

Physics Validation

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Simulation Steering Group Meeting



Validations 18/12/13: DC14 (1)

- 5 validation tasks for this week:
 - Several DC14 simulation tests, grouped into 3 tasks
 - 2 tasks on IBL/ITK digi+reco bugfix (ttbar only)
- (1) Test of simulation in 17.7.3.1, which will be used for DC14.
 - Without pileup and no changes expected.
 - Test: s1860_s1862_r5143 (17.7.3.1, 17.3.12.1) - GEO-21-00-03, FS off
 - Ref: s1859_s1862_r5143 (17.7.1.2, 17.3.12.1) - GEO-21-00-03, FS off
 - ATLPHYSVAL-39
- (2) Check impact of frozen showers in 17.7.3.1 (w/o pileup)
 - Ref is test from task 1. Similar changes expected to last FS validation
 - Test: s1861_s1862_r5143 (17.7.3.1, 17.3.12.1) - GEO-21-00-03, FS on
 - Ref: s1860_s1862_r5143 (17.7.3.1, 17.3.12.1) - GEO-21-00-03, FS off
 - ATLPHYSVAL-39

Validations 18/12/13: DC14 (2)

- (3) Several technical simulation changes for 17.7.3.1/.2
 - AthenaMP-II, New GEO tag naming, SLC6 release.
 - Reference is the test from task 1. No changes expected in all cases.
 - Test 1: (AthenaMP): s1860_s1862_r5143 (17.7.3.1, 17.3.12.1) - GEO-21-00-03, FS off, no pileup
 - Test 2: (SLC6): s1866_s1862_r5143 (17.7.3.2, 17.3.12.1) - GEO-21-00-03, FS off, no pileup
 - ~~Test 3: (GEO naming): s1865_s18XX_r51XX (17.7.3.2, 17.3.12.2) - GEO-21-00-03, FS off, no pileup~~
 - Ref: s1860_s1862_r5143 (17.7.3.1, 17.3.12.1) - GEO-21-00-03, FS off
 - ATLPHYSVAL-39
- Geo naming task not run in time due to crash in HITS merging
 - Fixed in 17.6.51.2 (thanks for quick turn around)
 - Running merging and digi+reco for ttbar scout
 - Hoping to be able to have TAG-level comparison by Friday
 - Since this is only a technical change this would probably be sufficient

Validations 18/12/13: IBL/ITK

- 4) Check of vertex bugfix for ITK digi+reco in 17.3.10.1.
 - Truth info accidentally used re-ordering the vertex container which may have caused a small bias in some samples, resulting in the primary vertex ID being more efficient than would be expected using usual $\text{sum}(p_T^2)$ criteria.
 - Only small changes in vertex efficiency expected
 - Test: s1636_r5087 (17.3.10.1,AtlasProduction) - No pileup, ttbar only
 - Reference: s1636_r4528 (17.3.10.1,AtlasProduction) - No pileup
 - ATLPHYSVAL-52
- (5) Check of vertex bugfix for IBL digi+reco in 17.3.10.1.1
 - Same issue as task 4. Again small changes in vertex efficiency expected.
 - Test: s1638_r5119 (17.3.10.1.1,IBLProd) - No pileup, ttbar sample only
 - Reference: s1638_r4514 (17.3.10.1.1,IBLProd) - No pileup
 - ATLPHYSVAL-52

Overview

Have most results:

- Electrons, photons, MET, muons (except 1/4), tracking (except 4), secondary tracking, jets (except 4/5), tau (except 2/3), b-tagging, top (except 4), Higgs (except 4)
- Physics/CP groups really pushed hard to get this validated

Still waiting for a few results:

- Jets(4/5), **muons** (1/4), tracking (4), **tau** (2/3), **SUSY**, top (4), Higgs (4), **exotics**
 - Ones in bold relevant for DC14

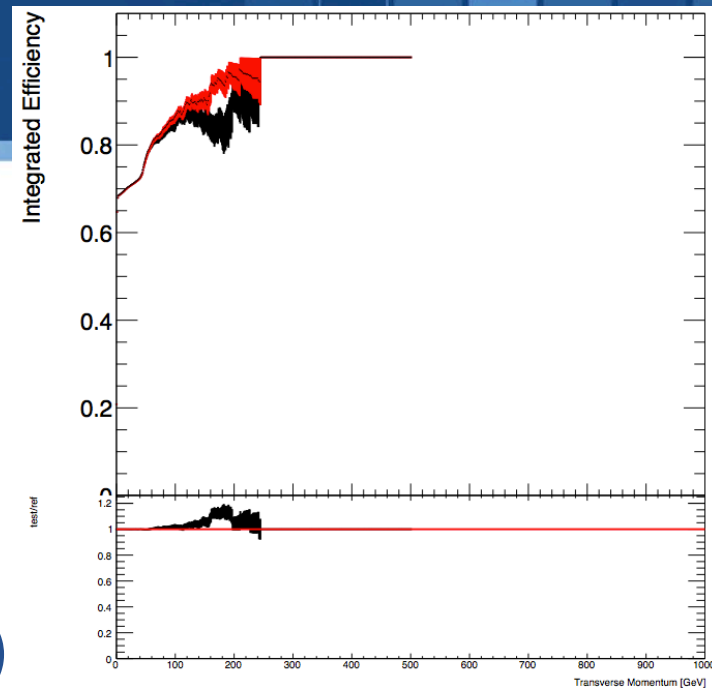
Things looking very good from what we can see so far for all DC14 tasks and IBL/ITK digi+reco:

