

HCAL 25ns reconstruction on MC progress

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GEN-SIM datasets

- Consider two GEN-SIM datasets (no PU) at T1_US_FNAL:

Dataset	Production release
/MinBias_TuneZ2star_13TeV-pythia6/Summer13-START53_V7C-v1/GEN-SIM	CMSSW_5_3_10_patch2
/QCD_Pt-1800_TuneZ2star_13TeV-pythia6/Fall13-POSTLS162_V1-v1/GEN-SIM	CMSSW_6_2_0_patch1

- QCD_Pt-1800 dataset:

- [DAS link](#)

- 93453 ($\sim 100k$) events, 95 files

- HcalNoiseAnalyzer ntuples on FNAL EOS:

/eos/uscms/store/user/eberry/QCD1800MC/

- MinBias dataset:

- [DAS link](#)

- 9999424 ($\sim 10M$) events, 946 files

- HcalNoiseAnalyzer ntuples on FNAL EOS:

/eos/uscms/store/user/eberry/MinBiasMC/

DIGI, trigger and RECO processing

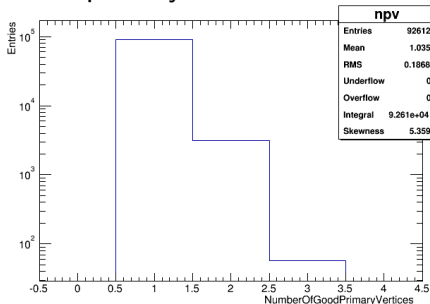
- Need to process these to get DIGI and RECO information
- Steps needed:
 - DIGI, L1, DIGI2RAW, HLT, RAW2DIGI, L1Reco, RECO
- Then run HcalNoiseAnalyzer (updated for 62X)
 - [HcalNoiseAnalyzer git page](#), Maintained by noise group?
 - [Updated .cc file for 62X](#), E. Berry
- Use CMSSW_5_3_9_patch3 to process MinBias dataset:
 - [cmsDriver.py command](#)
 - [Final python cfg](#)
- Use CMSSW_6_2_8 to process QCD_Pt-1800 dataset:
 - [cmsDriver.py command](#)
 - [Final python cfg](#)

Selecton

- Event selection:
 - No trigger requirement
 - No OfficialDecision requirement
 - NumberOfGoodPrimaryVertices > 0
- Channel selection:
 - Only HBHE considered
 - Rings: HB, HE: {17:20, 21:23, 24:25, 26:27, 28:28}
 - No channels in bad channels list
 - RecHit energy > 1 GeV
 - Charge > 5 fC
- Analyzer code:
 - [Git page](#)

$$N(\text{vertex})$$

Number of primary vertices: QCD sample



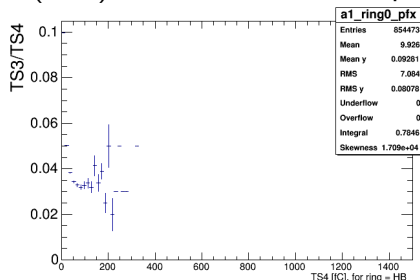
- 92612 events passing event selection
- Confirms no pileup, as expected

Definitions

- The following plots show TProfile distributions
- One entry per HCAL digi in the ZS-collection
- x-axis corresponds to charge in TS4 [fC]
- y-axis corresponds to one of several charge ratios:
 - a1: charge in TS3 [fC] / charge in TS4 [fC]
 - a2: charge in TS2 [fC] / charge in TS4 [fC]
 - a3: charge in TS1 [fC] / charge in TS4 [fC]

a1(TS4): HB in the MinBias sample

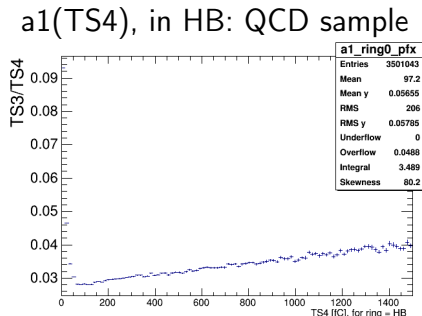
a1(TS4), in HB: MinBias sample



- Clearly not enough statistics in tail
- Can't use MinBias dataset to measure pulse shape
- MinBias dataset still useful for DIY pileup

