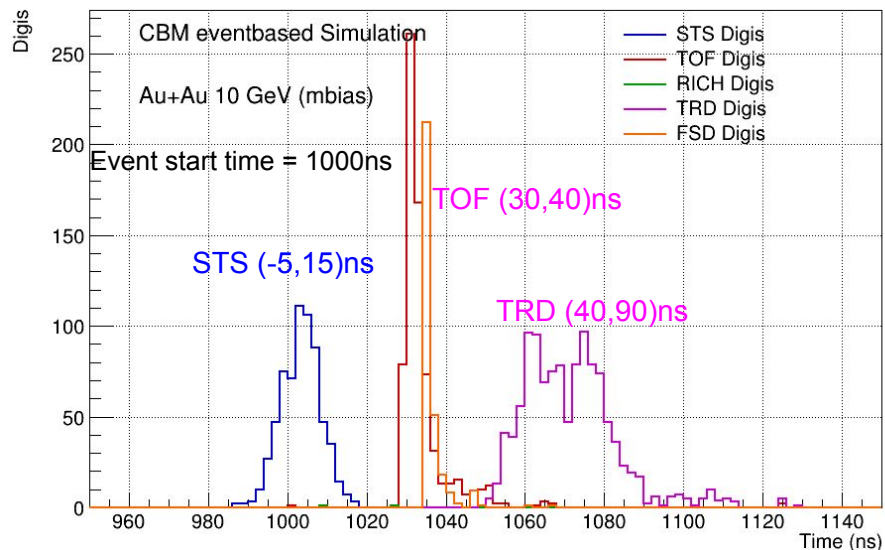


18.12.2025

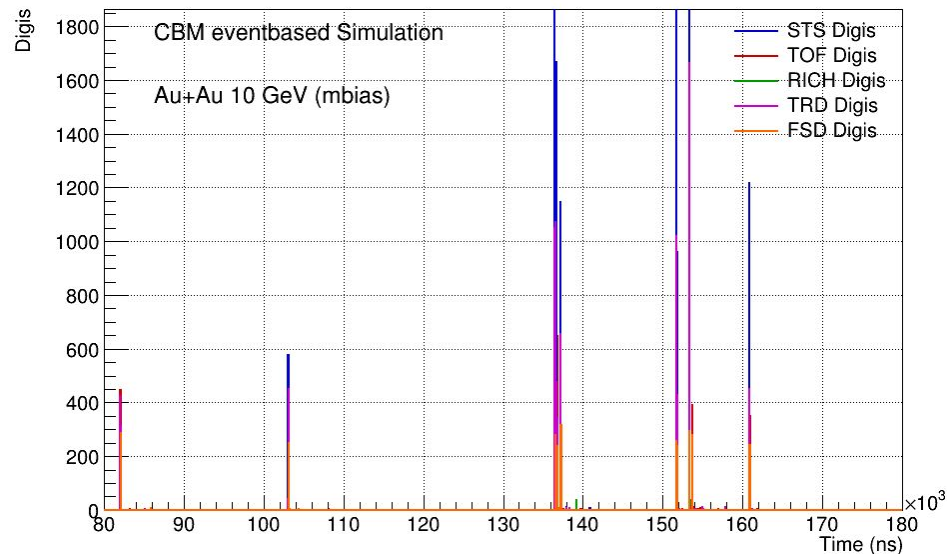
CBM Event Building & Choice of digi trigger

Shreya Roy

Digi time distribution : Event based vs Time based simulation

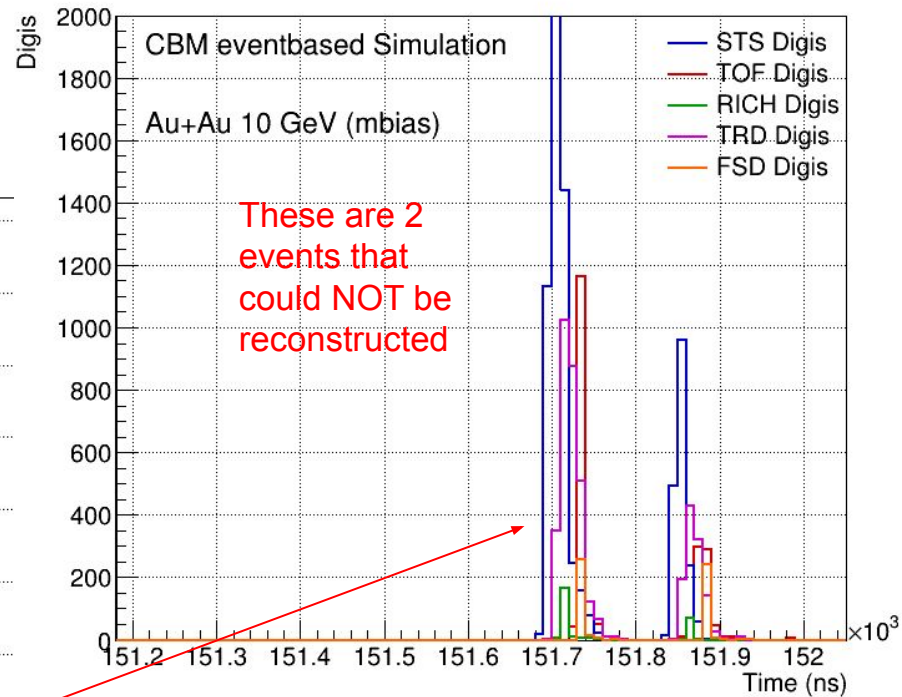
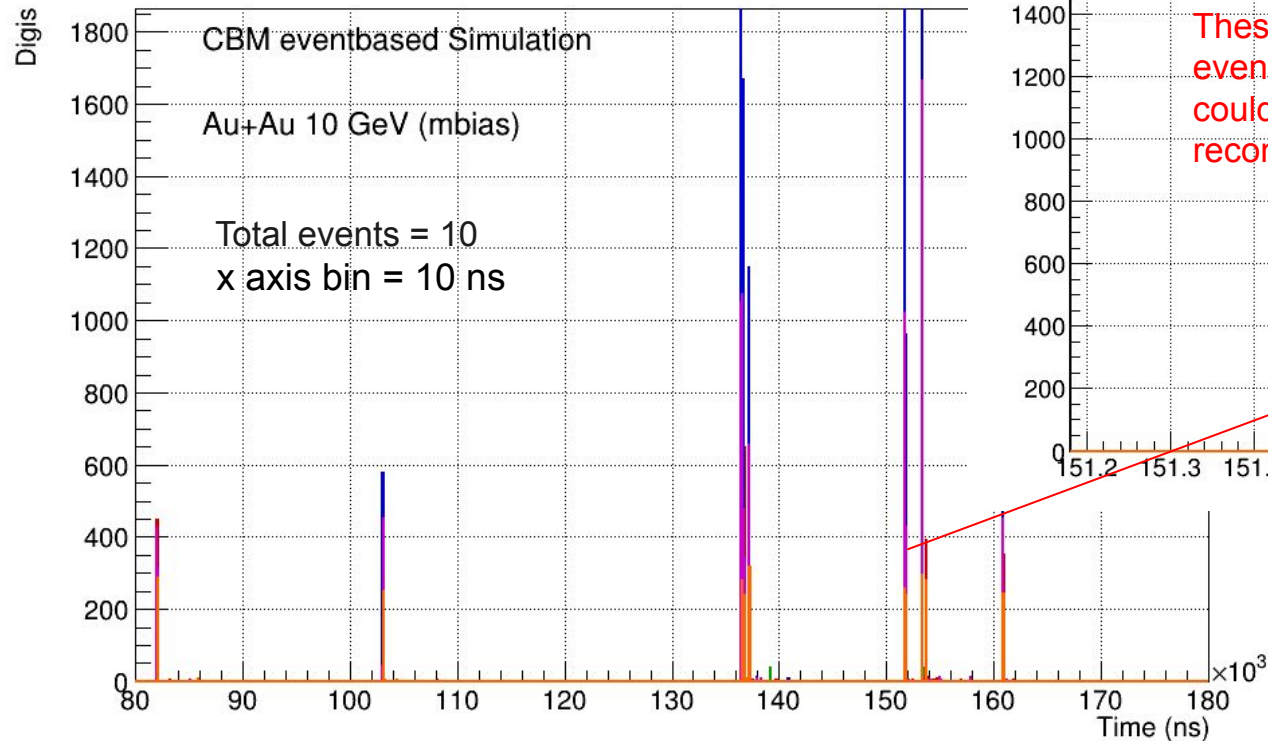


