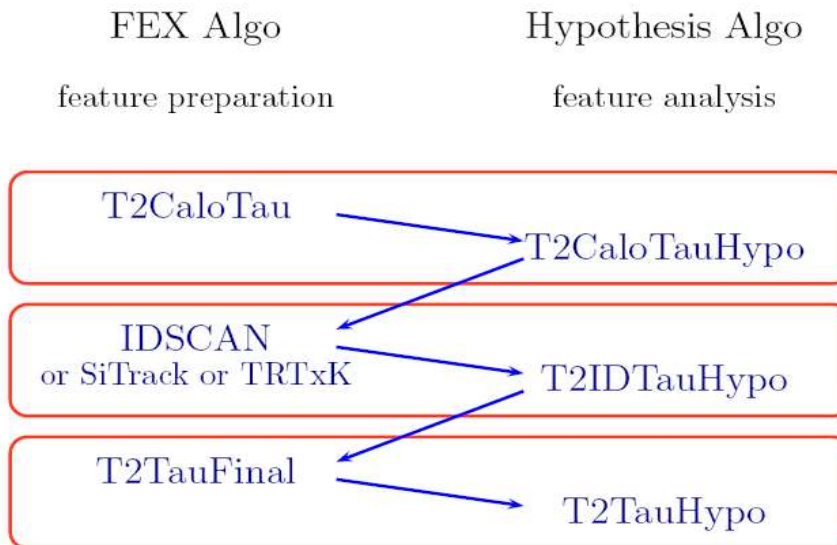


# Tau Trigger Efficiency and Timing Studies

- **Tau Trigger Efficiency**
- **Trigger Timing Studies with Online Monitoring Tools**
  - **Exercise the Framework**
  - **Check Performance of Caching in Reconstruction**
  - **Initial Measure of Timing Performance**

# Tau Trigger

- Tau trigger menu:
  - tau10, tau10i, tau15, tau15i, tau20i, tau25i, tau35i
- Trigger Philosophy:
  - early rejection (fex followed by hypo)

