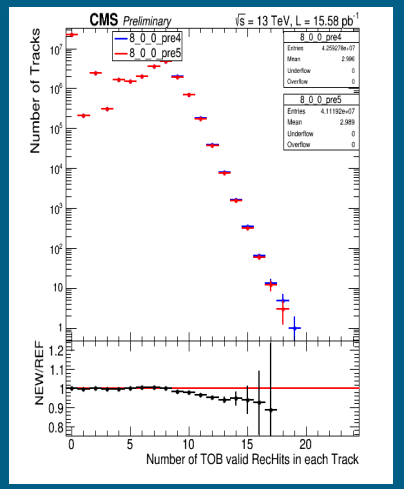
[1]http://goo.gl/NSNSb1



[3]http://goo.gl/vnjfJK



[4]http://goo.gl/zKhPSI

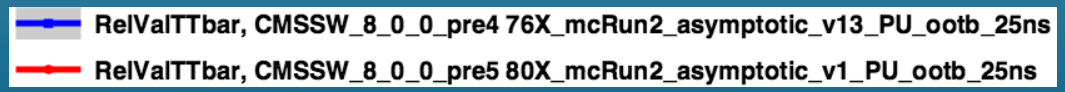


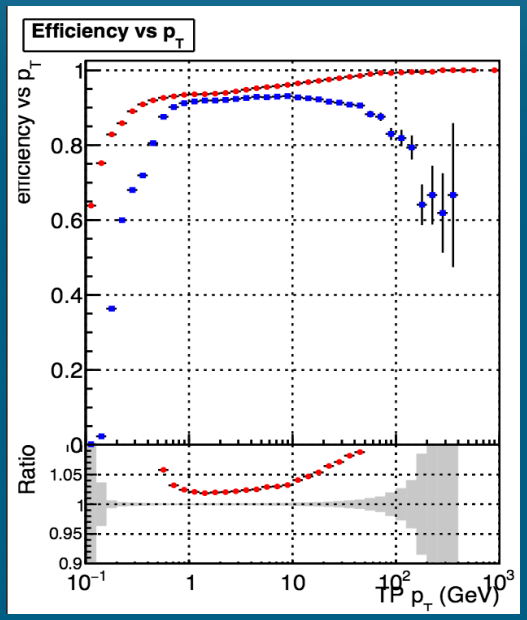
[5]http://goo.gl/ZxpPH5

Tracking Fastsim (by Matti Kortelainen)

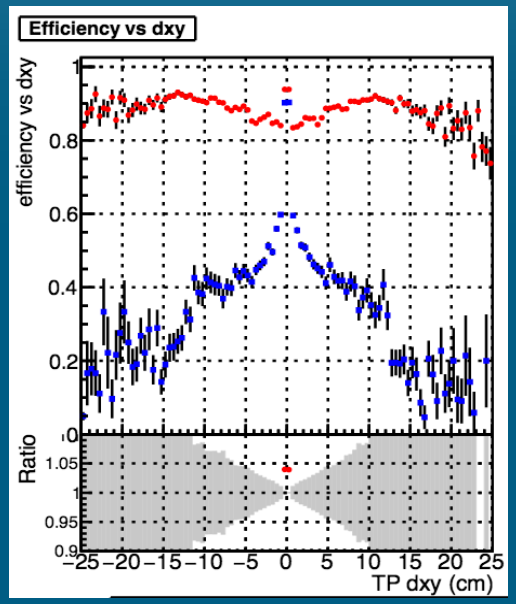
Failure:

- Comparison between TTbar noPU and TTbar PU: releases are agreement;
- Because differences between FastSim and FullSim in efficiencies at low pT [1] and high dxy [2] persist, then the release is marked as FAILURE.





[1]http://goo.gl/eOBntG

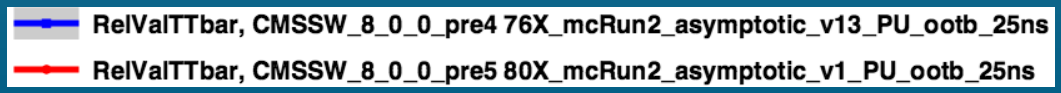


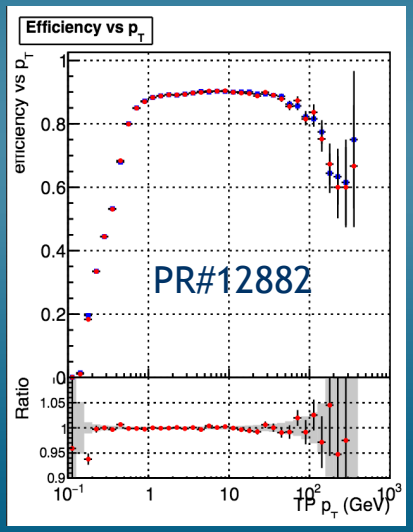
[2]http://goo.gl/C8bqtT

Tracking Fullsim (by Matti Kortelainen)