a1(TS4) in the QCD sample

a1(TS4): HB in the QCD sample

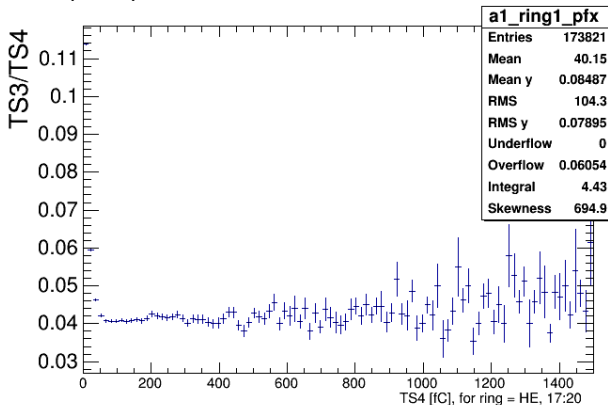


- Fewer events, but tail population much better
- Can emulate IT pileup by adding MinBias dataset
- Next slides show more results from QCD dataset

a1(TS4) in the QCD sample

a1(TS4): HE, ring 17:20

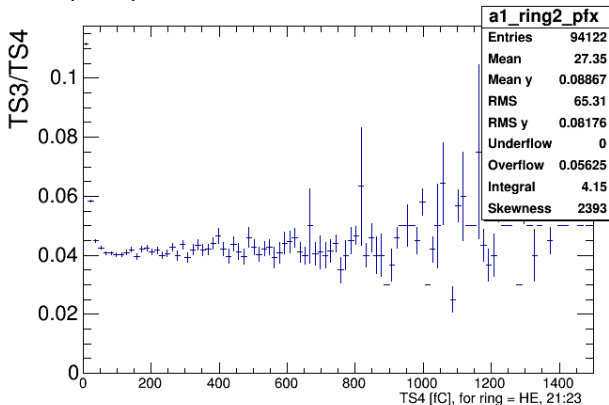
a1(TS4), in HE ring 17:20: QCD sample



a1(TS4) in the QCD sample

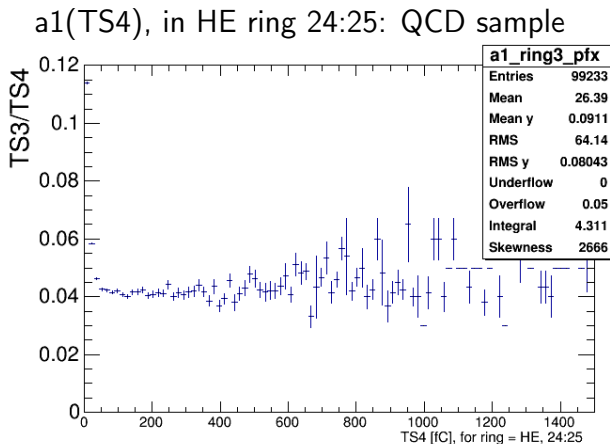
a1(TS4): HE, ring 21:23

a1(TS4), in HE ring 21:23: QCD sample



a1(TS4) in the QCD sample

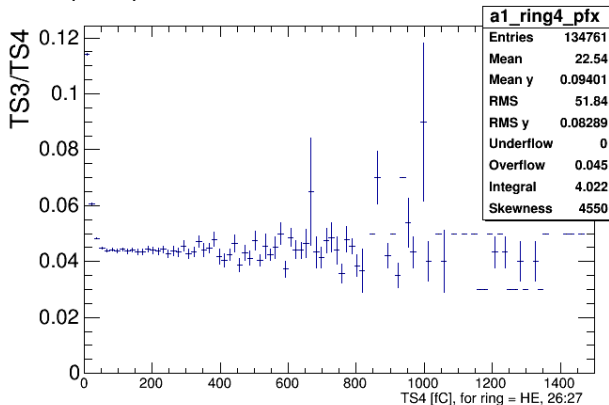
a1(TS4): HE, ring 24:25