Event rate 10^5 Hz



Digi time distribution

Event rate 10^5 Hz



Raw Evt Builder: fix missing info about params used by seed finder

parent [ba235c81](#)Branches [master](#) [nightly_master](#)

No related tags found

1 merge request [!2226](#) Raw Evt Builder: fix missing info about params used by seed finder✓ Pipeline #37329 passed
1 day agoChanges **1** Pipelines **3**Showing **1** changed file ▾ with **2** additions and **0** deletions

Show whitespace changes

Inline

Side-by-side

▼  [reco/eventbuilder/digis/CbmTaskBuildRawEvents.cxx](#) 

+2 -0



View file @ 7f758bd1

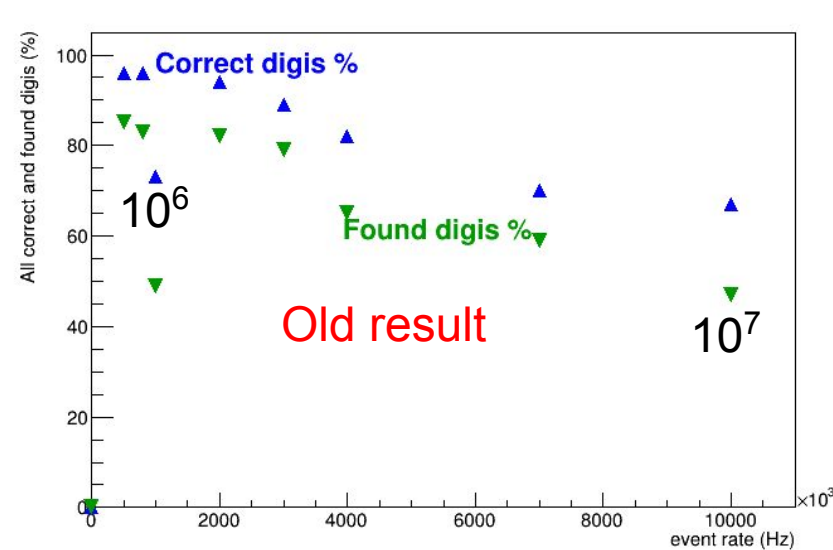
```
...  ...  @@ -79,6 +79,8 @@ void CbmTaskBuildRawEvents::SetSlidingWindowSeedFinder(int32_t minDigis, double
79  79
80  80      fSeedFinderSlidingWindow = new CbmSeedFinderSlidingWindow(fSeedTimes, minDigis, dWindDur, dDeadT);
81  81      fSeedFinderSlidingWindow->SetOffset(dOffset);
82  + // Set seed time window/deadtime for event building checks
83  + fPAlgo->SetSeedTimeWindow(0.0, dDeadT < dWindDur ? dDeadT : dWindDur);
82  84  }
83  85
84  86  void CbmTaskBuildRawEvents::SetSeedFinderQa(Bool_t bFlagIn)
```

Event building QA

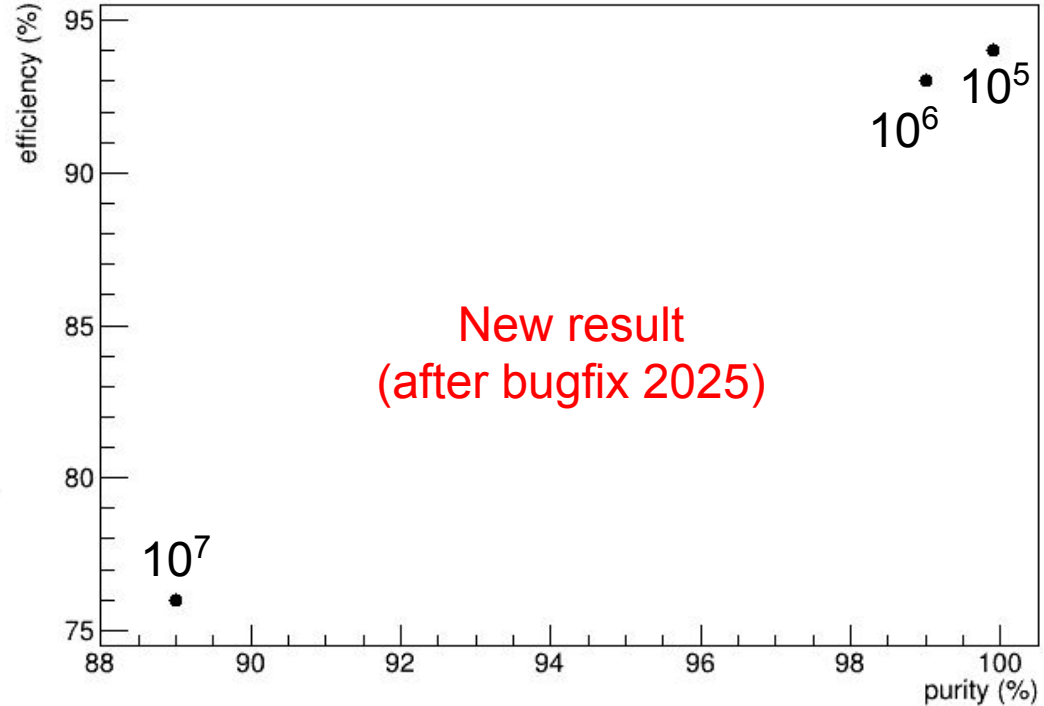
$$\text{Correct digis (Purity)} = \frac{\text{Digis whose MC link matched MC event}}{\text{digis assigned to this reconstructed event}}$$

$$\text{Found digis (Efficiency)} = \frac{\text{digis whose MC link matched MC event}}{\text{total number of digis from this MC event}}$$

Event builder performance at higher event rates



CBM collaboration meeting Poland, talk by S. Roy (2022)



Find trigger & EB parameters for min-bias event in vertical test.

Feature #3594 OPEN

Feature #3525: Vertical Test / Data Challenge 2025
Feature #3591: VT 25 - Online Data Processing

Choice of trigger


Added by [Volker Friese](#) 9 months ago. Updated 11 days ago.

Status:	In Progress	Start date:	04/14/2025
Priority:	Normal	Due date:	06/06/2025 (about 6 months late)
Assignee:	Shreya Roy	% Done:	<div><div></div></div> 10%
Target version:	Vertical test / DC 2025	Estimated time:	

Description

There are several possibilities for the minimum-bias trigger. The simplest is the Digi multiplicity trigger, e.g., with STS as trigger detector. This does not require any reconstruction of data.

More advanced would be a trigger on track multiplicity. For this, time-based reconstruction in STS and tracking in STS has to be performed.

For both cases, the required trigger algorithm is already in place ( [TimeClusterTrigger](#)). It was already used in mCBM with tracks as input.

For all trigger options, a study has to be performed to obtain the proper configuration / parameters.