Meeting 2013-12-18 (Week 51) ()

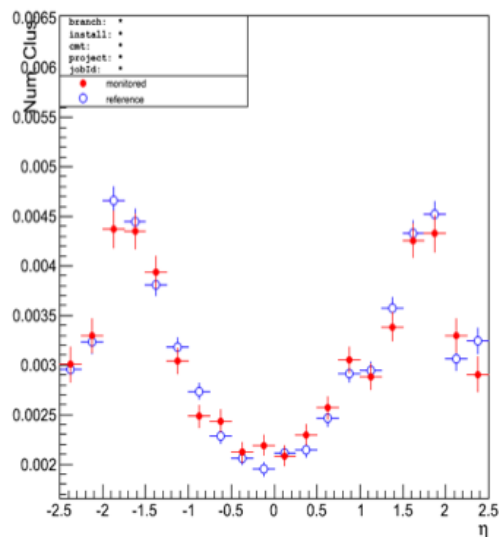
1	Test of DC14 simulation in 17.7.3.1	Summary	MC14-G4	s1860 r5143	
2	Check the impact of frozen showers in 17.7.3.1	Summary	MC11-G4	s1862 r5143	
3	Several technical simulation changes for 17.7.3.1/17.7.3.2: AthenaMP-II, SLC6 release	Summary	MC14-G4	s1862/66 r5143	
4	Check of vertex bugfix for ITK digi+reco in 17.3.10.1	Summary	HL-LHC	s1636 r5087	
5	Check of vertex bugfix for IBL digi+reco in 17.3.10.1	Summary	HL-LHC	s1682 r4514	

17.7.3.1 Simulation

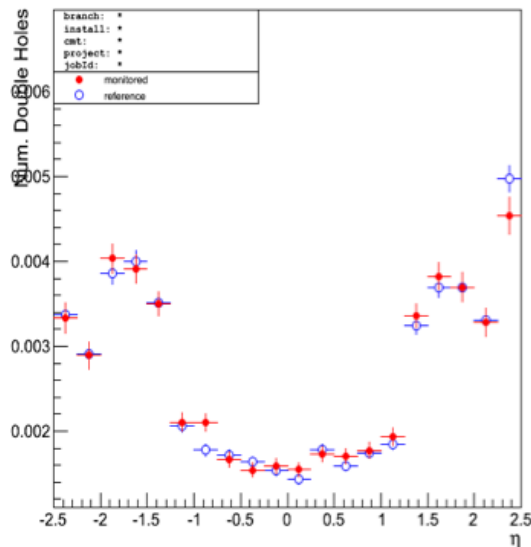
- In general looks good
 - b-tag yellow but diffs similar to usual
- Largest diff seen is increase in muon efficiencies at high p_T
 - Similar for all muon types
- Some small diffs in tracking for ganged pixels, holes, outliers (true for all tasks)



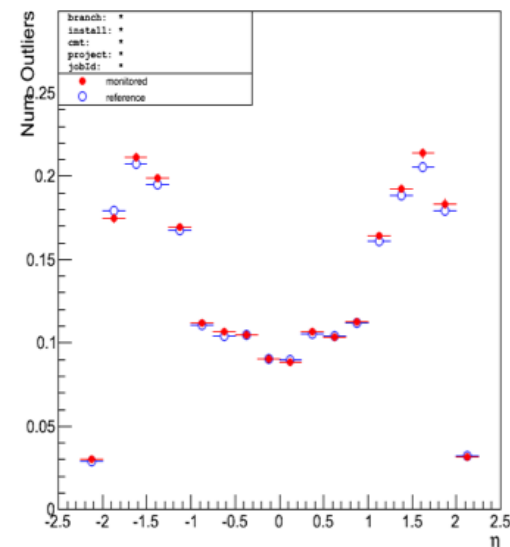
title: Number of ganged flagged fake Pixel hits vs eta
normal plot #52 TESTS: OK



