



Cleaning of MET

(Tag and Probe Method on W' events)

Asmaa Hassan, Ahmed Ali Abdelalim, Nicola De Filippis

(Helwan University)

FP7-EENP2 Meeting

WP1

30/7/2014

OUTLINE

- **MET Cleaning**
- **Fake MET Sources**
- **Analysis Recommendation**
- **MET with/without Filters (DATA)**
- **MET with/without Filters (MC)**
- **Conclusion**

MET Cleaning

- There are various instrumental and reconstruction effects cause fake MET, so some anomalous signals can be removed by cleaning an event and in some cases, we need to reject affected events

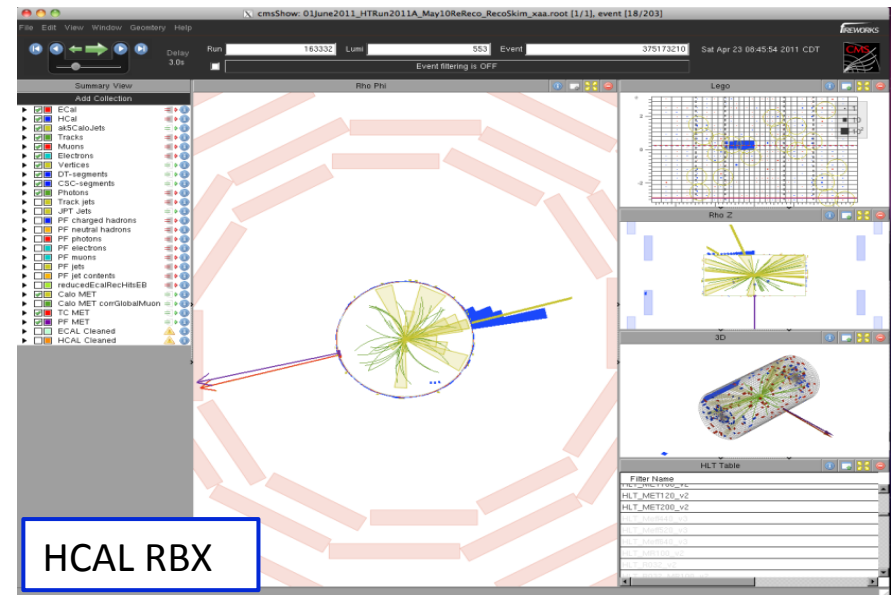
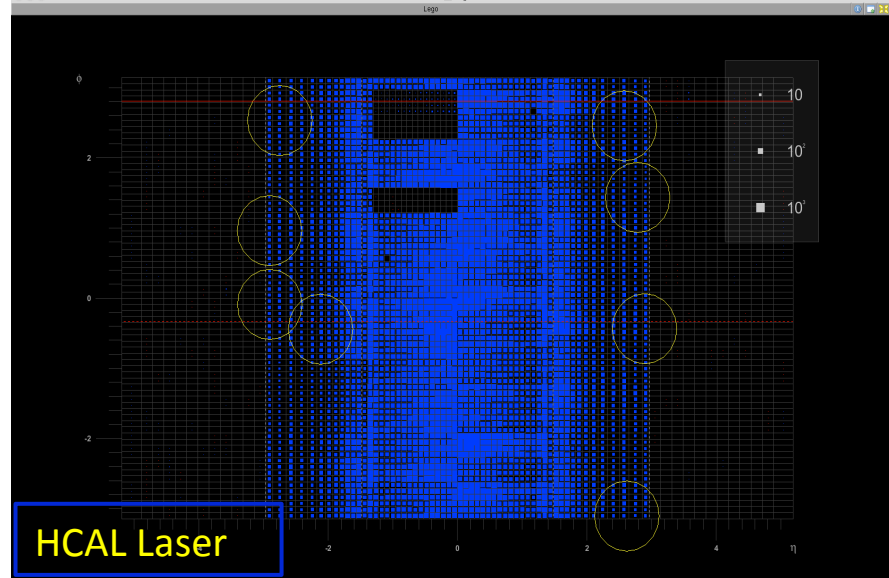
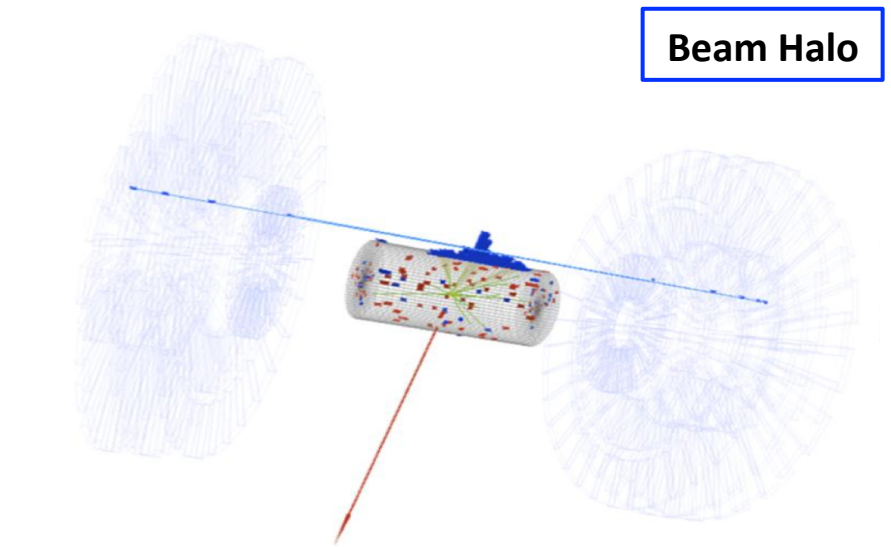
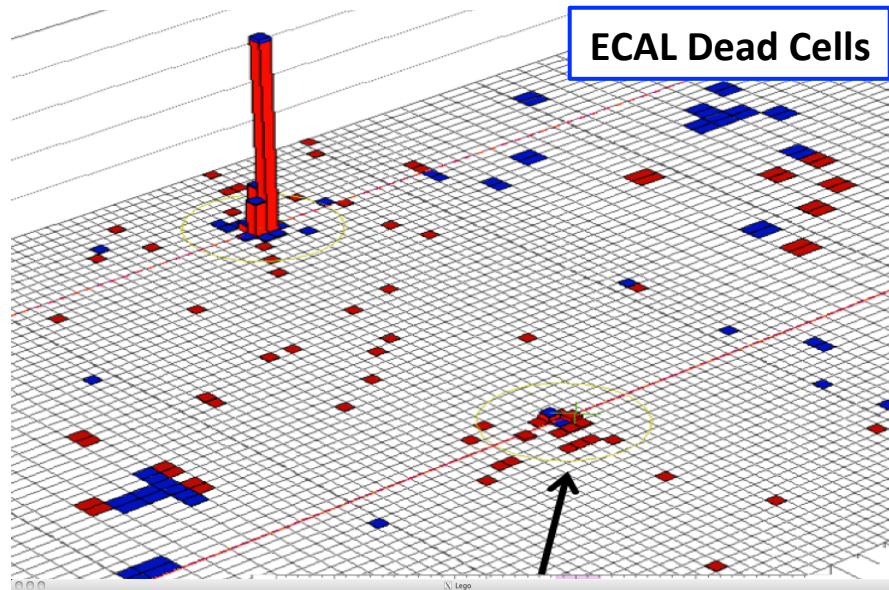
MET Optional Filters