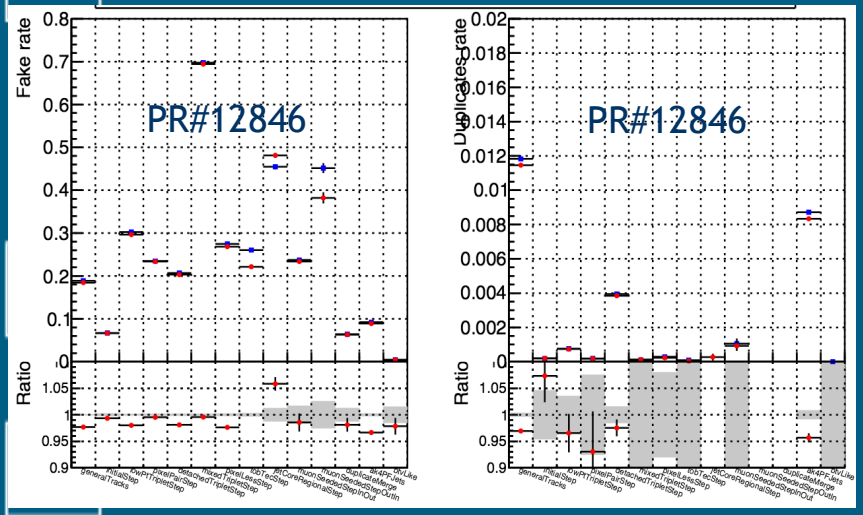
Expected:

- changes in tracks in all non-gun samples (TTbar+25ns PU generalTracks)
  - ~5 % efficiency drop for pT < 0.2 GeV (PR #12882) [1]
  - fake and duplicate rates decrease (PR #12846) [2]
  - more hits/track for $|\eta| \sim 0$ (artifact of a change in the analyzer in PR #12959) [3]
  - in TTbar and ZMM + PU samples, less tracks with missing inner layers (PR#12846)[4]