Result

Simulation details :-

Inputfile : /u/sroy/vfrieese/digidata/urqmd.AuAu.p12.mbias.00001.digi.root

No. of event simulated : 5000

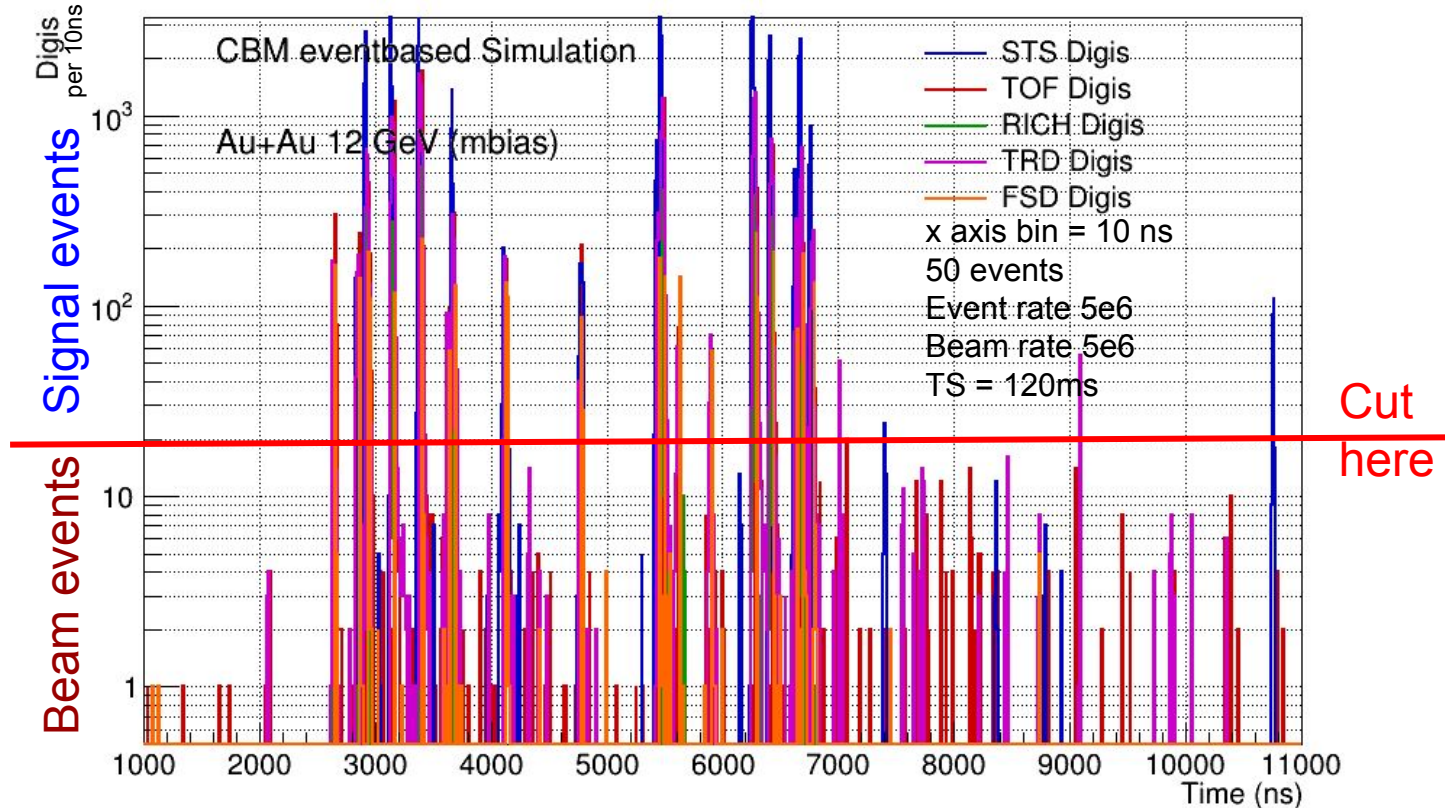
System : AuAu bias at 12 AGeV

Event rate = $5e4$, beam rate = $5e6$

Timeslice size $1.2e8$

```
[INFO] =====  
[INFO] BuildRawEvents: Run summary  
[INFO] Time slices           : 1  
[INFO] Events                 : 4956  
[INFO] Triggers               : 5085  
[INFO] Time / TS              : 6765.57 ms  
[INFO] =====
```


Example : Digi time distribution for Urqmd + beam



Parameters of “Real” event builder

```
evBuildRaw->AddSeedTimeFillerToList(kRawEventBuilderDetTof);  
evBuildRaw->SetSlidingWindowSeedFinder(20, 10, 50);//int32_t minDigis, double dWindDur, double dDeadT, double dOffset  
evBuildRaw->SetTsParameters(0.0, 1.2e8, 0.0);  
evBuildRaw->SetEventOverlapMode(EOverlapModeRaw::AllowOverlap);
```

```
evBuildRaw->SetTriggerMinNumber(ECbmModuleId::kSts, 30);  
evBuildRaw->SetTriggerWindow(ECbmModuleId::kSts, -45, 15);//for tof as ref
```

```
evBuildRaw->SetTriggerMinNumber(ECbmModuleId::kTof, 20);  
//evBuildRaw->SetTriggerWindow(ECbmModuleId::kTof, -5, 30); //for tof as ref  
evBuildRaw->SetTriggerMinNumber(ECbmModuleId::kRich, 1);  
evBuildRaw->SetTriggerWindow(ECbmModuleId::kRich, -20, 20);//for tof as ref
```

```
evBuildRaw->SetTriggerMinNumber(ECbmModuleId::kTrd, 1);  
evBuildRaw->SetTriggerWindow(ECbmModuleId::kTrd, -30, 30);//for tof as ref
```

```
evBuildRaw->SetTriggerMinNumber(ECbmModuleId::kFsd, 1);  
evBuildRaw->SetTriggerWindow(ECbmModuleId::kFsd, 0, 50);//for tof as ref
```

Result obtained using these params

```
[INFO] =====  
[INFO] BuildRawEvents: Run summary  
[INFO] Time slices           : 1  
[INFO] Events                : 4956  
[INFO] Triggers              : 5085  
[INFO] Time / TS             : 6765.57 ms  
[INFO] =====
```

Results : how the event looks after event building?

- Check the digi time distribution of each subsystem within an event
- Seed finder QA
- Event builder QA
- Check how many events were reconstructed

For this, I need to simulate urqmd+beam with MC info with known no. of signal and beam events.

Urqmd+beam simulation

Digitisation setup :

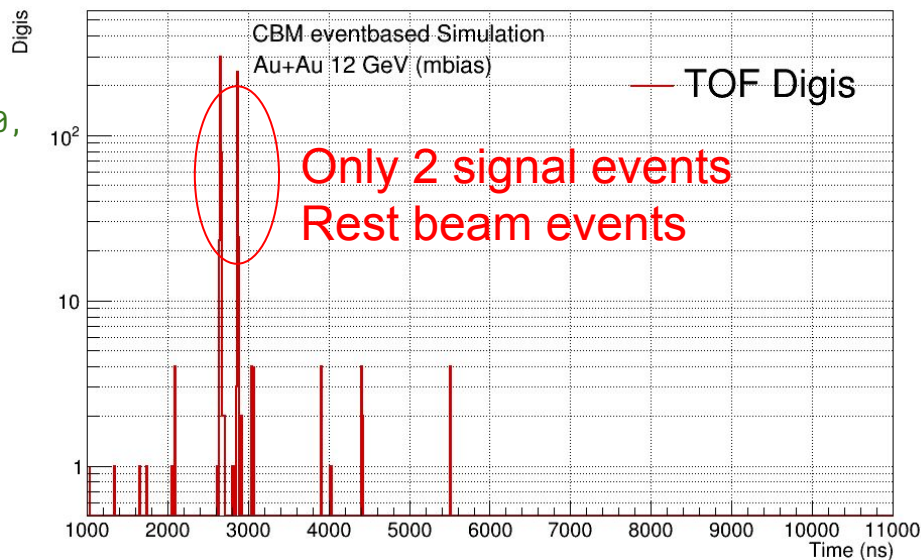
```
void run_digi(TString inputEvents =  
    "urqmd.AuAu.p12.mbias.00001", Int_t nEvents = 10,  
    TString output = "", Double_t eventRate = 5.e6,  
    Double_t tsLength = 1.2e8,  
    TString inputSignal = "", TString inputBeam =  
    "beam.Au.p12", Double_t beamRate = 5.e6)
```

Comment from Volker :

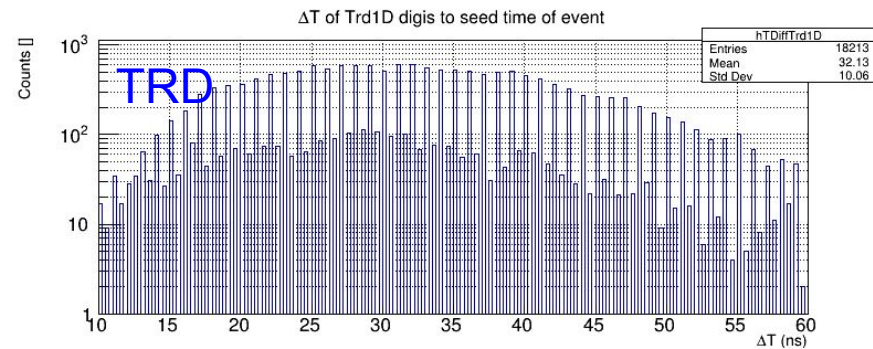
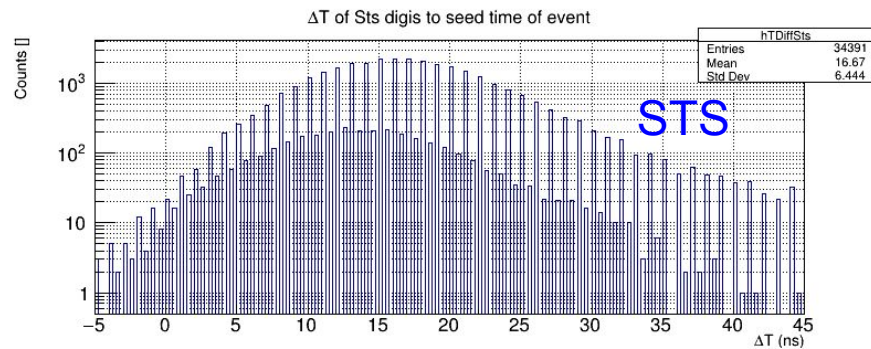
The sampling of events from the respective inputs is random, so you cannot control the exact number of signals events, only on average.