a1(TS4) in the QCD sample

a1(TS4): HE, ring 26:27

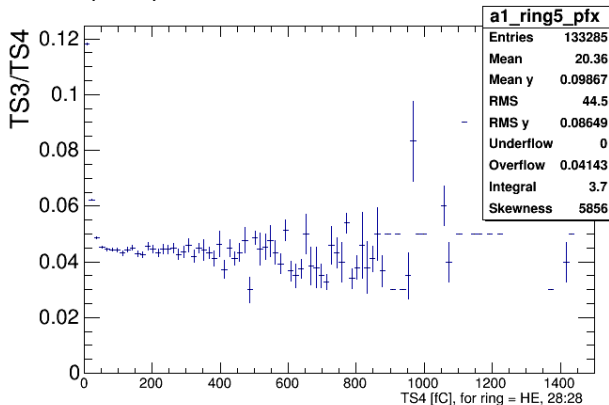
a1(TS4), in HE ring 26:27: QCD sample



a1(TS4) in the QCD sample

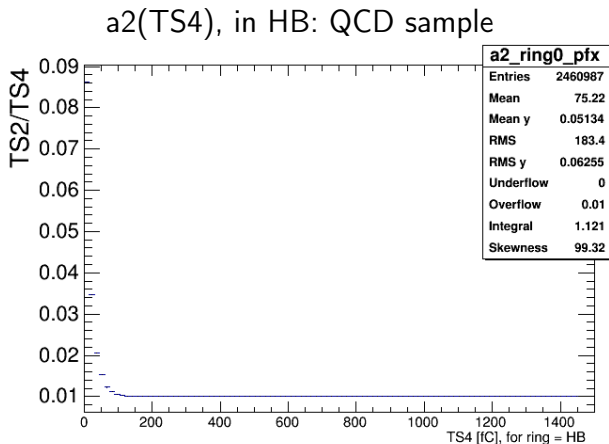
a1(TS4): HE, ring 28

a1(TS4), in HE ring 28: QCD sample



a2(TS4) in the QCD sample

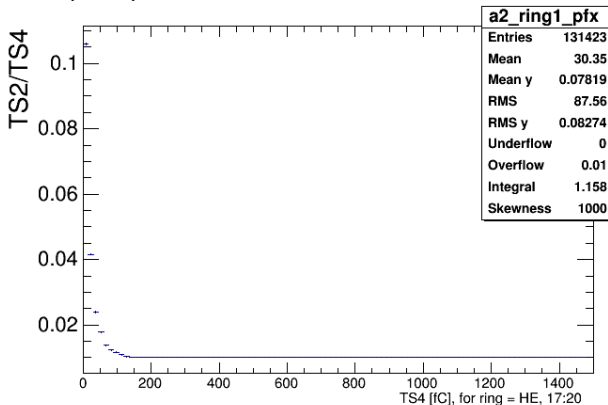
a2(TS4): HB



a2(TS4) in the QCD sample

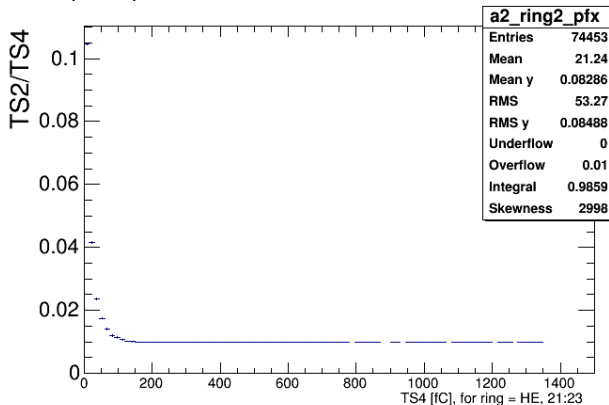
a2(TS4): HE, ring 17:20

a2(TS4), in HE ring 17:20: QCD sample



a2(TS4): HE, ring 21:23

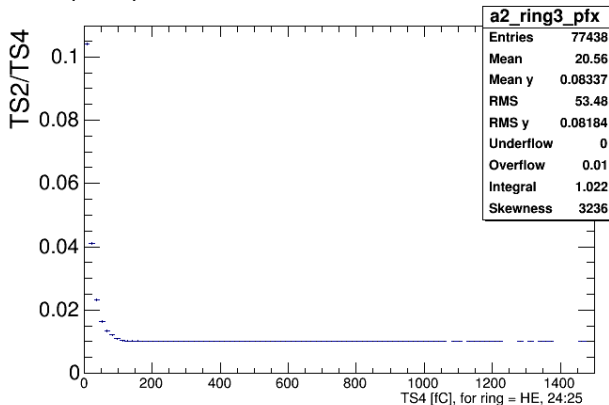
a2(TS4), in HE ring 21:23: QCD sample



a2(TS4) in the QCD sample