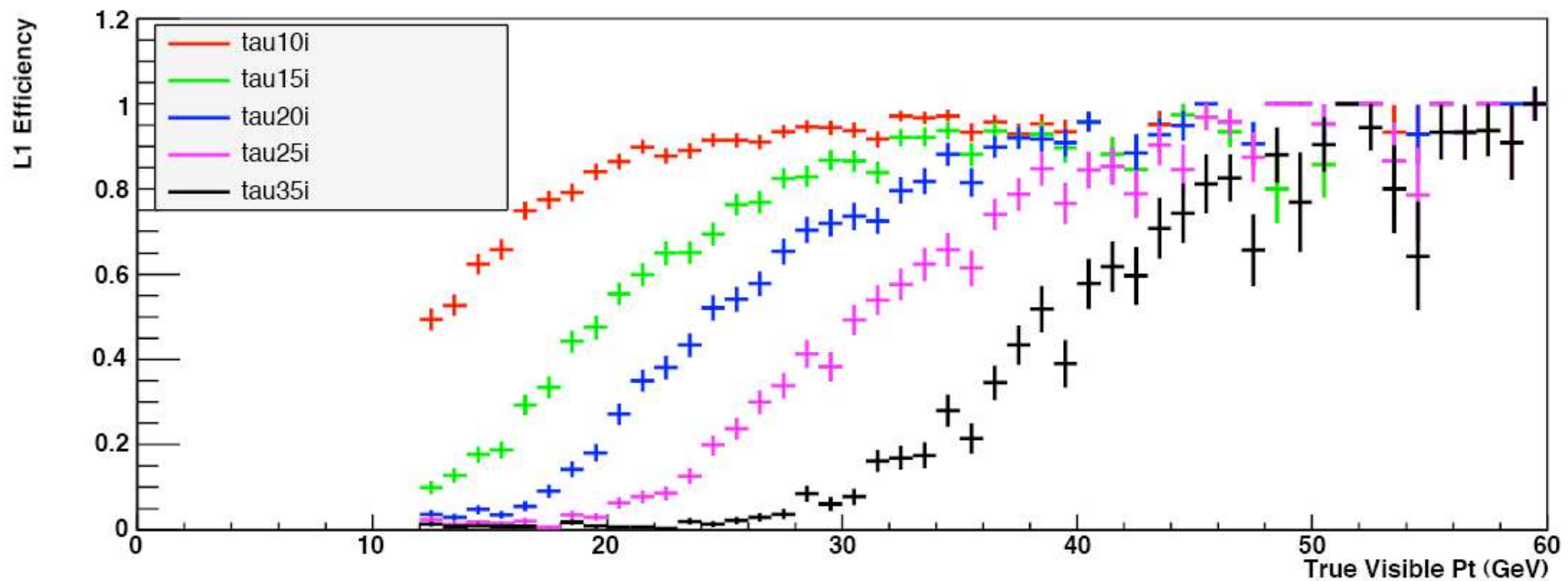


tau10: input from L1: "HA08"

"T2CaloTau"  
"T2CaloTauHypo"  
"TrigIdScan"  
"T2IDTauHypo"  
"T2TauFinal"  
"T2TauHypo"

"TrigCaloCellMaker"  
"TrigCaloTowerMaker"  
"TrigCaloClusterMaker"  
"InDet::SCT\_TrgClusterization"  
"InDet::Pixel\_TrgClusterization"  
"InDet::TRT\_TrgRIO\_Maker"  
"InDet::SiTrigSpacePointFinder"  
"InDet::SiTrigSPSeededTrackFinder"  
"InDet::InDetTrigAmbiguitySolver"  
"InDet::TRT\_TrigTrackExtensionAlg"  
"InDet::InDetTrigExtensProcessor"  
"InDet::TrigVxPrimary"  
"InDet::TrigParticleCreator"  
"TrigTauRec"  
"EFTauHypo"