title: Number of SCT double holes vs eta
normal plot #55 TESTS: OK

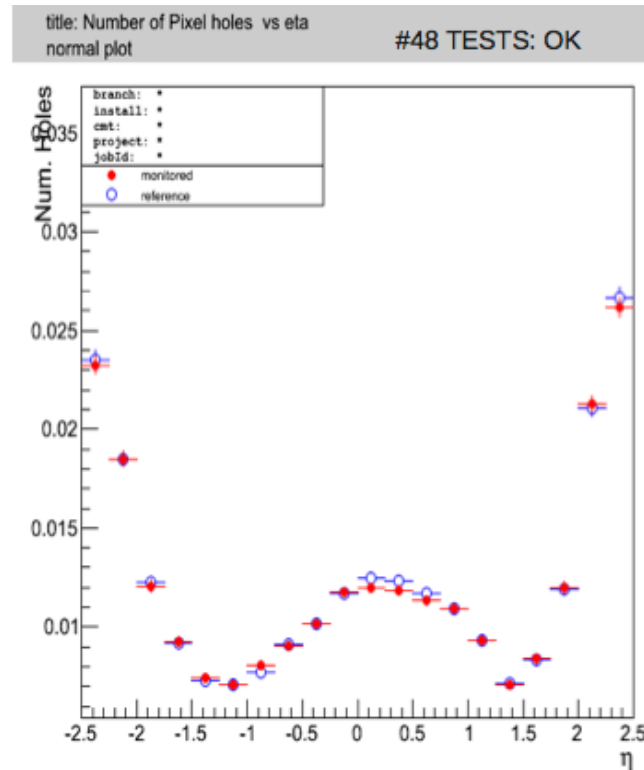


title: Number of TRT High Threshold outliers vs eta
normal plot #60 TESTS: OK



17.7.3.1 Simulation: AthenaMP/SLC6

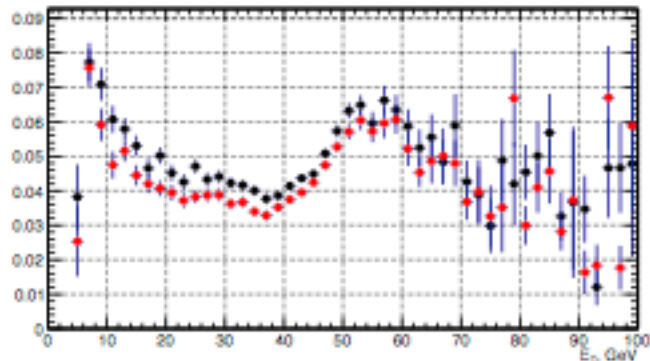
- Some small differences seen but pretty much all within stat uncertainties
 - An example of a largest one seen for SLC6: pixel holes



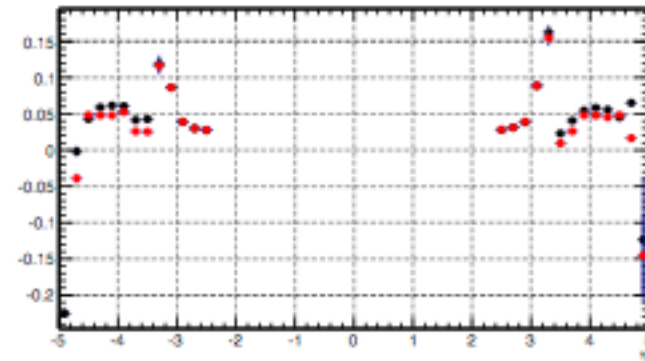
Frozen Showers in 17.7.3.1 (1)

- Some diffs in E response (linearity/uniformity) for forward elects
 - Uniformity (right) similar to seen in 17.7.1.2 validation (bottom)
 - Larger difference for linearity seen by egamma (left) but not for SM (later)
 - Shape clearly different to previous results too

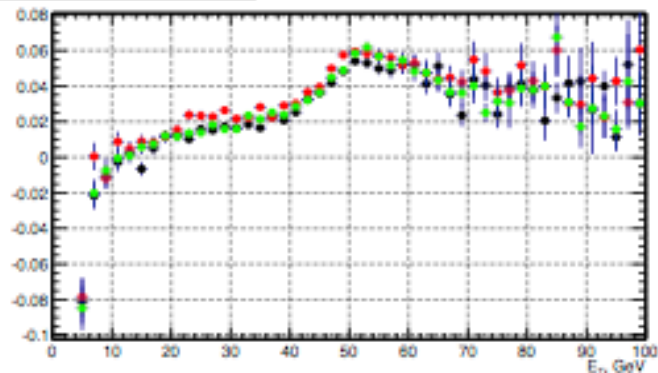
Forward electrons: Linearity



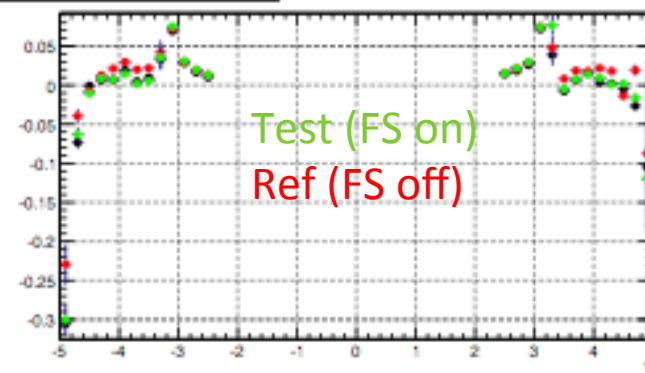
Forward electrons: Uniformity



Forward electrons: Linearity



Forward electrons: Uniformity



Frozen Showers in 17.7.3.1 (1b)

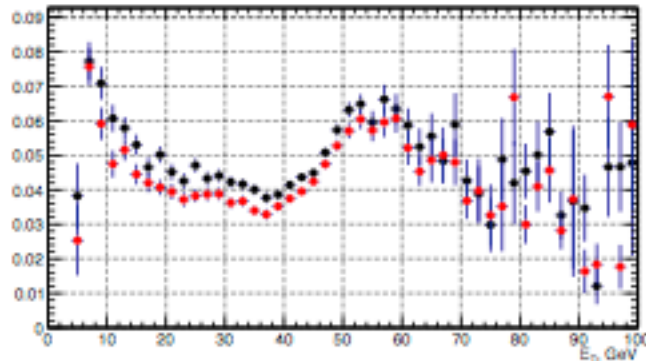
- Differences noticeably larger than MC12 new FS library validation

Task : Validation of new Frozen Showers library. New tune of the Frozen Showers library, expect some (hopefully small) differences in the FCAL.