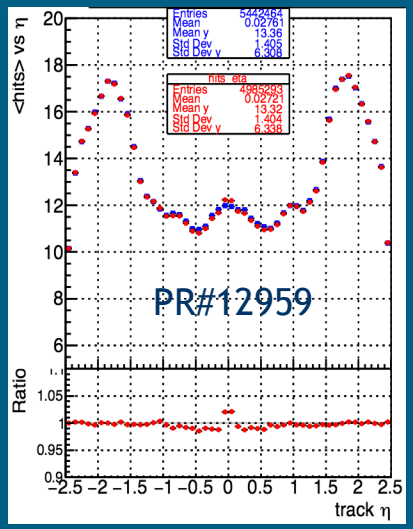




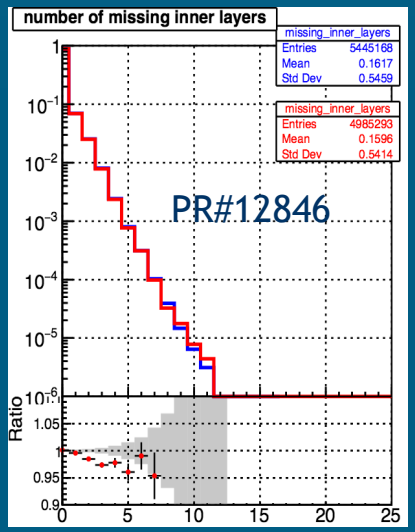
[1] http://goo.gl/6ZldER



[2]http://goo.gl/xOOyFj



[3]http://goo.gl/7t69zr

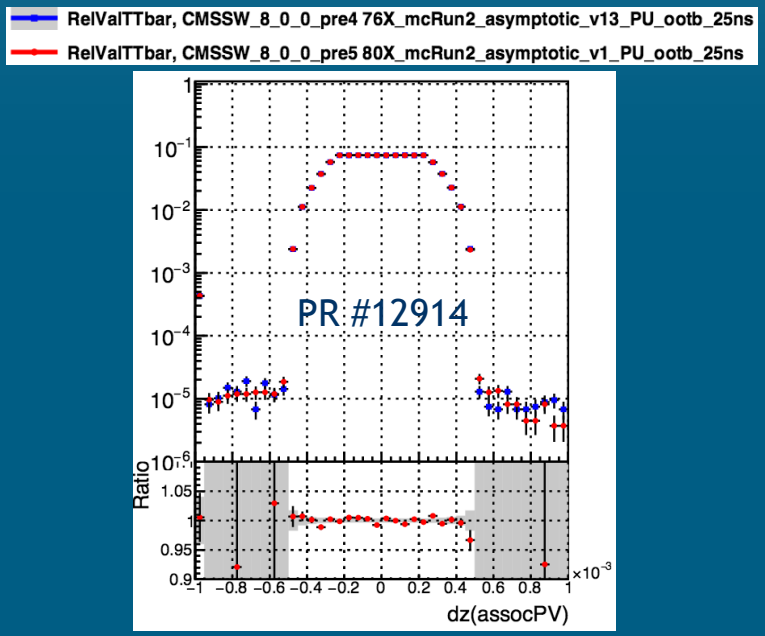


[4]http://goo.gl/Mlk0yA

Tracking Fullsim (by Matti Kortelainen) (cont.)

Expected:

- MiniAOD: regarding the tiny issues in PackedCandidate-track validation reported in 800pre4,
  - sign flips in dz(assocPV) have reduced, but still present despite of PR #12914 [5]
  - underflows in cov(lambda, dsz) and cov(phi, dxy), where PackedCandidate va lue was not the expected minimum, got fixed by PR #12914. Will be investiga ted further.

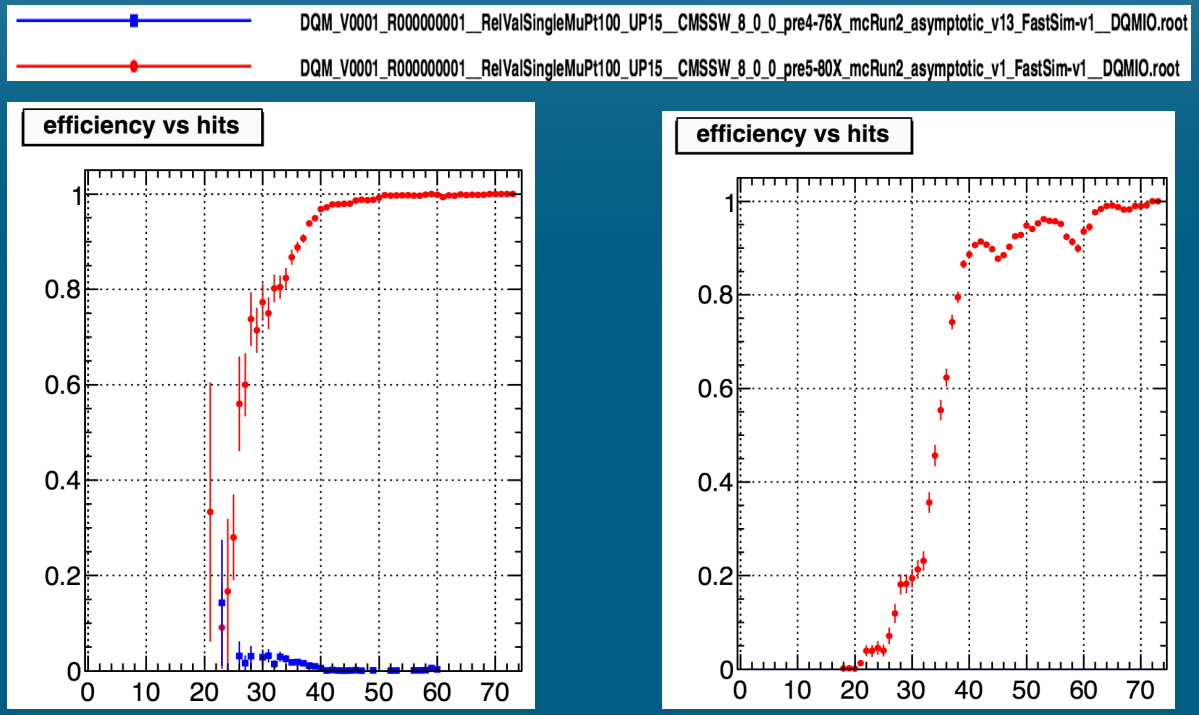


[5]http://goo.gl/vfLRK3

Muon Fastsim (by Giorgia Miniello)

Ok:

- distributions of HLT collections (L3) for all the sample totally mis match [1] or are empty [2]
- Experts confirmed bug before 800pre5, evident in HLT plots; bug fixed => Fastsim 800pre5 considered validated.