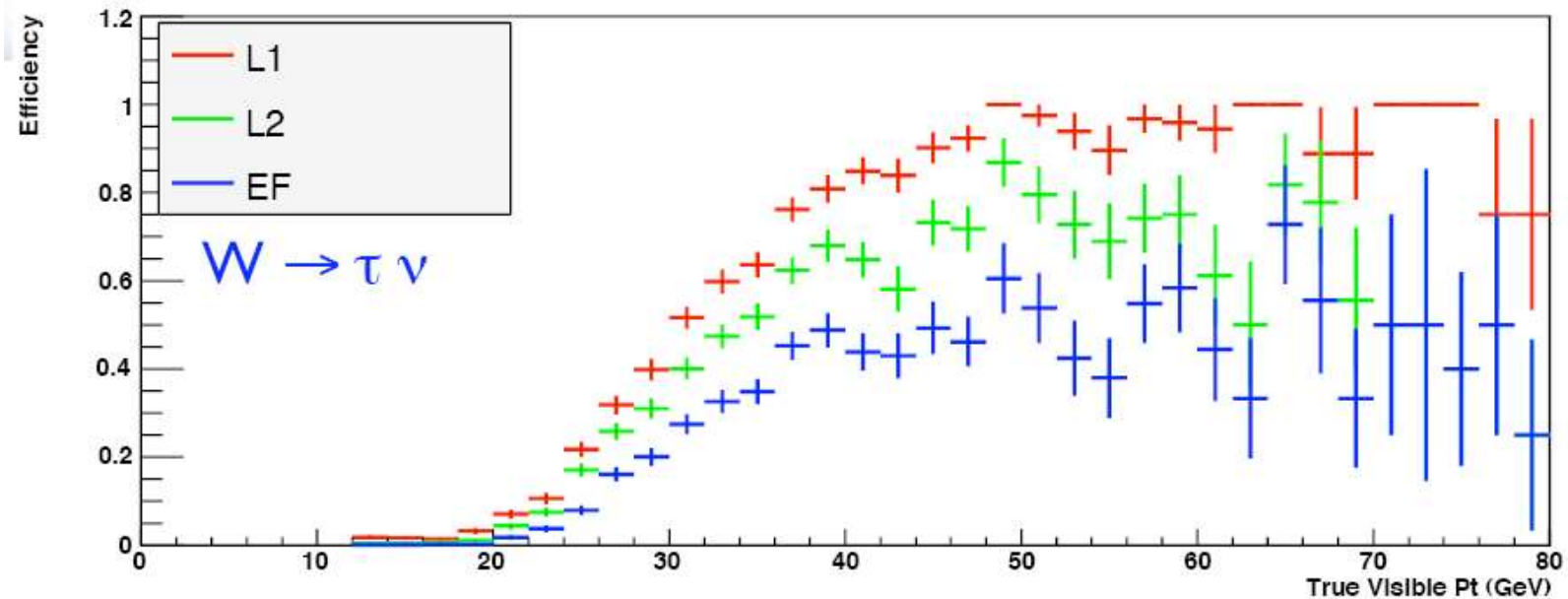
# Tau Trigger L1 Turn-On



(Following three slides from Eric's talk at the Tau Workshop in Krakow)

<http://indico.cern.ch/conferenceDisplay.py?confId=11918>

# Trigger Efficiency



tau25i trigger

(Will likely need to combine with Missing ET)

# Background Rejection

	L1 Rate	L2 Rate	EF Rate	L1 Rej.	L2 Rej.	EF Rej.
J0	884	306	55	193	2.9	5.6
J1	961	379	79	14.3	2.5	4.8
J2	339	103	25	2.7	3.3	4.1
J3	28	7.4	2.3	2.1	3.7	3.2
Sum	2213 Hz	796 Hz	161 Hz	84	2.8	4.9

Table 1: tau15i background rates,  $\mathcal{L} = 10^{31} \text{cm}^{-2} \text{s}^{-1}$

- Min bias not yet included (doubles rates)
- HLT too high by a factor of 5-10

# Trigger Timing Studies

- Available Time
  - L2: 20 ms latency, ~2.5 ms goal per alg
  - EF: 2 s latency, ~0.25 s goal per alg
  - <https://twiki.cern.ch/twiki/bin/view/Atlas/TriggerPerformanceTargets>
- Online Timing Tools
  - TrigTimerSvc: measures total alg time, prints results, saves histograms
  - <https://twiki.cern.ch/twiki/bin/view/Atlas/TrigTimerSvc>

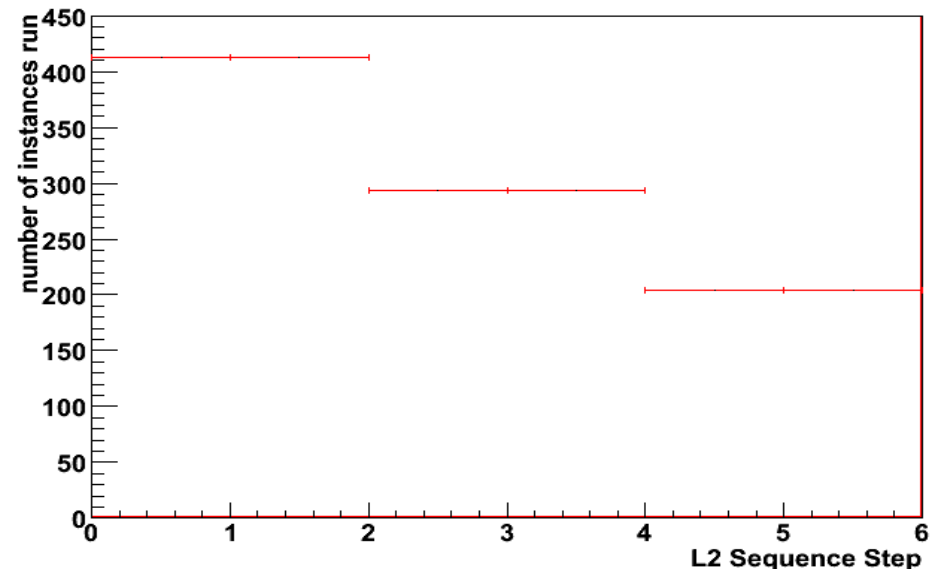
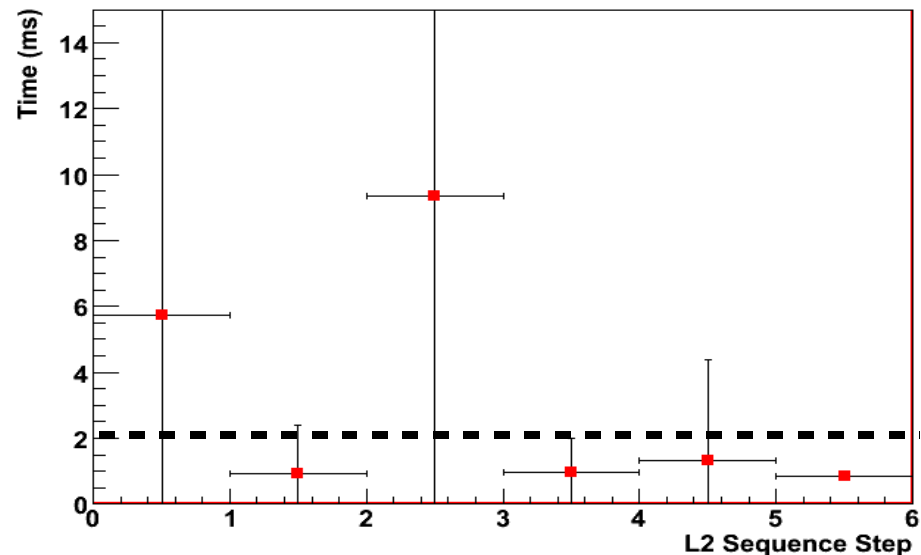
# Trigger Timing Studies