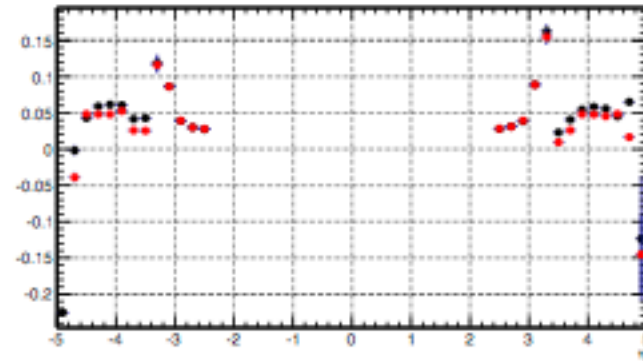
Test: s1499_r3542 (17.2.2.6,17.2.1.4)

Reference a) s1469_r3542 (17.2.0.2,17.2.1.4)

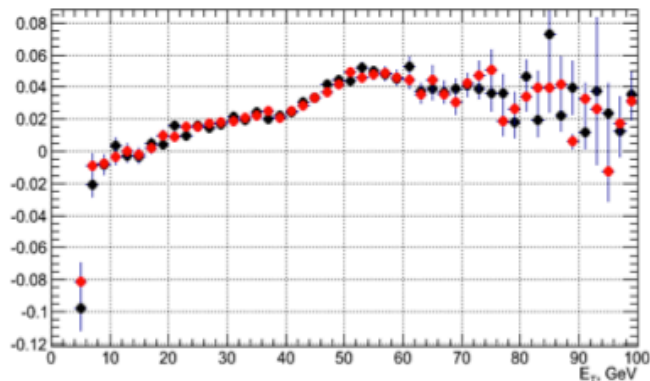
Forward electrons: Linearity



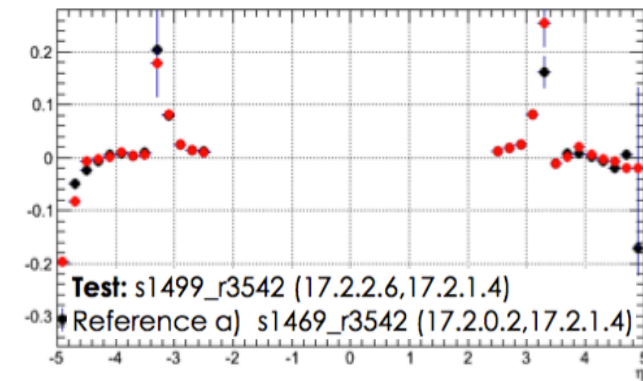
Forward electrons: Uniformity



Forward electrons: Linearity

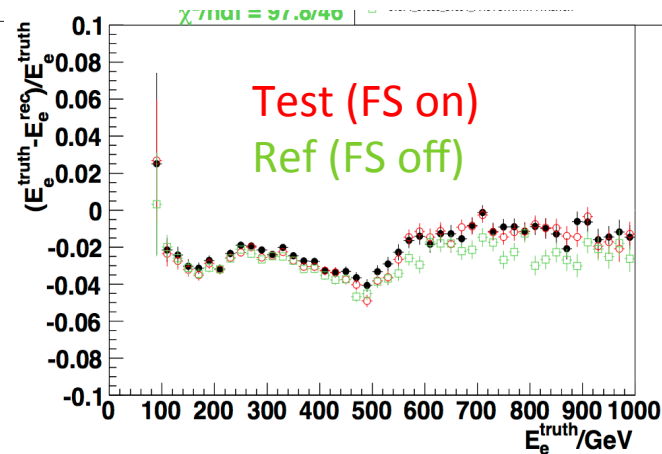
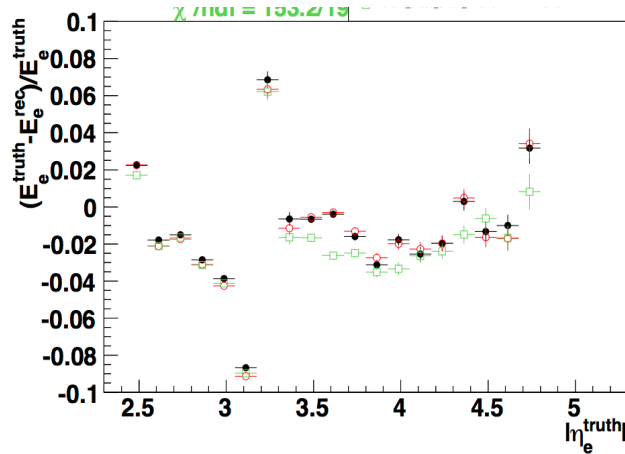
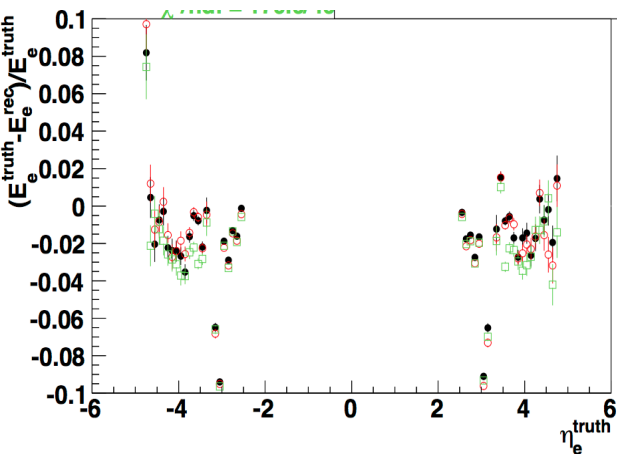
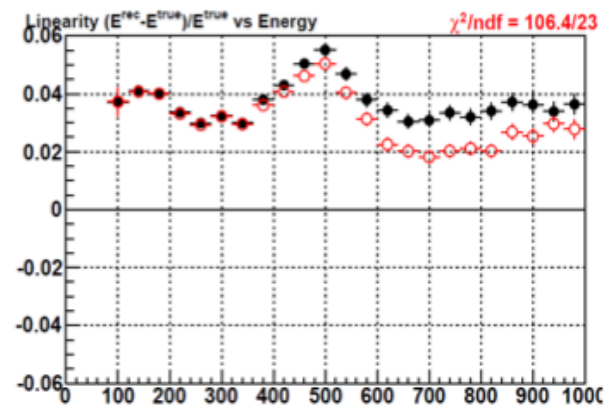
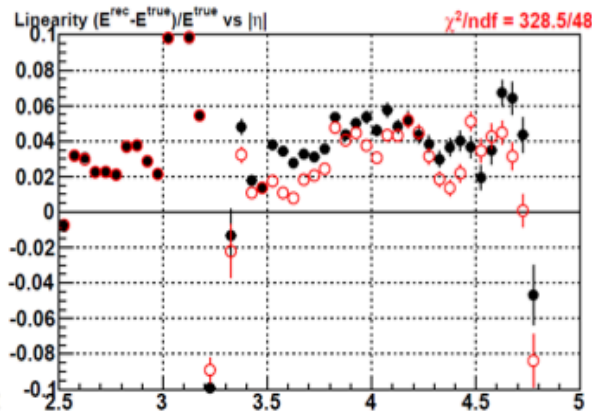
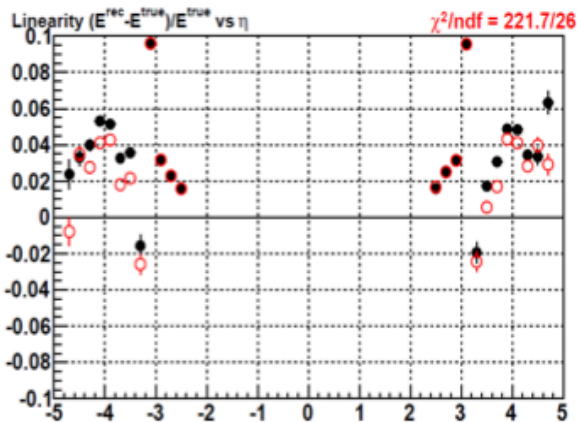