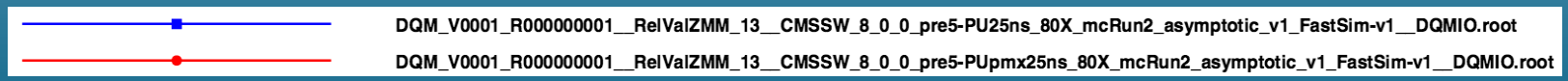
[1]https://goo.gl/69DNhE

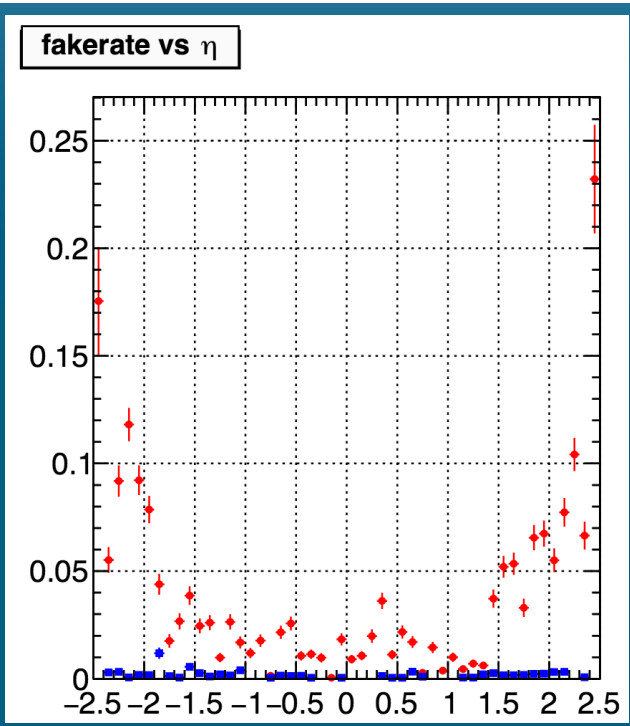
[2]https://goo.gl/aDFrmC

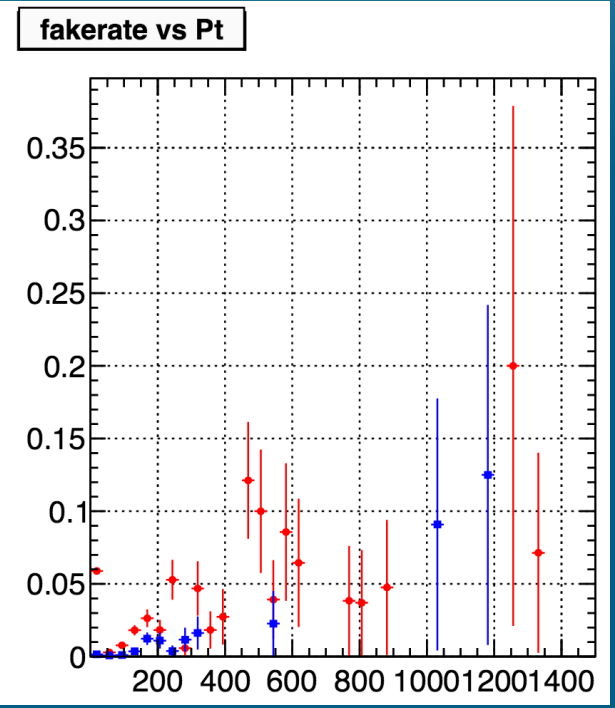
Muon Fastsim 800pre5_premix (by Nicola di Filippis)

Ok:

- fake rate plots show some differences for all the muon collections [1] : probably due tracking particles not matched in pileup.







[1]https://goo.gl/YlnAEq

Jet Fastsim/Fullsim (by James Anthony Faulkner)

In progress:

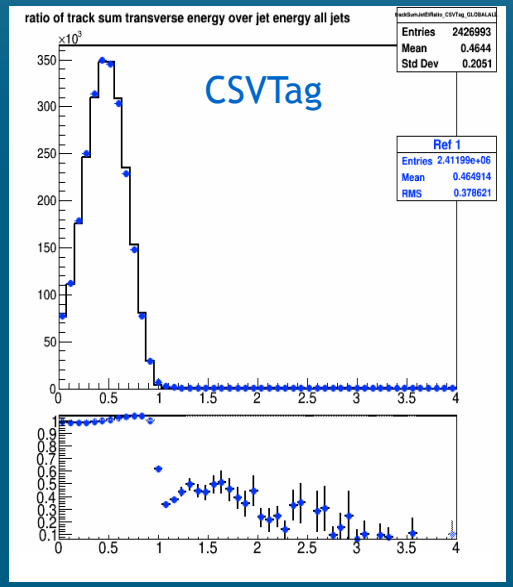
- Datasets:
  - RelValTTbar_13 (w/o PU, w/ PU) [1], RelValQCD_FlatPt_15_3000_13 [2], RelValQCD_Pt_80_120_13 [3], RelValQCD_FlatPt_15_3000HS_13 [4];
- good agreement is observed;
- in “Successful Comparisons” :
  many histograms are empty in all dataset comparisons because in TTbar there are no jets available; in QCD the plots are filled. These plots were recently added so are still under tests. (Thanks James and Mathias Weber).

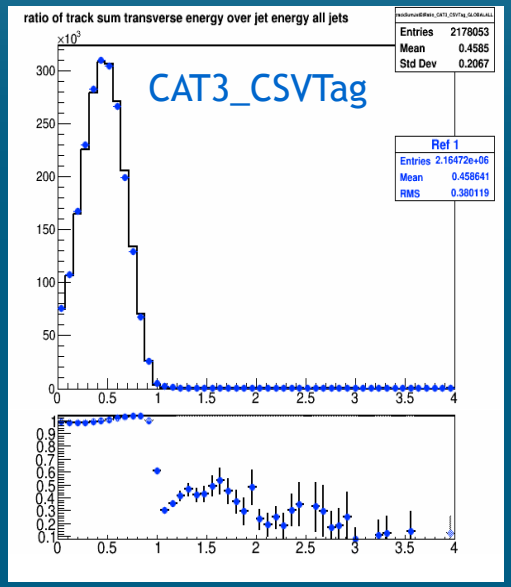
-for more info..
[1]https://goo.gl/Wo8bcE
[2]https://goo.gl/0ew3Dx
[3]https://goo.gl/hy2ofM
[4]https://goo.gl/mW853q

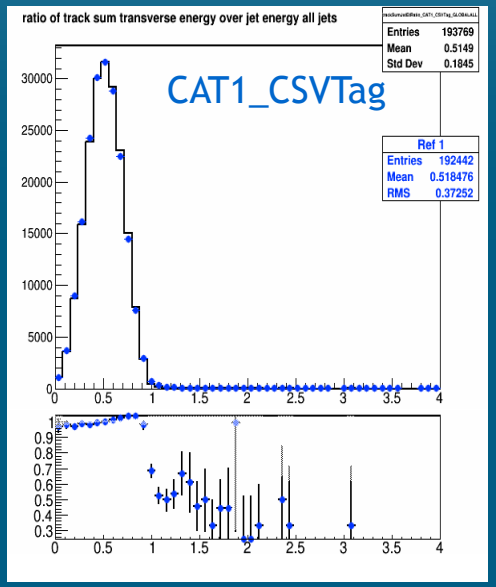
Btag Data (by Pablo Manzano)

OK

- small shifts in the tails of ”trackSumJetEtRatio” distributions. Nevertheless efficiencies and shape do not change significantly.







-for more info…
https://goo.gl/XcpDQP

PAGs

Data

Release Name	SMP	Higgs	Top	Susy	Exotica	B2G	B	Fwd	HIN	Info	RelMon
8_0_0_pre5	⊙	–	✓	–	–	✓	✓	–	◈	i	✕

FastSim

Release Name	SMP	Higgs	Top	Susy	Exotica	B2G	B	Fwd	HIN	Info	RelMon
8_0_0_pre5	–	–	–	–	–	✓	–	–	–	i	✕
8_0_0_pre5_premix	–	–	–	–	–	✓	–	–	–	i	✕

FullSim

Release Name	SMP	Higgs	Top	Susy	Exotica	B2G	B	Fwd	HIN	Info	RelMon
8_0_0_pre5	⊙	–	◈	–	–	✓	✓	–	◈	i	✕
8_0_0_pre5_premix	⊙	–	–	–	–	✓	–	–	–	i	✕