For more information and updates follow :

<https://redmine.cbm.gsi.de/issues/3594#change-19933>



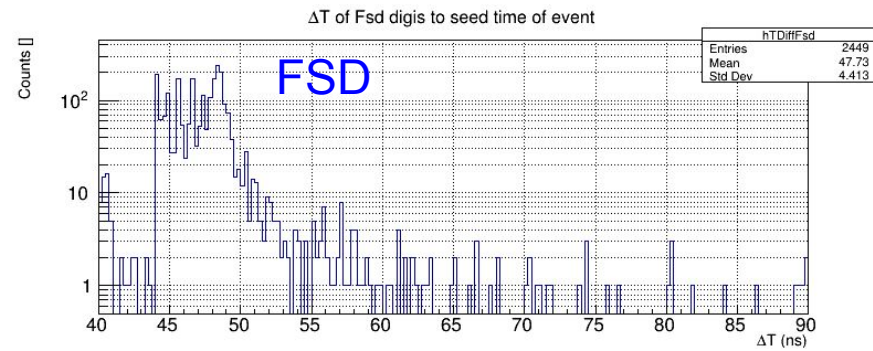
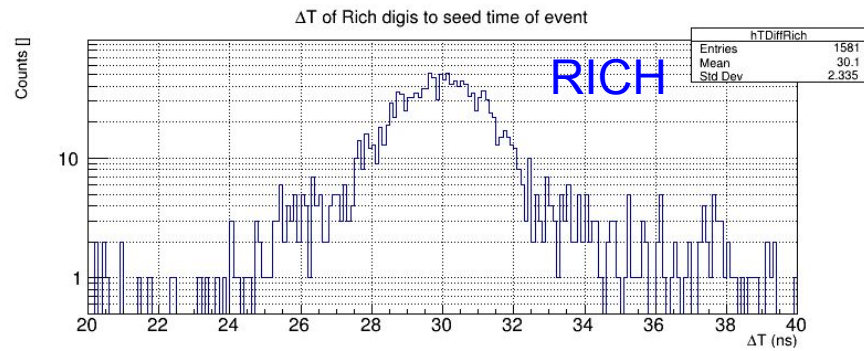
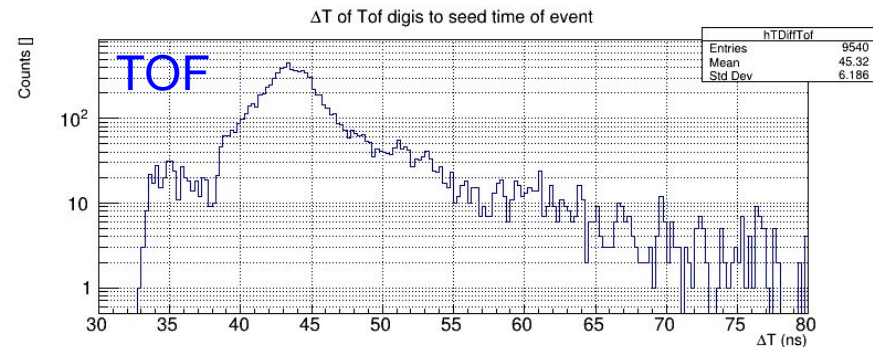
Backup



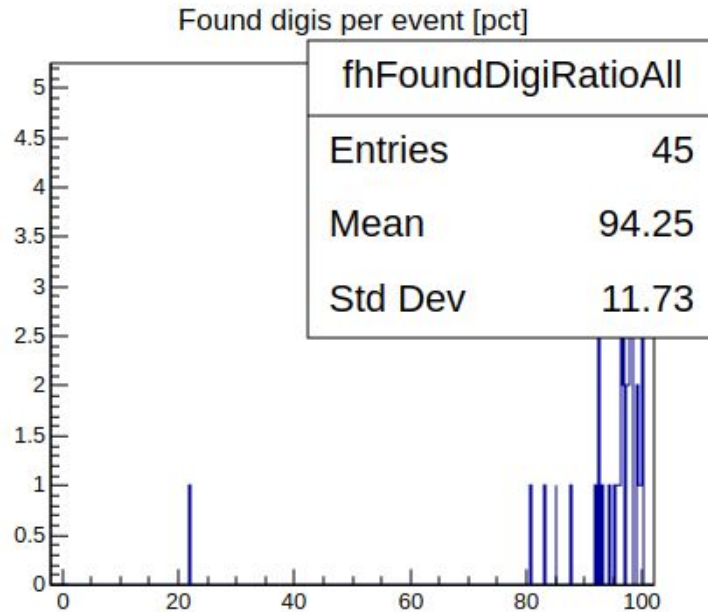
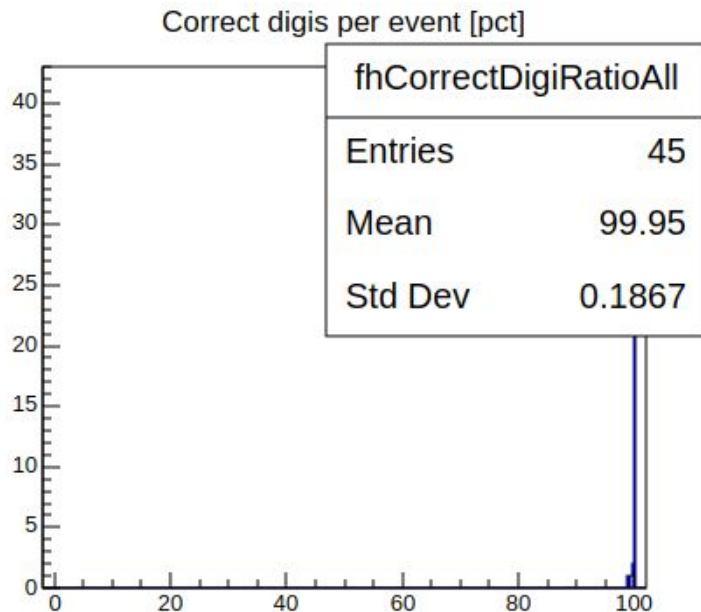
Digi time distribution w.r.t. the seed time
(trigger time) of event after event building.
Event rate = 10^5 Hz (works fine)