- **CPU Info:**
  - A computer at SLAC that is unused during CERN's day time
  - QUAD Core, Intel(R) Xeon(TM) CPU 2.40GHz
- **Caveats:**
  - Timing Optimization has not been a primary focus, so numbers can be seen as a starting point
  - Need to interpret results in the context of events used

# First Results: L2, tau10 Sequence

350  $W \rightarrow \tau_{(\text{had})} \nu$  events

- top plot: mean time per step
- bottom plot: number of times run (in tau10 sequence)
- all CSC05 slices run
- steps running in all sequences
- Ave Total Time: 19.4 ms



## L2 tau10 Sequence

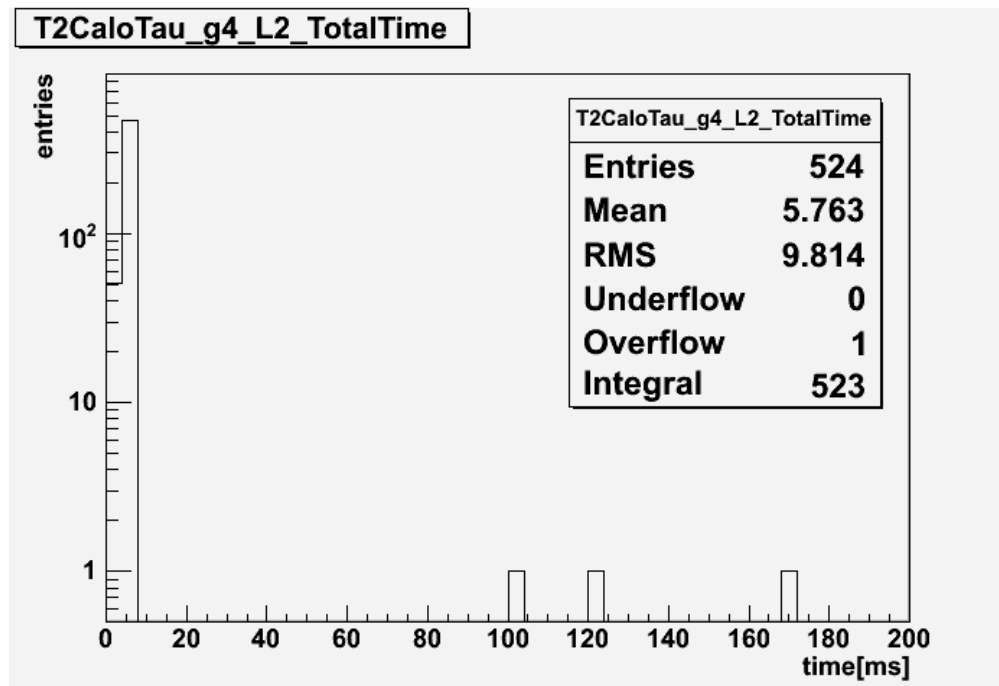
- 1) T2CaloTau\_g4 (524)
- 2) T2CaloTauHypo\_tau10
- 3) TrigIDScanMain\_Tau (524)
- 4) T2IDTauHypo\_tau10
- 5) T2Final\_g4 (516)
- 6) T2TauHypo\_tau10