Forward electrons: Uniformity



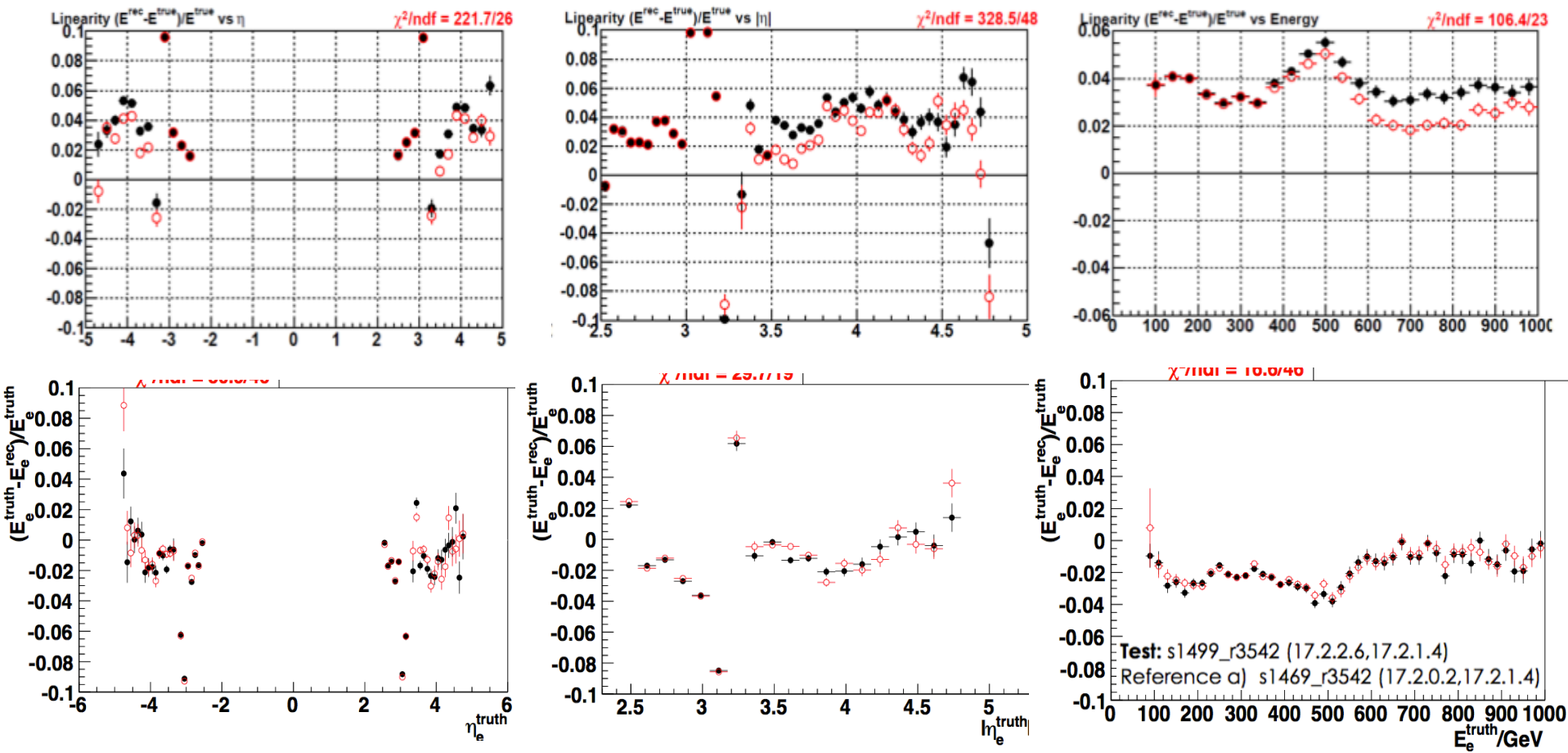
Frozen Showers in 17.7.3.1 (2)