Purity = 99%

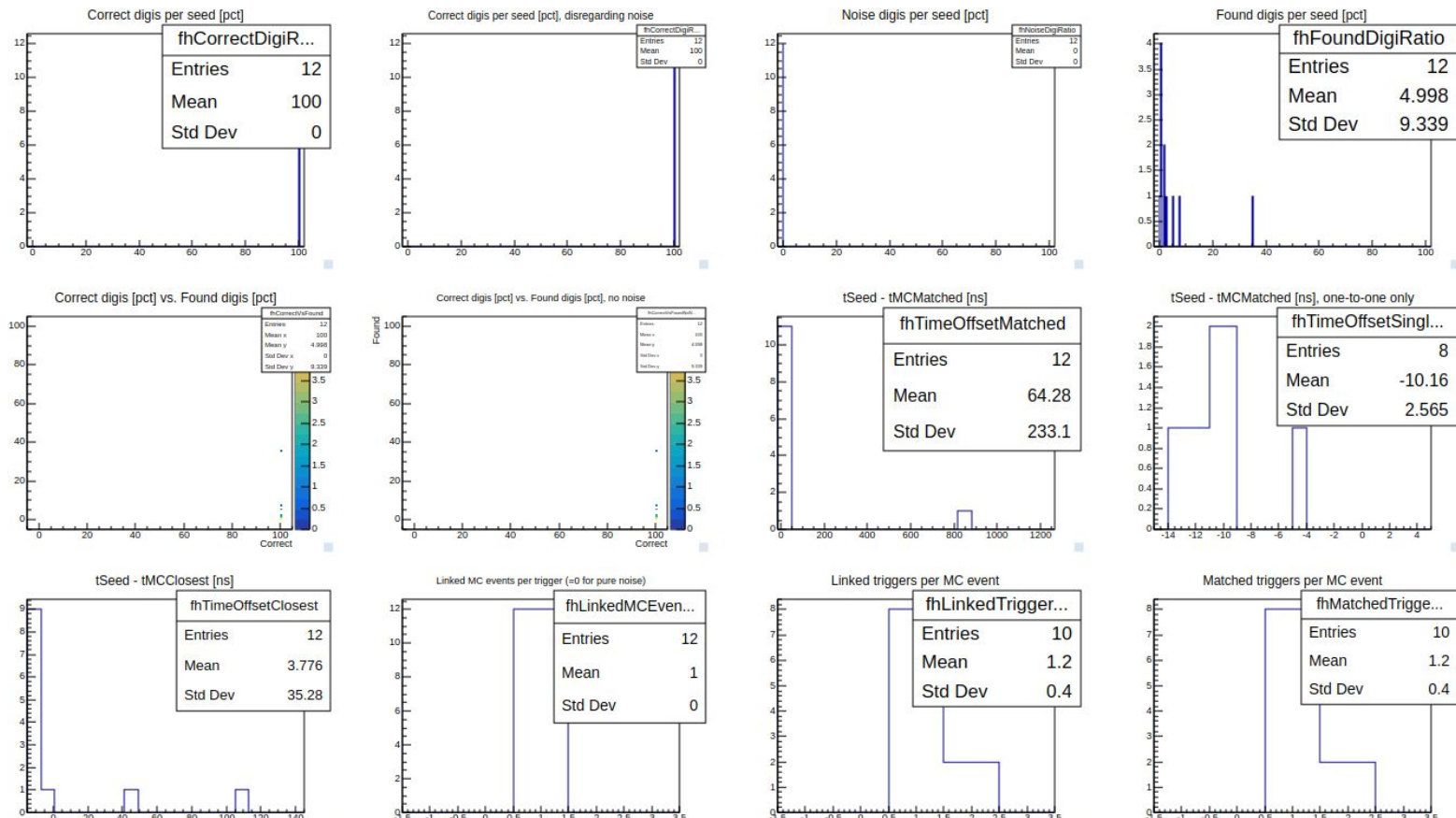
Efficiency = 94%



Event builder QA (event rate 1e5)

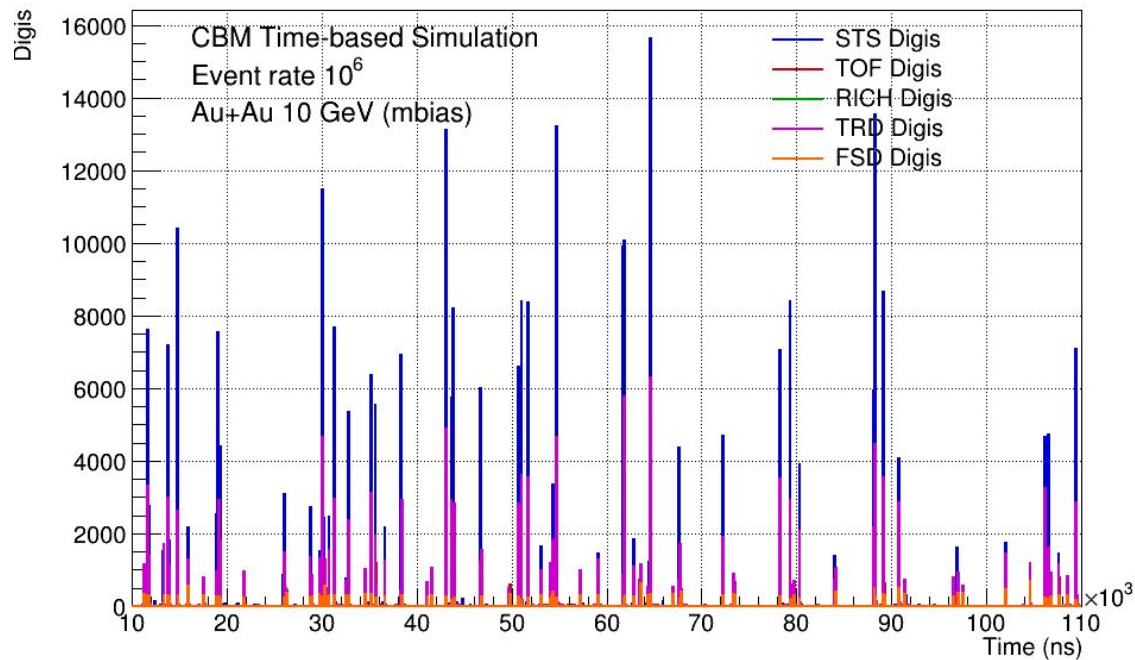


Seed finder QA (event rate 10^5)

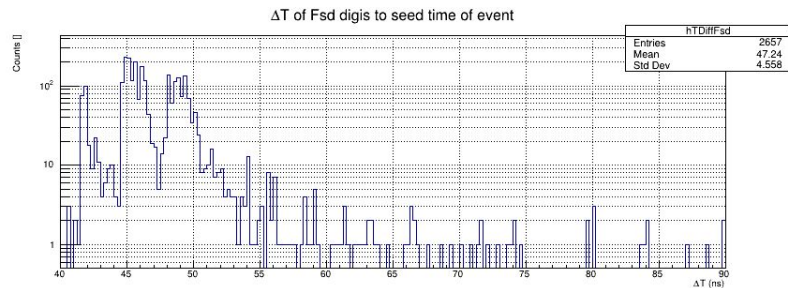
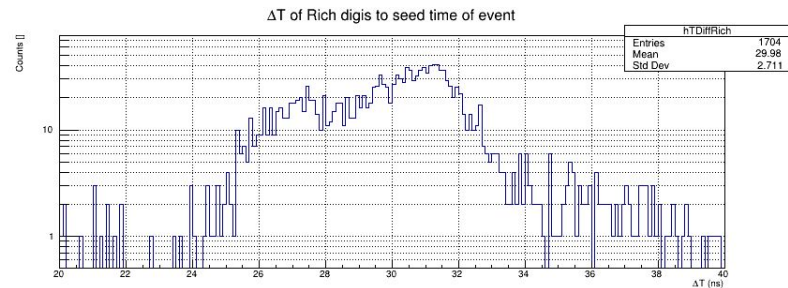
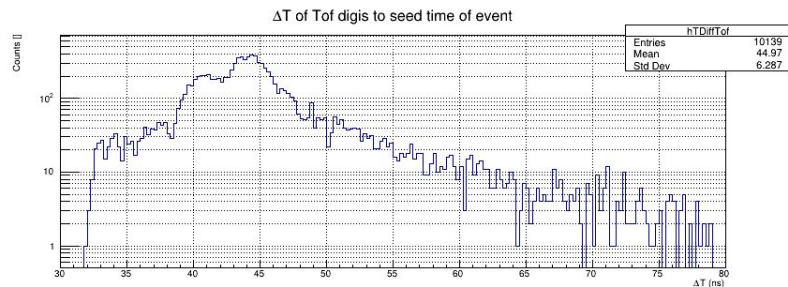
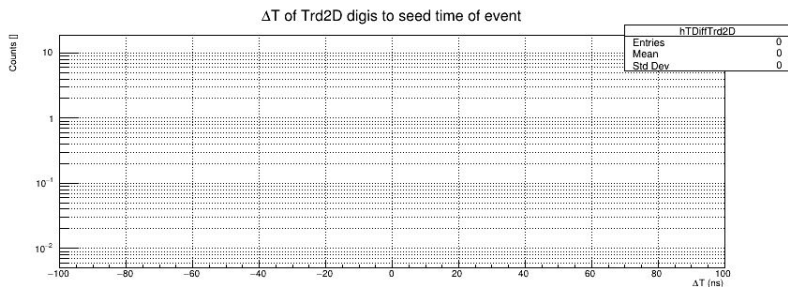
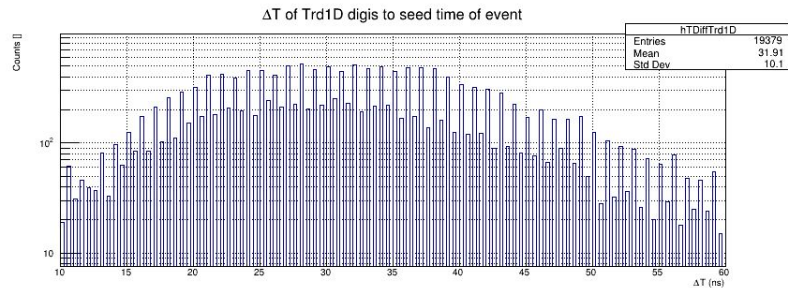
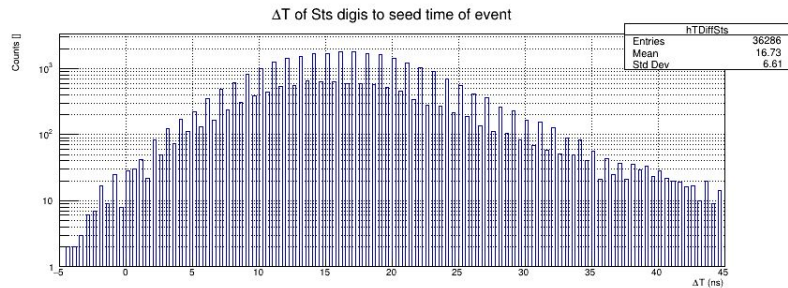