- **CSC beam halo filter:** filter beam halos using CSC info.
- **HBHE noise filter:** HBHE HPD & RBX noise rejection.
- **ECAL dead cell filters (trigger primitive & boundary energy filter):** remove events losing large energy in the dead cell region.
- **HCAL laser filter:** remove events with laser firing at wrong times.
- **Tracking failure filter:** remove events with too few tracks.
- **Bad EE Supercrystal filter:** to remove events with crystal regions which give anomalously high energies.
- **EB or EE Xtals with large laser calibration correction:** to reject events with energetic crystals that have unphysically large laser correction values (>3.0 in EB and >8.0 in EE).

MET Cleaning

- **Tracking odd events filters (tracking POG filters):** to remove events with (partly) aborted track reconstruction and affected by the Strip Tracker coherent noise.
- **Muon inconsistency filter:** remove events in which the pf muon Pt and reco muon Pt are discrepant by $>10\%$.
- **Greedy muon filter:** remove events with pf muon wrongly absorbing calo E $>$ muon P.
- **EE ring-of-fire filter:** remove events with anomalous high hits in EE.

Fake MET Sources



Analysis Recommendation

- **The MET group recommends to use:**
(for any analysis with MET)
 - CSC tight beam halo filter
 - HBHE noise filter with isolated noise rejection
 - HCAL laser filter
 - ECAL dead cell trigger primitive (TP) filter
 - Tracking failure filter
 - Bad EE Supercrystal filter