# Investigate Details: Steps 1 and 3

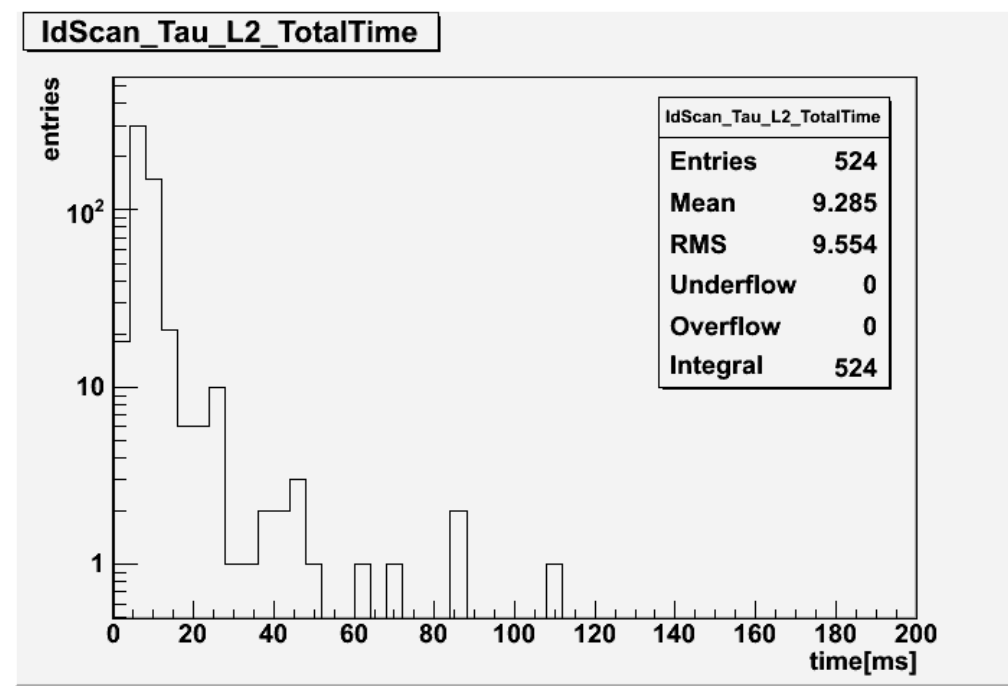
Step 1: T2CaloTau\_g4

mean: **5.7 ms** rms: **10.1 ms**



Step 3: TrigIdScan\_Tau

mean: **9.3 ms** rms: **9.5 ms**

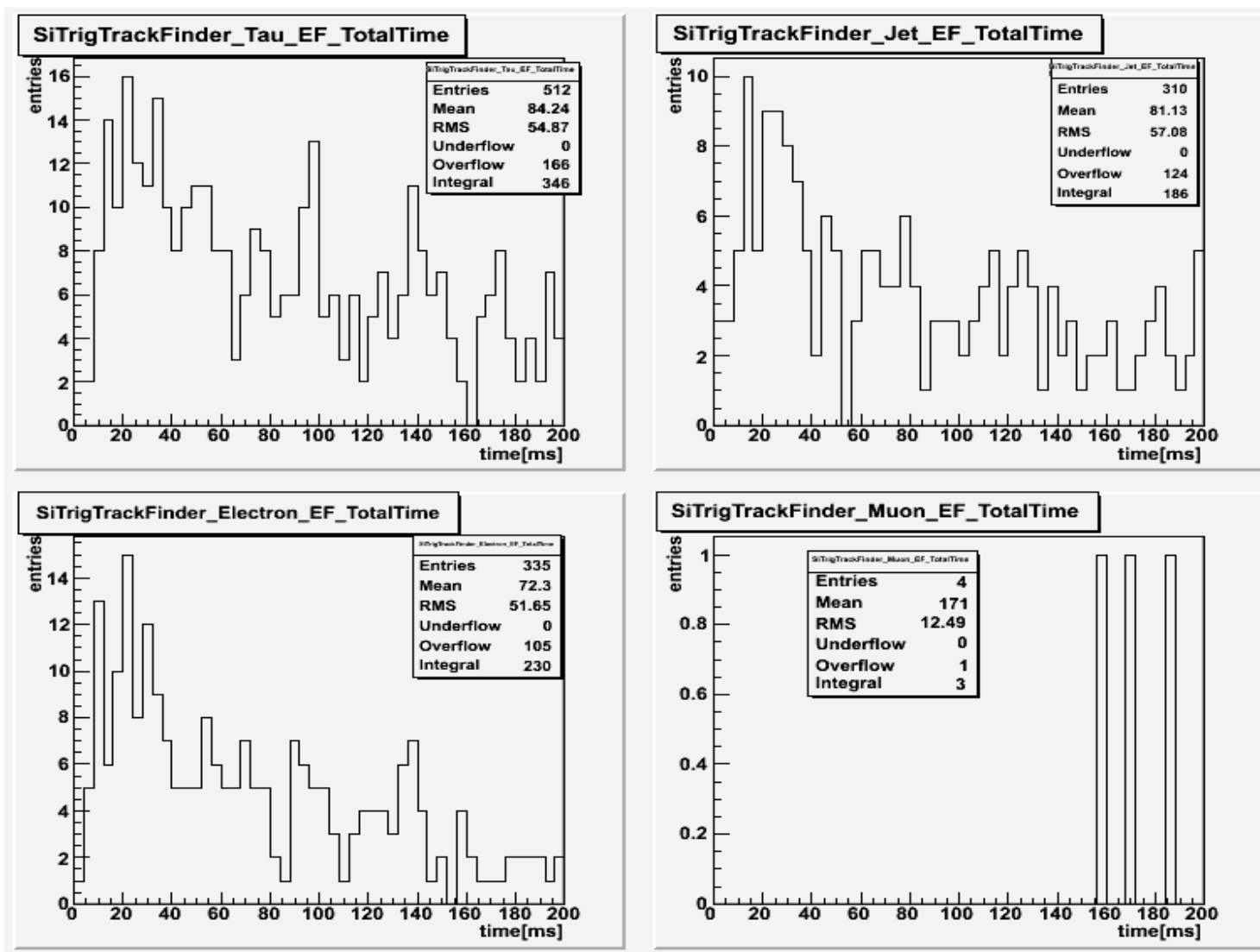


# First EF Results

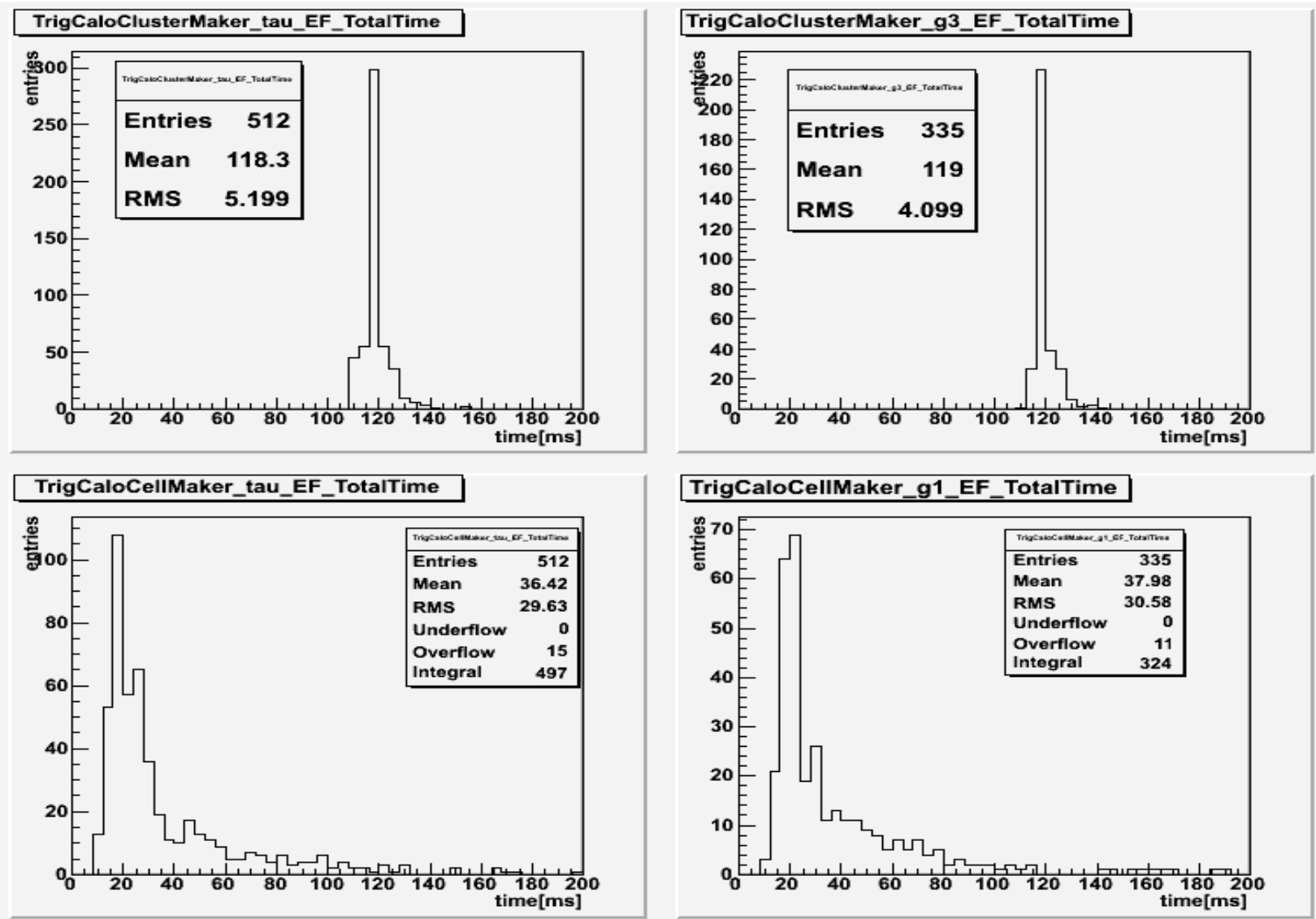
First look at EF tau10 Sequence: Total 0.526 s

1) TrigCaloCellMaker_tau	29.7 ms $\pm$ 2.6 ms
2) TrigCaloTowerMaker_tau	43.6 ms $\pm$ 52 ms
3) TrigCaloClusterMaker_tau	<b>116 ms <math>\pm</math> 6 ms</b>