- SM $Z \rightarrow ee$ also see difference in linearity for fwd elecs
 - But here similar to 17.7.1.2 validation (bottom)
 - Note: colors switched wrt egamma; RHS plot definition inverted wrt previous



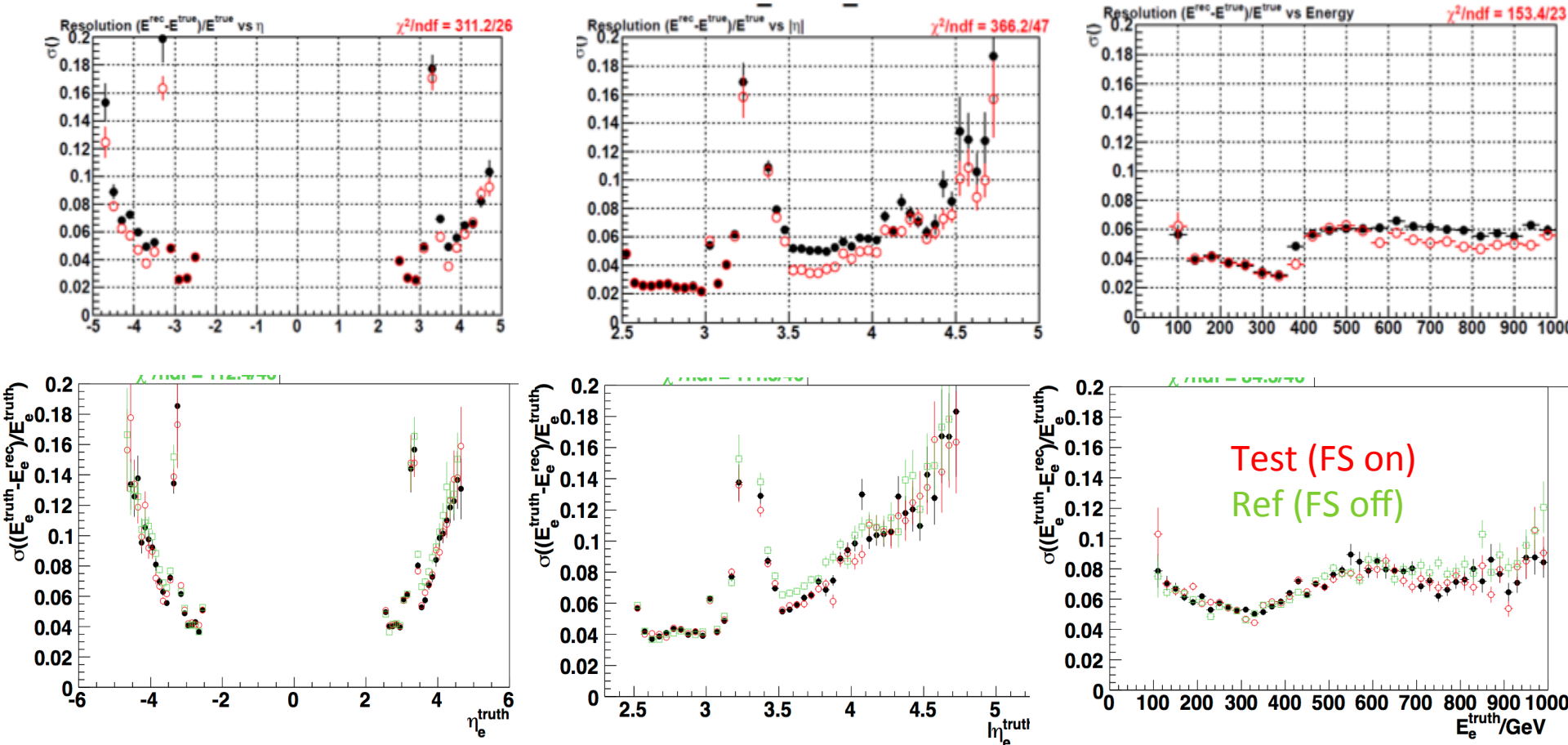
Frozen Showers in 17.7.3.1 (2b)