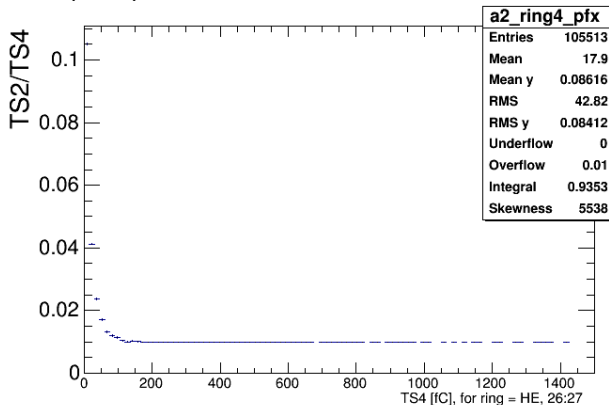
a2(TS4): HE, ring 24:25

a2(TS4), in HE ring 24:25: QCD sample



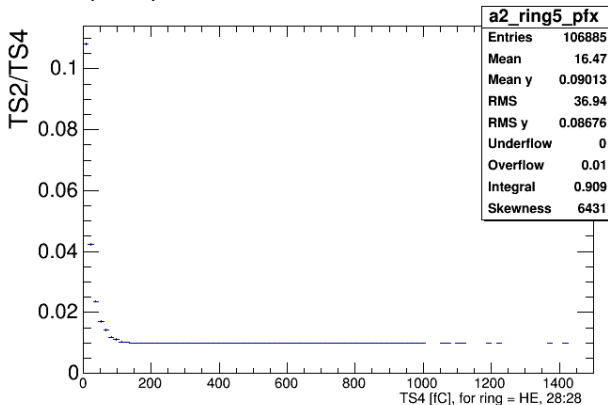
a2(TS4): HE, ring 26:27

a2(TS4), in HE ring 26:27: QCD sample



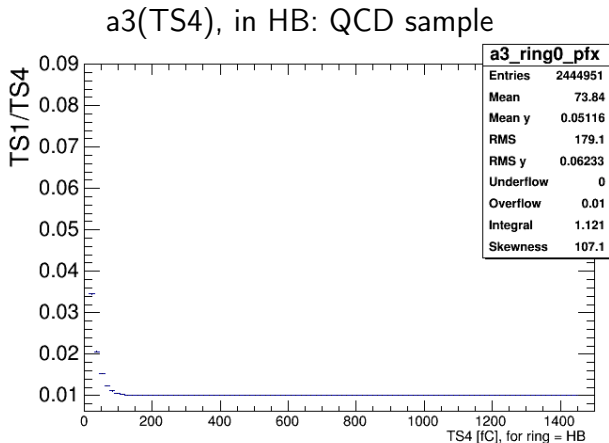
a2(TS4): HE, ring 28

a2(TS4), in HE ring 28: QCD sample



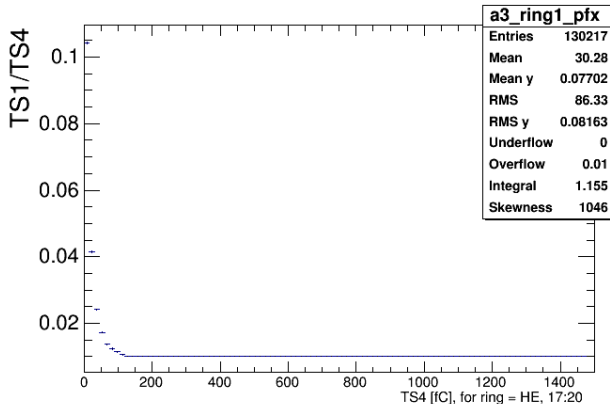
a3(TS4) in the QCD sample

a3(TS4): HB



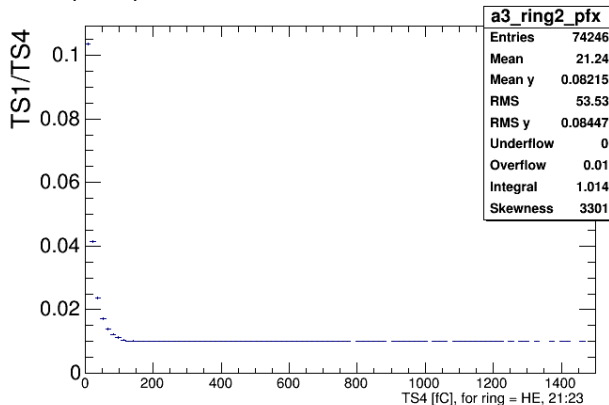
a3(TS4): HE, ring 17:20

a3(TS4), in HE ring 17:20: QCD sample



a3(TS4): HE, ring 21:23

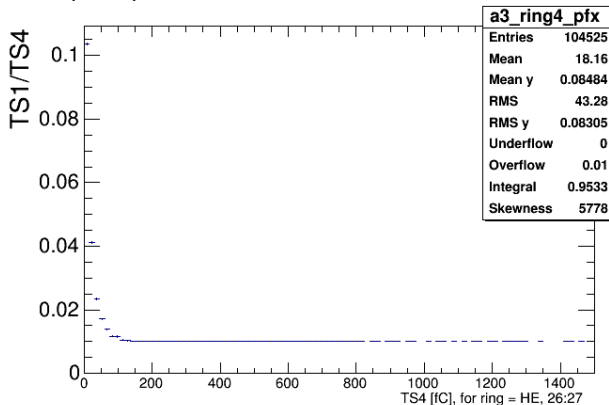
a3(TS4), in HE ring 21:23: QCD sample