Higher event rates

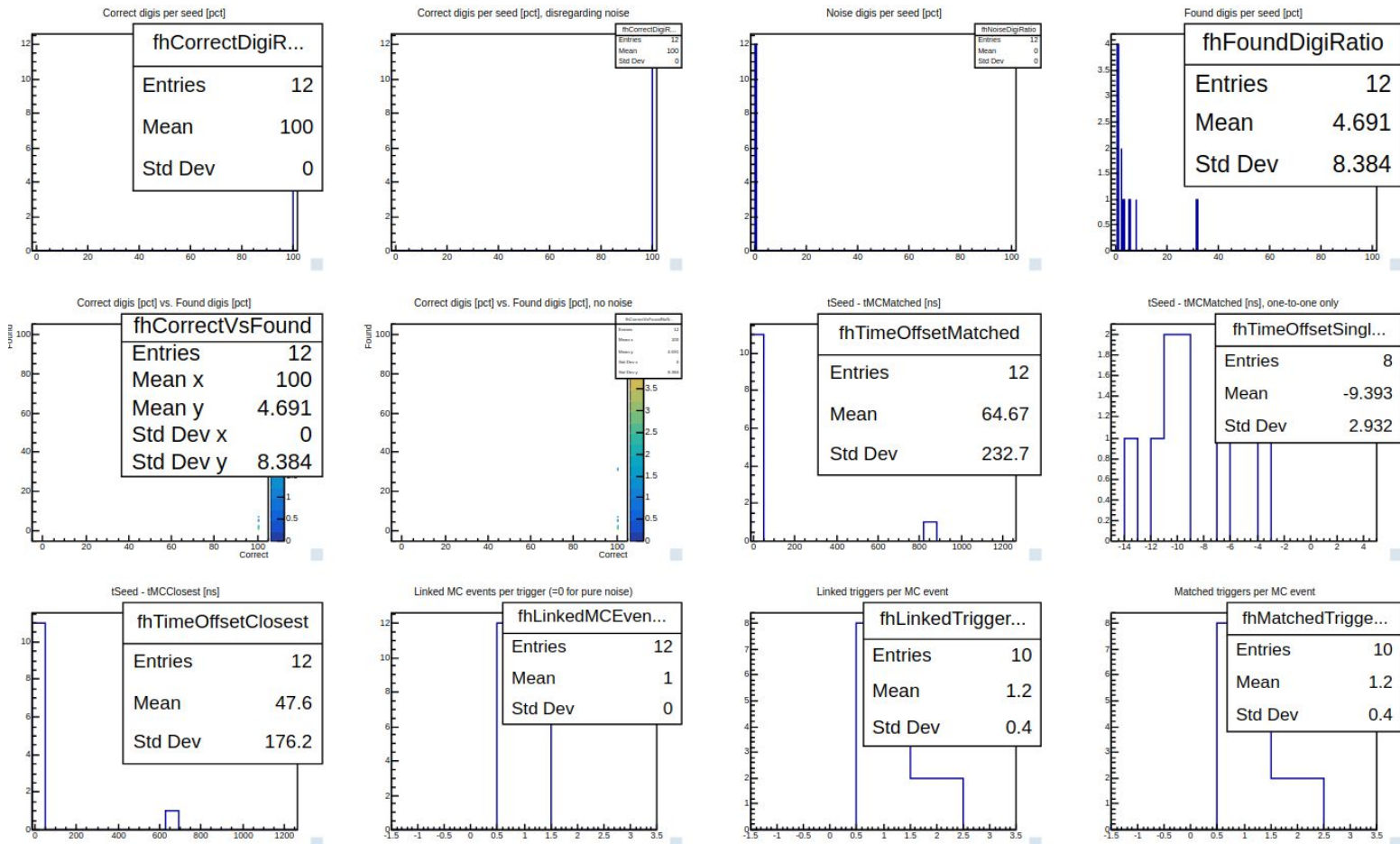
Event rate 10^6 Hz



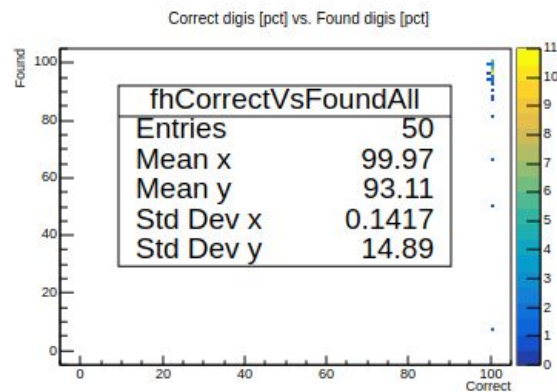
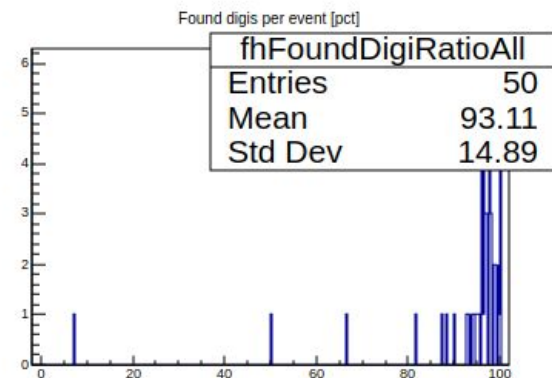
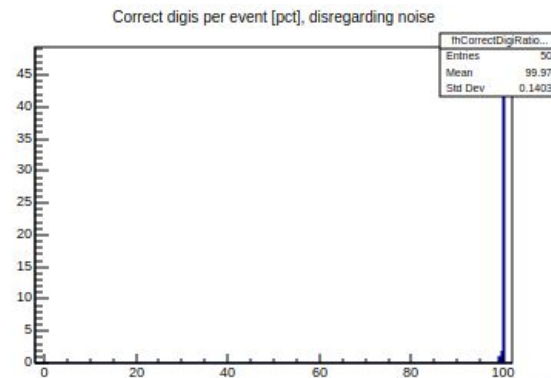
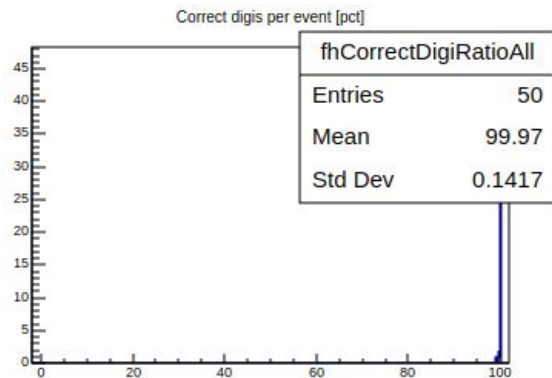
Event building 1e6