- Again significantly larger differences in linearity than in MC12



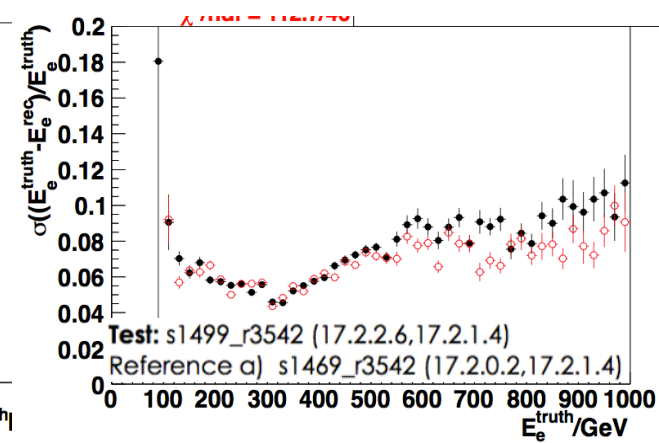
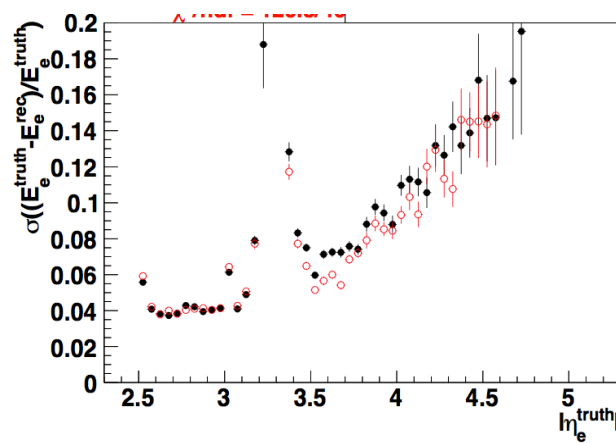
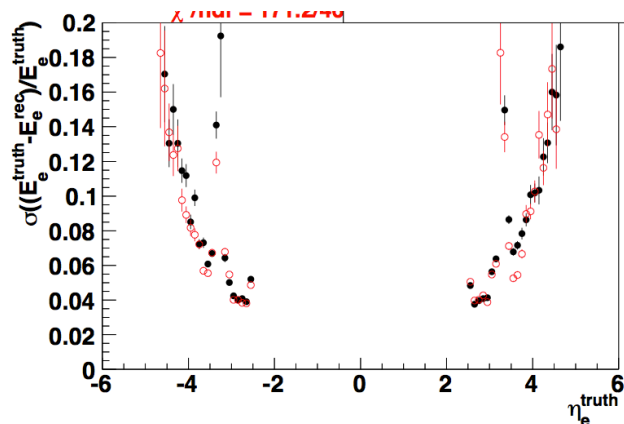
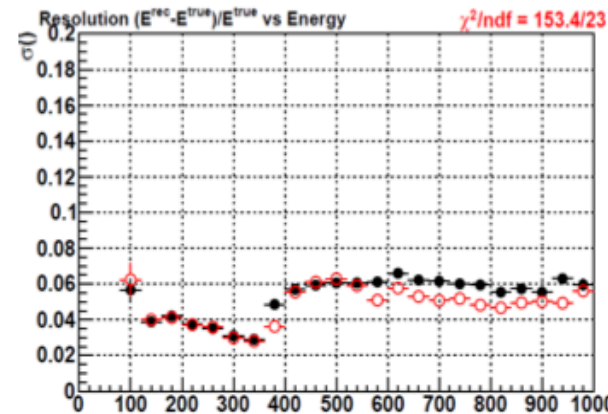
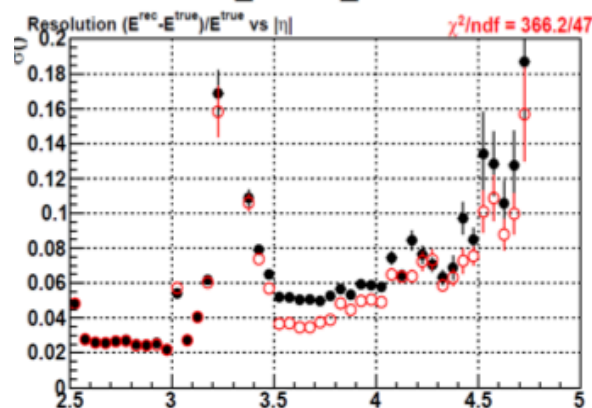
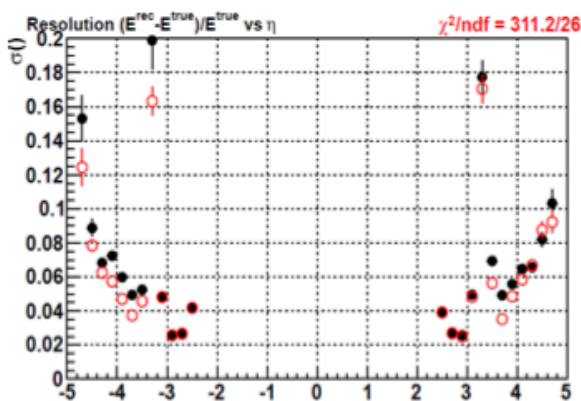
Frozen Showers in 17.7.3.1 (3)

- SM Z $\rightarrow$ ee further see difference in resolution for fwd elects
 - Again similar to previous validation (bottom)



Frozen Showers in 17.7.3.1 (3b)

- Resolution changes similar to those seen in MC12



Frozen Showers in 17.7.3.1 (4)

- Egamma/Z -> ee linearity differences are clearly larger than those seen in MC12
- Photon results marked green but haven't seen plots to check in depth the level of differences
- Given the above would suggest to not use FS for DC14 at this point