a3_ring3_pfx	
Entries	76673
Mean	20.6
Mean y	0.08338
RMS	52.25
RMS y	0.08156
Underflow	0
Overflow	0.01
Integral	1.003
Skewness	3521

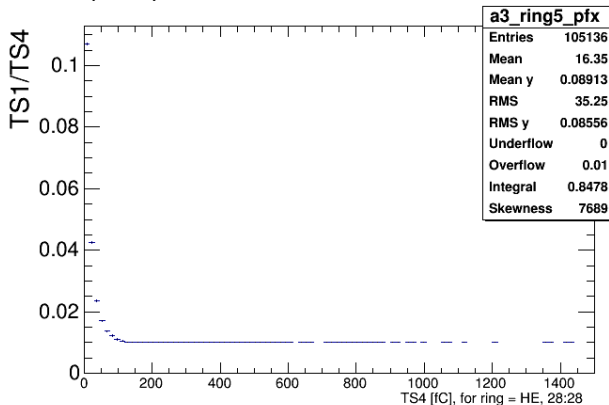
a3(TS4): HE, ring 26:27

a3(TS4), in HE ring 26:27: QCD sample



a3(TS4): HE, ring 28

a3(TS4), in HE ring 28: QCD sample



Summary

- Completed analysis framework
- Processed zero-pileup samples adequate for studies
- Have preliminary results for those samples
- Working on applying/validating results to put into CMSSW

To-do list

- Fit a_1 , a_2 , a_3 functions
 - Recommended fit functions, Sasha?
- Apply & validate