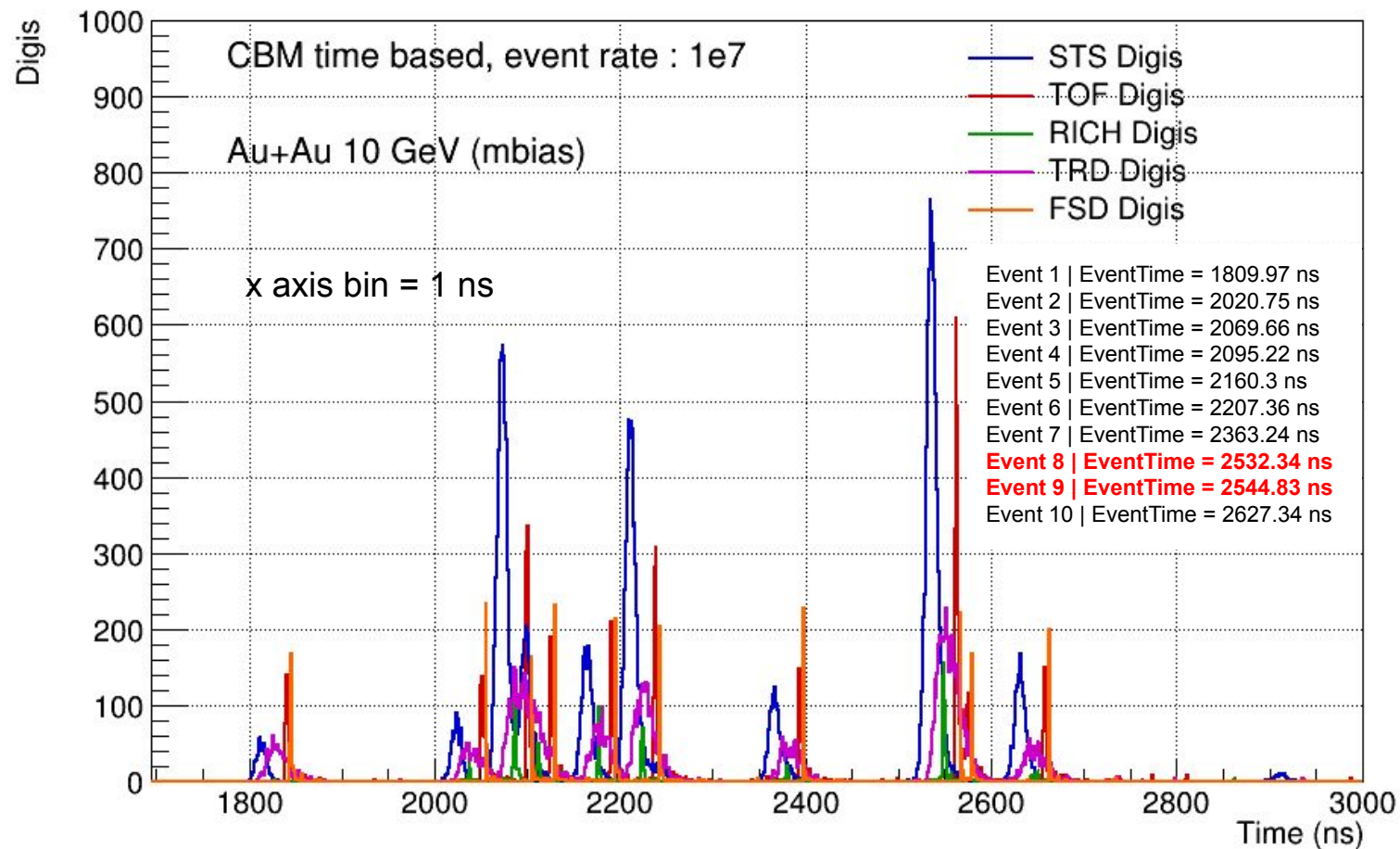
Seed finder QA at 1e6



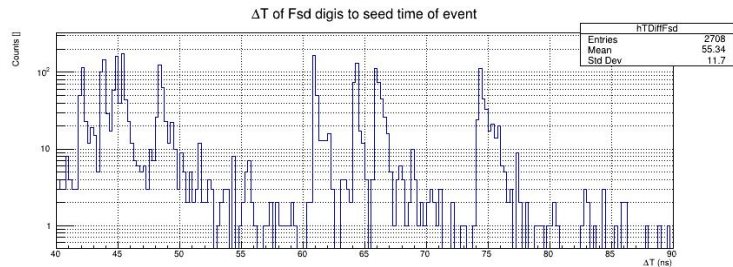
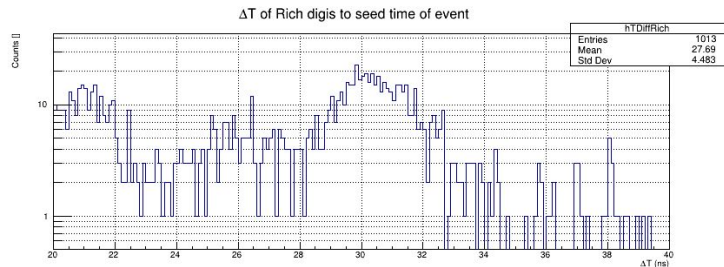
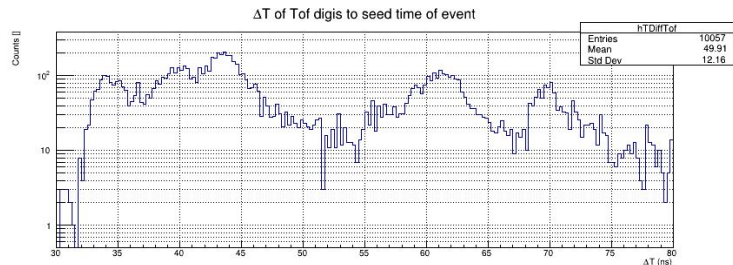
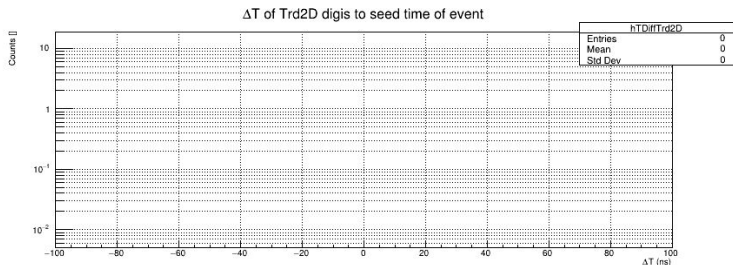
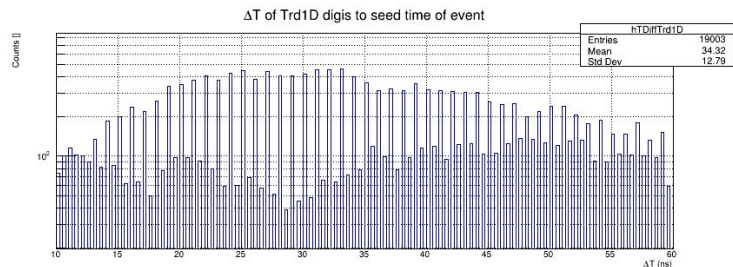
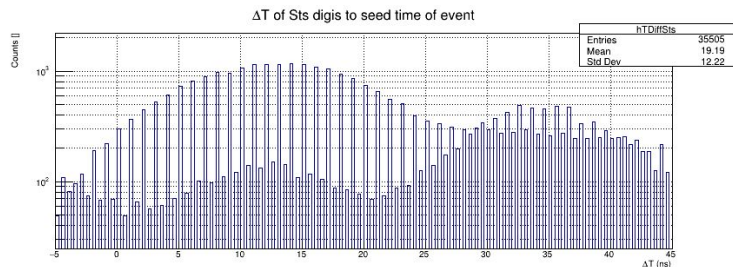
Event builder QA