 - EB or EE Xtals with large laser calibration correction
 - Tracking odd events filters (tracking POG filters)
- **They suggest to use (or at least check for further studies):**
(for searches sensitive to high MET tails)
 - ECAL dead boundary energy (BE) filter (works on AOD)
 - Muon inconsistency filter
 - Greedy muon filter
 - EE ring-of-fire filter

Analysis Recommendation

- For filtering the MET, I include the following in my configuration file and so on for all MET optional filters

For example:

(CSC Beam Halo Filter)

```
process.load('RecoMET.METAnalyzers.CSCHaloFilter_cfi')
process.p = cms.Path(
    process.CSCTightHaloFilter*
    process.yourModules
)
```

(HBHE Noise Filter)

```
process.load('CommonTools/RecoAlgos/HBHENoiseFilter_cfi')
process.p = cms.Path(
    process.HBHENoiseFilter*
    process.yourModules
)
```

MET with/without Filters (DATA)

➤ Without Filter:

▪ Input File:

04349EF0-2C91-E211-BAD2-003048FFD720_MET_DATA.root

▪ Dataset: ([/MET/Run2012C-22Jan2013-v1/AOD](#))

▪ The number of entries → (11353)

➤ With Filters:

▪ CSC tight beam halo filter → (10166)

▪ HBHE noise filter with isolated noise rejection → (7328)

▪ HCAL laser filter → (7328)

▪ ECAL dead cell trigger primitive (TP) filter: **(Error !!)**

▪ Tracking failure filter → (7285)

▪ Bad EE Supercrystal filter: **(Error !!)**

▪ EB or EE Xtals with large laser calibration correction → (2739)

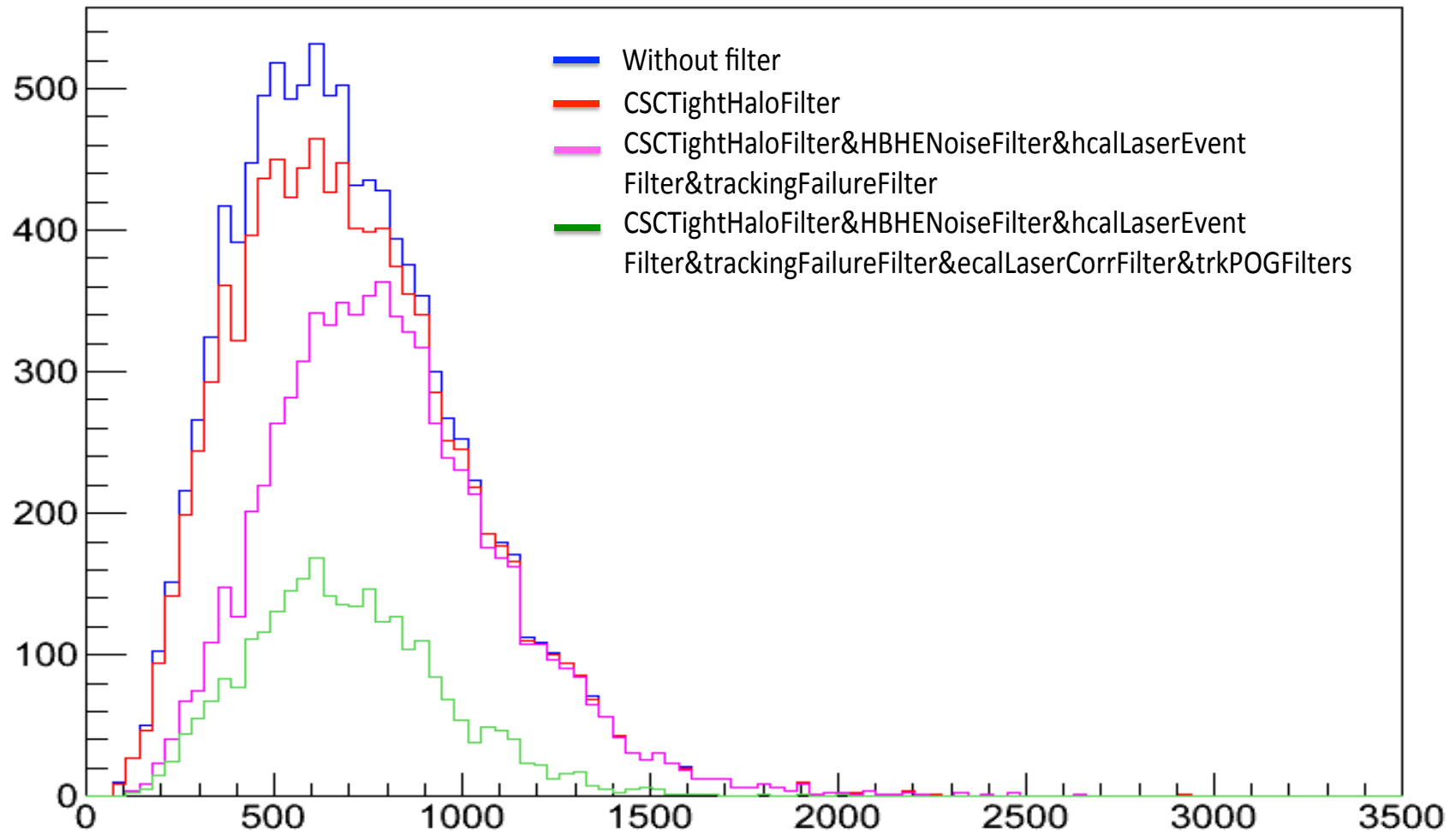
▪ Tracking odd events filters (tracking POG filters) → (2739)