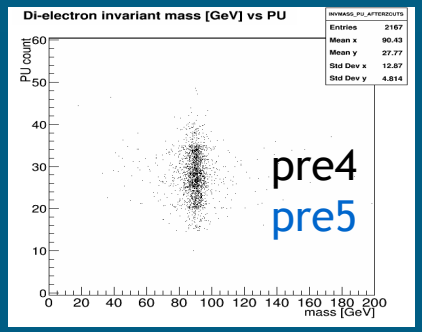
-for more info…
https://goo.gl/gR8v8h

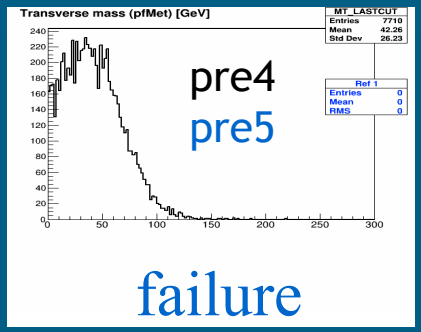
SMP Data (by Sandeep Sharma)

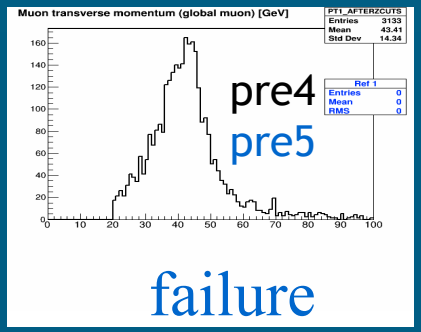
Expected:

Validation status waiting for clarifications.

- Data:
  - For Single Electron 2015B sample has empty invariant mass vs PU distribution[1] and also ~48% failing distributions [2];
  - For Single Electron 2015C, D samples have empty invariant mass vs. PU distributions [3];
  - For Single Muon 2015B sample have ~ 60% failure distributions[4].
- FullSim:
  - RelValWM sample has ~37% empty histograms (21 out of 56) [5]
  - RelValWE and RelValZEE samples have empty invariant mass vs. PU distributions [6,7]
- FullSim_PU:
  - RelValZEE_25 sample has empty invariant mass vs. PU distribution for pre5 [8];
  - RelValZEE_50 sample has 50% failure distributions with many empty distributions for pre5 [9];
  - RelValZMM_50 sample has ~61% failure distributions with many empty distributions for pre5 [10].







-for more info..

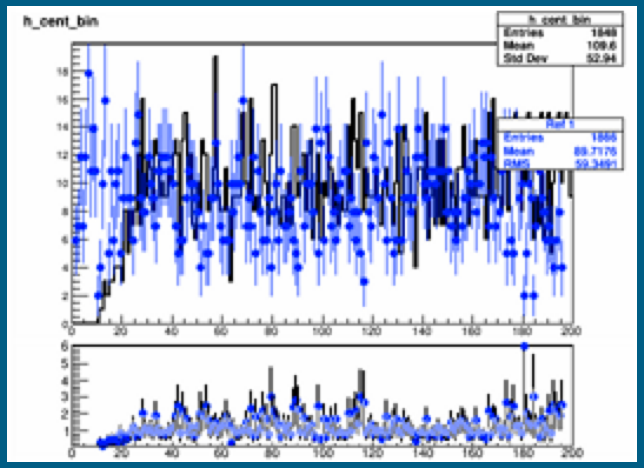
[1]https://goo.gl/VqBseU
[2]https://goo.gl/c7kc9F
[3]https://goo.gl/mCrHo1
[4]https://goo.gl/I9V6uW
[5]https://goo.gl/Zofyhu
[6]https://goo.gl/Xj2QZo
[7]https://goo.gl/6O6i0B
[8]https://goo.gl/cxpJ1E
[9]https://goo.gl/l6azU0
[10]https://goo.gl/LkwUZ5

TOP FullSim (by Franco Ligabue)
HIN Data/FullSim (by Sunil Manohar Dogra)

In progress:

- TOP FullSim
  - comparison OK on TTbarLepton [1].
- HIN Data
  - comparison with HIMinBiasUPC sample [2];
  - releases are in good agreement but still need to understand changes in 8_0_0_pre4 vs. 8_0_0_pre2 in Castor reconstruction as it effects the event plane histograms.
- HIN FullSim
  - Comparison with HydjetQ_MinBias_5020GeV, RelValPhotonJets_Pt_10_13_HI, RelValQCD_Pt_80_120_13_HI, RelValZEEMM_13_HI
  - discrepancy in the CentralityBin distribution at HydjetQ_MinBias_5020GeV [3]