4) SCT_TriggerClusterization_Tau	5.9 ms $\pm$ 2.2 ms
5) Pixel_TriggerClusterization_Tau	6.0 ms $\pm$ 1.8 ms
6) TRT_TriggerRIO_Maker_Tau	10.1 ms $\pm$ 5.6 ms
7) SiTrigSpacePointFinder_Tau	5.5 ms $\pm$ 4.1 ms
8) SiTrigSPSeededTrackFinder_Tau	<b>176.5 ms <math>\pm</math> 250 ms</b>
9) InDetTrigAmbiguitySolver_Tau	20.6 ms $\pm$ 25.8 ms
10) TRT_TriggerTrackExtensionAlg_Tau	7.6 ms $\pm$ 8.6 ms
11) InDetTrigExtensionProcessor_Tau	19.2 ms $\pm$ 19.8 ms
12) TrigVxPrimary_Tau	2.3 ms $\pm$ 1.4 ms
13) TrigParticleCreator_Tau	2.3 ms $\pm$ 1.3 ms
14) TrigTauRec_h5	81.9 ms $\pm$ 27.6 ms
15) EFTauHypo_tau10	1.1 ms $\pm$ 0.5 ms

# SiTrackFinder: instances for each physics object



# Calorimeter instances run in multiple slices



# Timing Studies: Future Plans

- **Repeat studies with events from different physics signatures**
- **Investigate performance of caching**
  - **Compare timing of "overlapping" instances (electron and tau calorimeter reconstruction)**
  - **Compare timing between running one tau sequence and running multiple tau sequences**
- **Suggestions?**