MET with/without Filters (DATA)

```
TrigReport ----- Modules in Path: p -----
TrigReport Trig Bit# Visited Passed Failed Error Name
TrigReport 1 0 11353 10166 1187 0 CSCTightHaloFilter
TrigReport 1 0 10166 7328 2838 0 HBHNoiseFilter
TrigReport 1 0 7328 7328 0 0 hcalLaserEventFilter
TrigReport 1 0 7328 7328 0 0 goodVertices
TrigReport 1 0 7328 7285 43 0 trackingFailureFilter
TrigReport 1 0 7285 2739 4546 0 ecalLaserCorrFilter
TrigReport 1 0 2739 2739 0 0 manystripclus53X
TrigReport 1 0 2739 2739 0 0 toomanystripclus53X
TrigReport 1 0 2739 2739 0 0 logErrorTooManyClusters
TrigReport 1 0 2739 2739 0 0 cfpzc
```

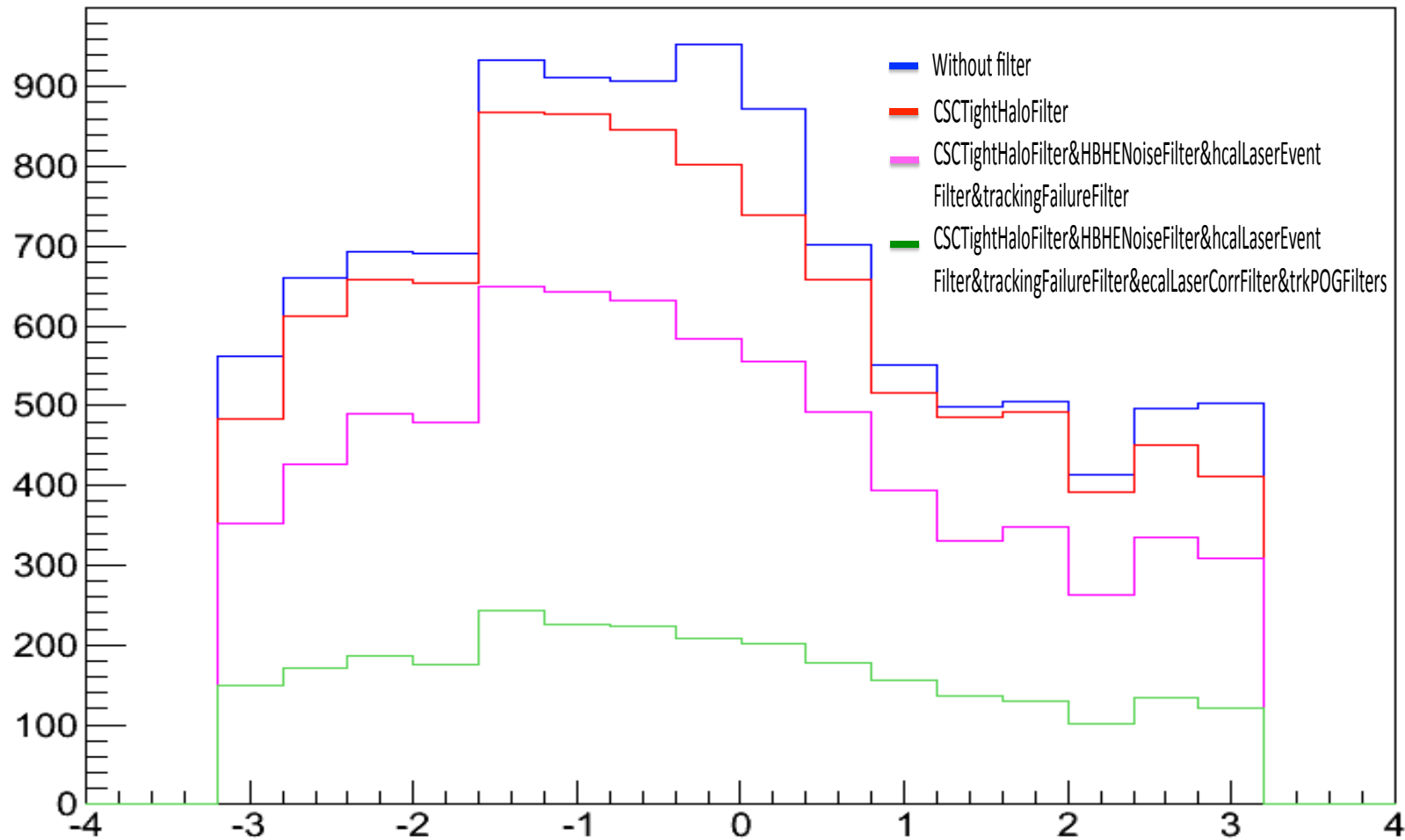
MET with/without Filters (DATA)

Histogram of pfmet_sumEt



MET with/without Filters (DATA)

Histogram of pmet_phi



MET with/without Filters (MC)

➤ Without Filter:

▪ **Input File:**

888B8598-45A0-E111-B66B-002618943838_MET_MC.root

▪ **Dataset:** ([/WprimeToMuNu_M-1300_TuneZ2star_8TeV-pythia6/Summer12_PU_S7_START52_V9-v1/AODSIM](#))

- The number of entries → (5856)

➤ With Filters:

- CSC tight beam halo filter → (5853)

- HBHE noise filter with isolated noise rejection → (5851)

- HCAL laser filter → (5851)

- ECAL dead cell trigger primitive (TP) filter: !!

- Tracking failure filter → (5851)

- Bad EE Supercrystal filter: !!

- EB or EE Xtals with large laser calibration correction → (5851)