[1]https://goo.gl/4buKnb
[2]https://goo.gl/A227wG



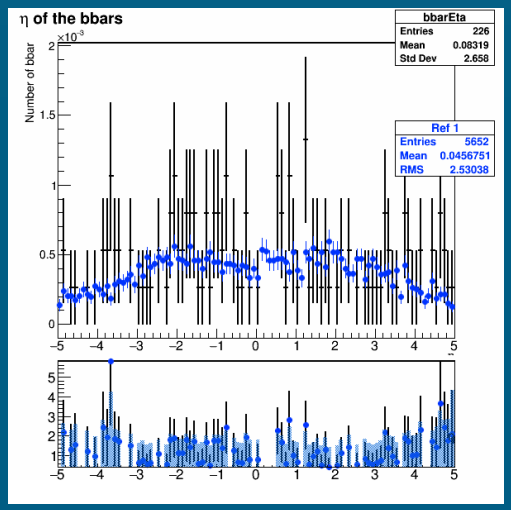
pre4
pre5

[3]https://goo.gl/oZM0P3

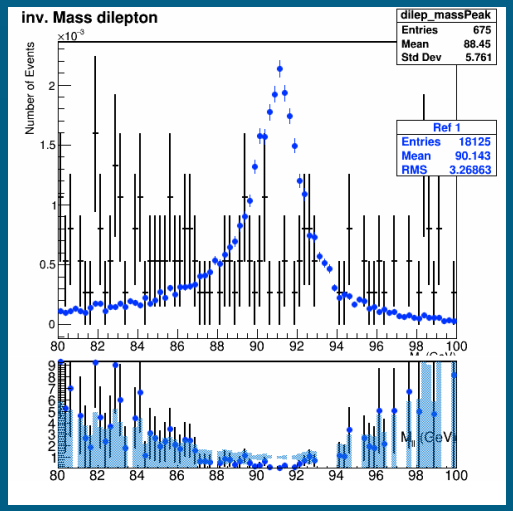
GEN FullSim (by Muhammad Bilal Kiani)

Expected:

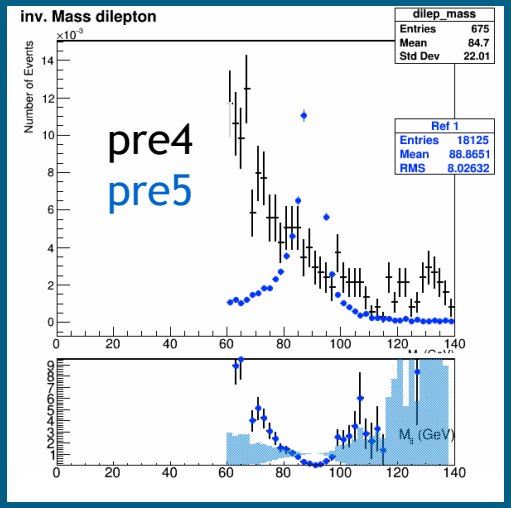
- The failures reported in 8_0_0_pre2 were fixed;
- Disagreement with 8_0_0_pre4 due the fix done for 8_0_0_pre2;
- Particles [1] : success 74.6%
- DrellYanElectrons [2]: success 27.8%
- DrellYanMuons [3]: success 27.8%



[1]https://goo.gl/dsrdib



[2]https://goo.gl/9NYtAL



[3]https://goo.gl/I4PvB8

HLT (by STEAM)

HLT validation report: 8_0_0_pre5 +|_premix

In general good agreement with the 8_0_0_pre4_premix campaign

FastSim: progress in fixing longstanding issues

- IsoMu paths are now fixed!
  - comparison to **8_0_0_pre4** not yet possible
    - therefore marked as Failing by validator
  - will be relevant for Muon|Higgs
- Electrons still missing
  - reflected in **Higgs** validation
- some empty histograms in MET (since 7_6_0_pre5/MET): to be reviewed

Data

Release Name	Tracking	Electron	Photon	Muon	Jet	MET	bTag	Tau	SMP	Higgs	Top	Susy	Exotica	B2G	B	Fwd
8_0_0_pre4	–	–	–	✓	✓	✓	–	–	–	–	–	–	–	–	–	–
8_0_0_pre5	–			✓	✓	✓	–	–	–	–	–	–	–	–	–	–
8_0_0_pre5_premix	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

FastSim

Release Name	Tracking	Electron	Photon	Muon	Jet	MET	bTag	Tau	SMP	Higgs	Top	Susy	Exotica	B2G	B	Fwd
8_0_0_pre4	–	✗	✗	✗	✓	✓	–	–	–	✗	–	–	–	✓	–	–
8_0_0_pre4_premix	–	✗	✗	✗	✓	✓	–	–	–	✗	–	–	–	✓	–	–
8_0_0_pre5	–			✗	✓	✓	–	–	–	✗	–	–	–	✓	–	–
8_0_0_pre5_premix	–			✓	✓	✓	–	–	–	✗	–	–	–	✓	–	–