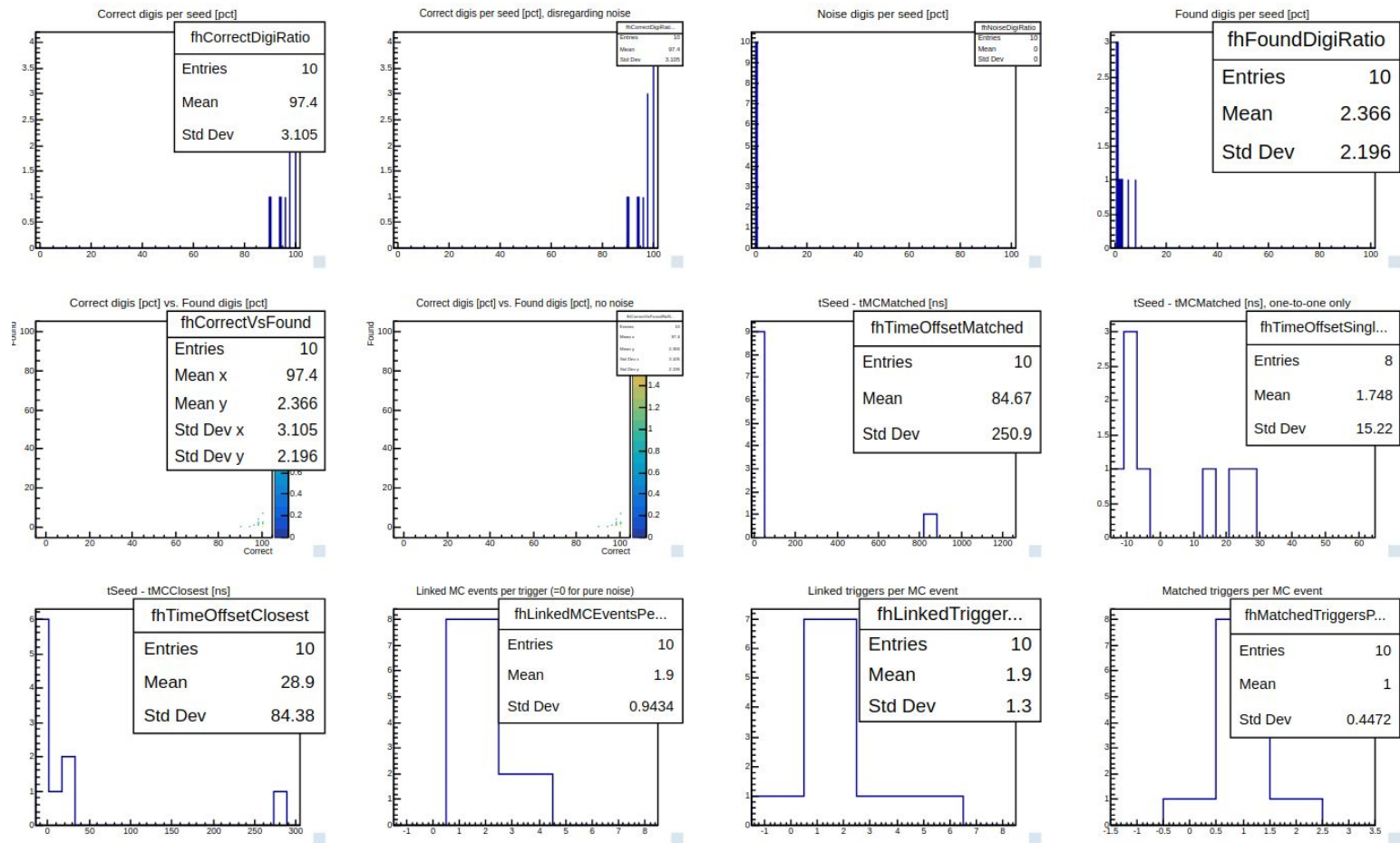
Higher event rates 10^7 Digi time distribution



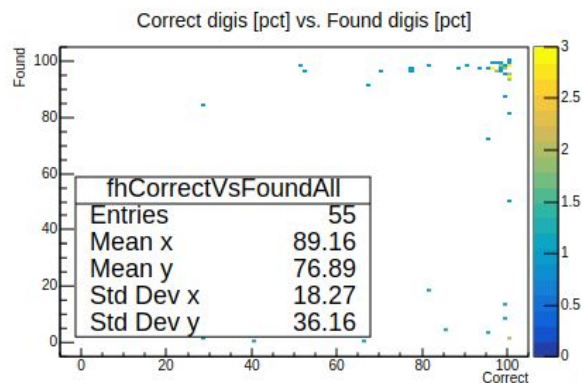
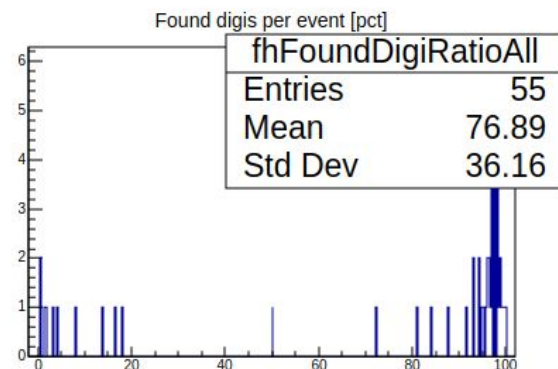
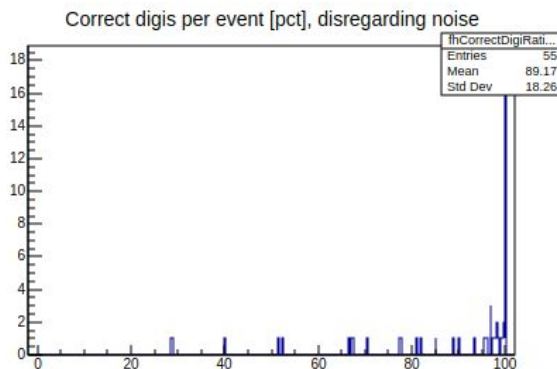
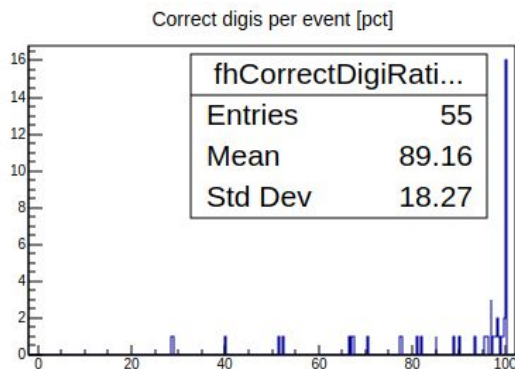
Event building at 1e7

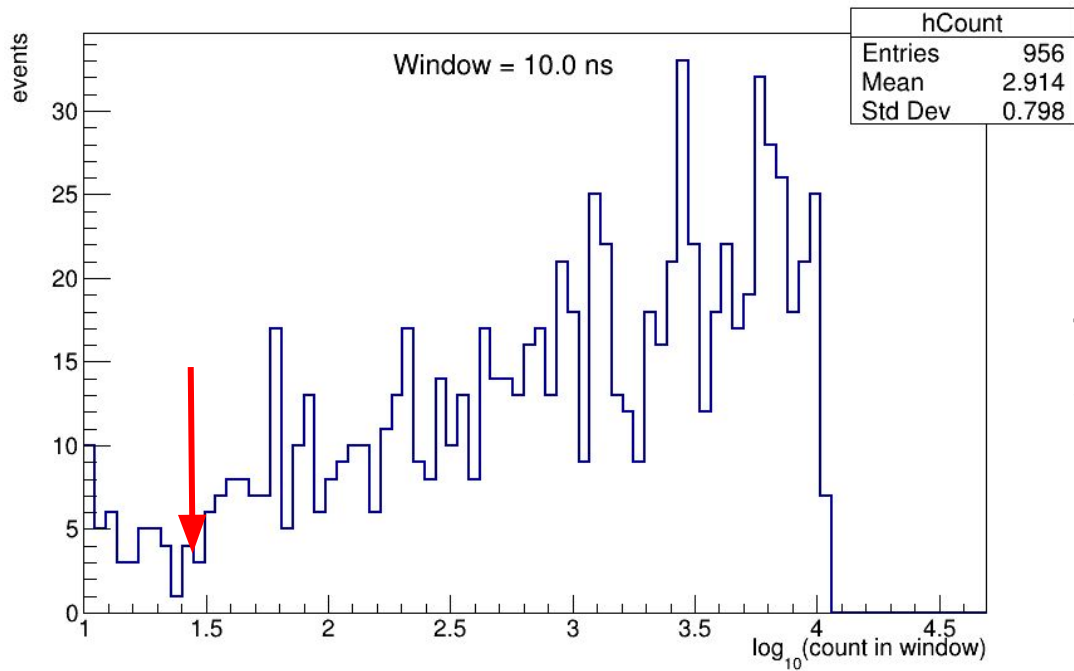


Seed finder QA at 1e7



Event builder QA at 1e7





Minimum digis = 30, that is equal to one track though all STS stations