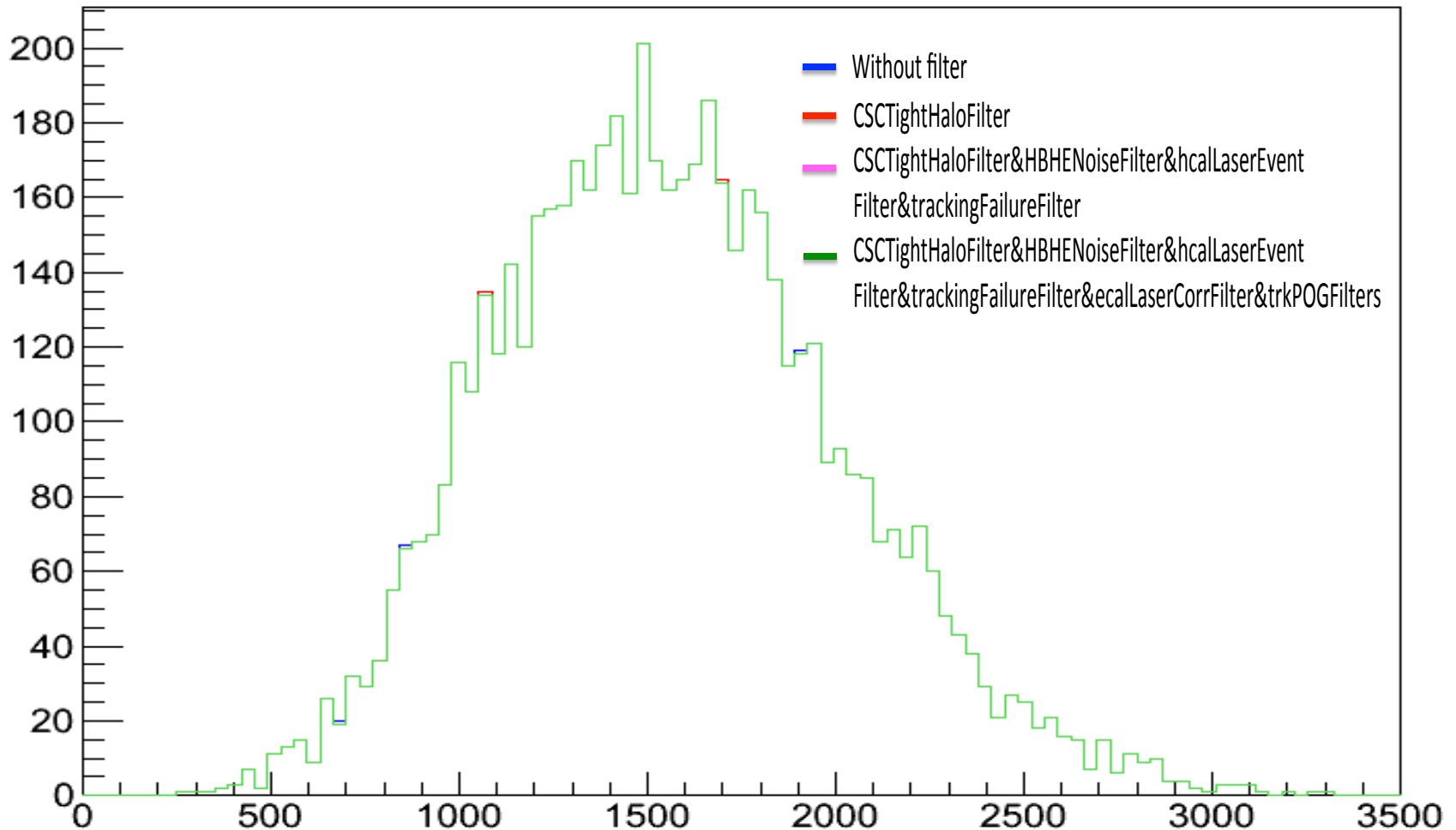
- Tracking odd events filters (tracking POG filters) → **(Found zero products matching all criteria).**

MET with/without Filters (MC)

```
TrigReport ----- Modules in Path: p -----  
TrigReport Trig Bit# Visited Passed Failed Error Name  
TrigReport 1 0 5856 5853 3 0 CSCTightHaloFilter  
TrigReport 1 0 5853 5851 2 0 HBHNoiseFilter  
TrigReport 1 0 5851 5851 0 0 hcalLaserEventFilter  
TrigReport 1 0 5851 5851 0 0 goodVertices  
TrigReport 1 0 5851 5851 0 0 trackingFailureFilter  
TrigReport 1 0 5851 5851 0 0 ecalLaserCorrFilter  
TrigReport 1 0 5851 0 0 5851 manystripclus53X  
TrigReport 1 0 0 0 0 0 toomanystripclus53X  
TrigReport 1 0 0 0 0 0 logErrorTooManyClusters  
TrigReport 1 0 0 0 0 0 cfpzc
```