FullSim

Release Name	Tracking	Electron	Photon	Muon	Jet	MET	bTag	Tau	SMP	Higgs	Top	Susy	Exotica	B2G	B	Fwd
8_0_0_pre4	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	✓
8_0_0_pre4_premix	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	✓
8_0_0_pre5	✓			✓	✓	✓	⊙	✓	⊙	✓	✓	✓	✓	✓	–	✓
8_0_0_pre5_premix	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	✓

missing reports

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-for more info… https://goo.gl/gR8v8h

HLT (by STEAM)

HLT validation report: 8_0_0_pre5 +|_premix

FullSim: fine in general

- missing HLT/Tracking folders are back (issue from 7_6_0_pre3/Tracking)
- expected changes in bTag due to the new training
- efficiencies of HLT_IsoTkMuXX changed in 8_0_0_pre4/SMP
  - not spotted before due to GUI problems
  - being investigated by experts
  - 8_0_0_pre5 consistent with |_pre2
- lower jet efficiency for Higgs since 7_6_0/Higgs (reason still not clear)
  - consistent with 7_6_0/Jet results

Data

Release Name	Tracking	Electron	Photon	Muon	Jet	MET	bTag	Tau	SMP	Higgs	Top	Susy	Exotica	B2G	B	Fwd
8_0_0_pre4	–	–	–	✓	✓	✓	–	–	–	–	–	–	–	–	–	–
8_0_0_pre5	–			✓	✓	✓	–	–	–	–	–	–	–	–	–	–
8_0_0_pre5_premix	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

FastSim

Release Name	Tracking	Electron	Photon	Muon	Jet	MET	bTag	Tau	SMP	Higgs	Top	Susy	Exotica	B2G	B	Fwd
8_0_0_pre4	–	✗	✗	✗	✓	✓	–	–	–	✗	–	–	–	✓	–	–
8_0_0_pre4_premix	–	✗	✗	✗	✓	✓	–	–	–	✗	–	–	–	✓	–	–
8_0_0_pre5	–			✗	✓	✓	–	–	–	✗	–	–	–	✓	–	–
8_0_0_pre5_premix	–			✓	✓	✓	–	–	–	✗	–	–	–	✓	–	–

FullSim

Release Name	Tracking	Electron	Photon	Muon	Jet	MET	bTag	Tau	SMP	Higgs	Top	Susy	Exotica	B2G	B	Fwd
8_0_0_pre4	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	▪	✓
8_0_0_pre4_premix	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	✓
8_0_0_pre5	✓			✓	✓	✓	⊙	✓	⊙	✓	✓	✓	✓	✓	▪	✓
8_0_0_pre5_premix	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	✓

missing reports

****GT reference for 50ns fullSim PU will be fixed in pre6****

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-for more info…
https://goo.gl/gR8v8h

Summary

- Comparison of CMSSW 8_0_0_pre5 against 8_0_0_pre4;
  - for fullSim and fastSim, 8_0_0_pre5 premixing PU vs 8_0_0_pre5 PU;
  - GT as well as HLT/L1 menu different from reference release => changes are expected;

- [fastsim PU with premix] exit code 139 will be fixed in PR#13125; [HI data] exit code 139 being fixed in PR#13152;

- Failures affecting the release:
  - Tracking Fastsim (DPG/POGs):
    - differences between FastSim and FullSim in efficiencies at low pT and high dxy persist;
  - Muon and Higgs FastSim (HLT):
    - Muon: IsoMu paths fixed; comparison with pre4 not yet possible;
    - Higgs: Electrons missing => Higgs validation affected

Summary (cont.)

- Issues not yet understood to be followed up:
  - Tracking FullSim (DPG/POGs):
    underflows in cov(lambda, dsz) and cov(phi, dxy)
    will be investigated further;
  - MET FastSim (HLT): some empty histograms since 7_6_0_pre5;
  - Higgs FullSim (HLT): lower jet efficiency since 7_6_0;

- Pending reports:
  - DPG/POGs: L1 and Muon Data, Jet and MET Fastsim, L1, Photon and Jet FullSim;
  - PAGs : HIN Data, SMP, Top, B and HIN FastSim, Top and HIN FullSim;
  - HLT: Electron and Photon FastSim/FullSim;

- Waiting for clarifications:
  - PAGs: SMP Data/FullSim;

Next steps

- CMSSW 8_0_0_pre6 is under preparation: release validation samples are being produced.
- Technical validation of multiCore processing is under preparation, to be compared with 8_0_0_pre6 current default. Once validated, release validation FullSim and Data workflows will use multiCore processing as default.