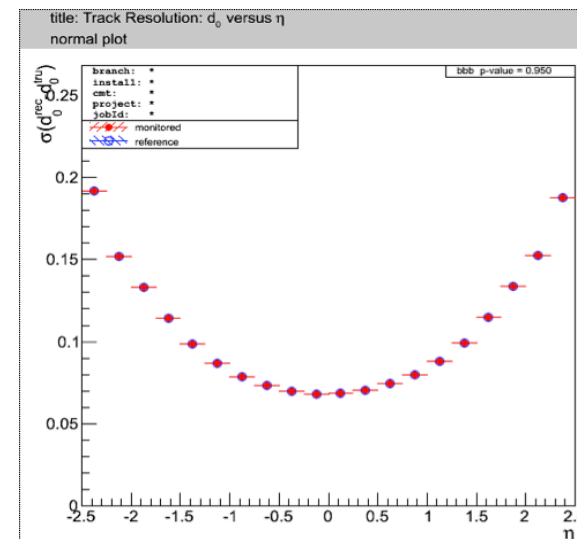
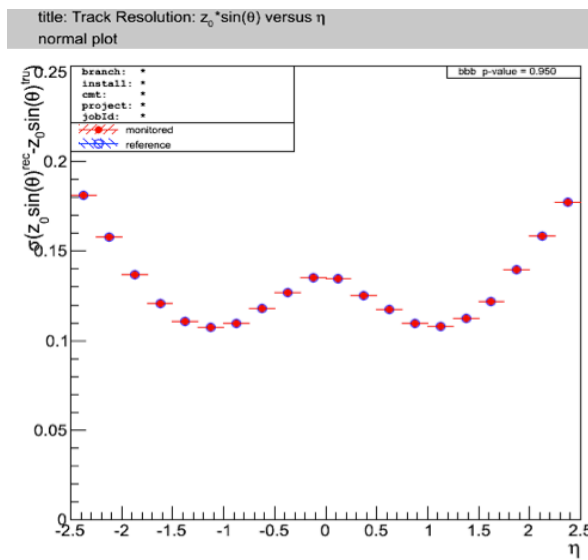
New Geometry Naming



- Include TAG comparison if get in time

IBL/ITK digi+reco

- Several groups struggling to run on task 4 (ITK)
 - Likely due to changes to job options needed for IBL
- For IBL task (5), things look good so far
 - Including vertex-dependent tracking variables
 - Don't yet have a vertex distribution itself
- Unfortunately unable to run b-tagging for these samples
 - Mistakenly included "JetTagNtuple/preInclude_Reco_trf_IBL.py" which was found previously to disable some required containers.





Upcoming validations + Plans for next meeting

Upcoming Validations (1)

- Validation of AFII for DC14 in 17.7.2.1/17.7.3.1.
 - Reminder: no validated AFII with pileup so proposed plan is:
 - AFII vs latest validated AFII in 17.6.0.7 **without** pileup
 - AFII vs validated G4 in 17.7.3.1 **without** pileup to check expected AFII diffs
 - AFII **with** pileup vs G4 with pileup
 - ATLPHYSVAL-37
 - Sample A done for 17.7.1.2
 - Probably want to rerun with 17.7.3.1?
 - Can run these samples over holiday
- Continue run-dependent conditions tag validation for simulation
 - Disentangle effect of beamspot change & other conditions changes by:
 - MC12b simul and digi+reco conditions tag with override of BS to new tag
 - Run-dep simul & digi+reco conditions tag with override of BS to MC12b tag
 - Sample A reco running
 - MC11, MC10 after MC12 validated
 - MC10 with full sample A (changes in MET); others only tracking validation (BS)

Upcoming Validations (2)



- Validation of new TRT digi+reco code in 17.3.12.Y
 - In parallel with run-dep conditions tests as requires new conditions tag
 - ATLPHYSVAL-34
 - **Waiting for cache**
- Check new GEO naming for simul (17.7.3.1) & digi+reco (17.3.12.2)
 - Depends on if get results of TAG-level validation before holidays.
 - ATLPHYSVAL-43
- Check digi+reco in 17.3.12.1
 - Plan to properly validate by comparing to last validated digi+reco
 - Already needed to use for 17.7.3.1 simul validation (new GEO + 64 bit ID)
 - **Sample A done with GEO-20 to compare to validated 17.2.12.1**
 - Do we want to redo?
 - GEO-21?
 - Pileup?
 - New Reco_tf.py (being validated in separate tasks – see next slide)
 - ATLPHYSVAL-45

Upcoming Validations (3)

- Validation of new Reco_tf.py and Digi_tf.py in 17.2.12.1
 - Two tests: digi and reco in two separate steps or one combined step
 - ATLPHYSVAL-56
 - Sample A reco running
- Validate updated IBL GEO + code (2 steps) for run 2 DC14
 - ATLASPHYSVAL-33: simul & digi+reco in 17.3.12.1
 - ATLASPHYSVAL-15: simul in 17.7.3.1 & digi+reco in 17.3.12.Y
 - Still two steps?
 - Waiting for digi+reco cache
- Validation of overlay in 17.2.11.15
 - Will have two references: previous overlay + standard MC12 simul
 - Since overlay samples only use HCP data a pile up reweighting is needed
 - HCP GRL must also be applied to the overlay ones (since comes from data)
 - Sample A done
 - ATLASPHYSVAL-49

Upcoming Validations (4)

- Validation of ITK in 17.7.3.1
 - Needed to allow non-Gaussian beamspot.
 - Slightly longer term
 - ATLPHYSVAL-53

First Meeting Plans



- What are priorities for first post-Christmas meeting?
 - Monday 13th Jan (brought forward to gain some time)
- Possible tasks (samples available or can be run over holiday):
 - AFII simulation
 - New digi and reco transforms
 - 17.3.12.1 digi+reco
 - Run-dependent conditions in MC12b
 - New GEO naming (depending on TAG-validation)
 - Overlay
- Maybe slightly too many for one meeting
 - Might squeeze in if don't need to do GEO-naming
 - Should really get overlay done
 - If we need to postpone something, which one?