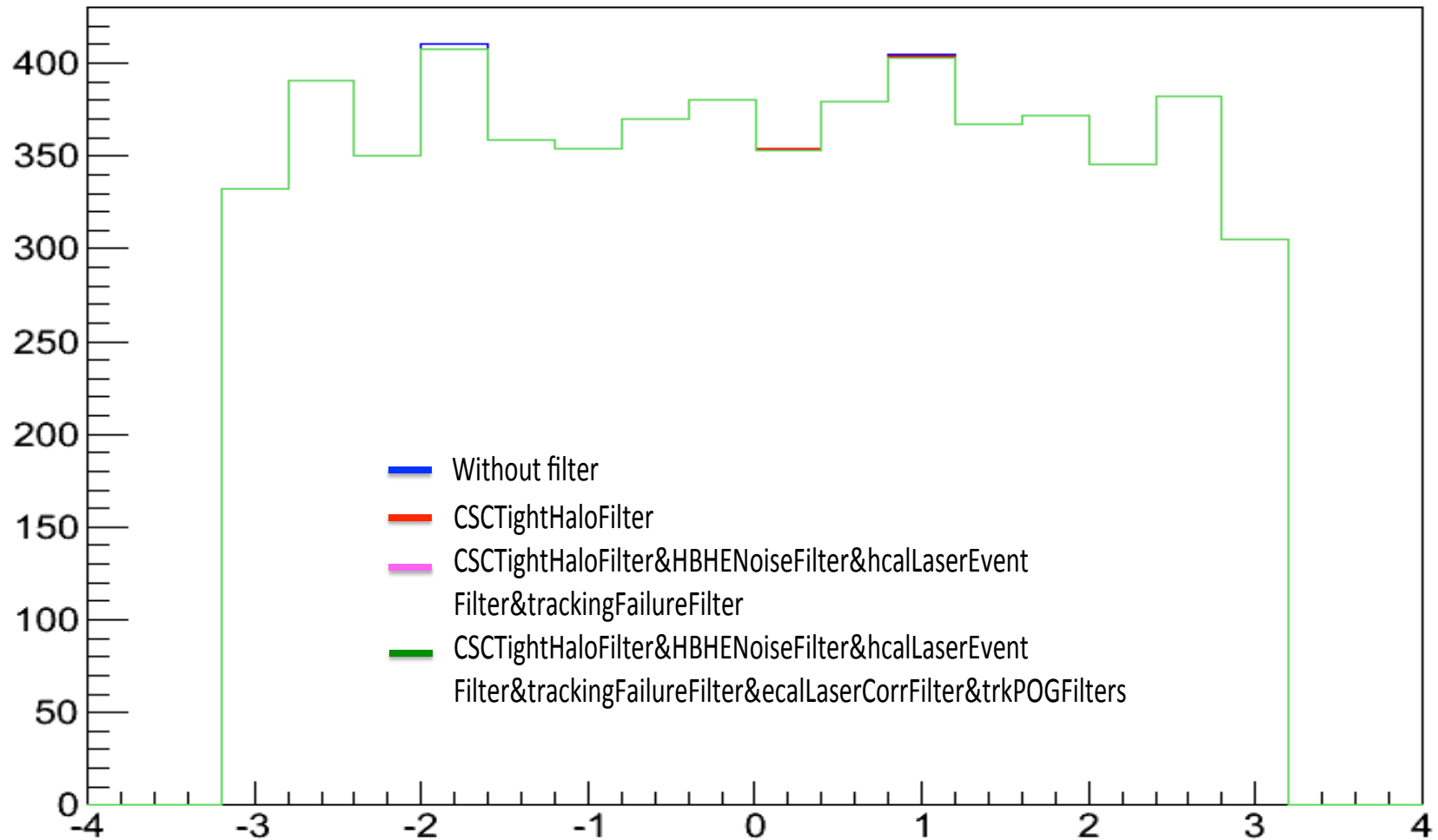
MET with/without Filters (MC)

Histogram of pfmet_sumEt



MET with/without Filters (MC)

Histogram of pfmet_phi



Conclusion

➤ I applied a variety of the MET cleaning filters

- The CSC beam halo filter, HBHE noise filter, HCAL laser filter, ECAL dead cell TP filter, Tracking failure filter, Bad EE Supercrystal filter, EB or EE Xtals with large laser calibration correction and Tracking POG filters are recommended for any analysis for MET.
- There are other optional filters suggested for analysis sensitive to high MET tails.

➤ Next Step:

- I will complete the correction of MET (tag).
- Put cuts on Muons (probes).
- Calculate the trigger efficiency of muons.

THANK YOU

