

Trigger Comparison

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CalTech - January 4, 2002

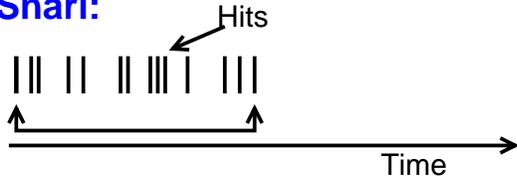


Outline

- Trigger Description and Comparison Procedure
- Statistical Summary
- One Overlap Results
- Conclusions

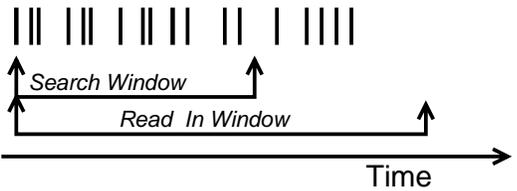
The Triggers

Snarl:



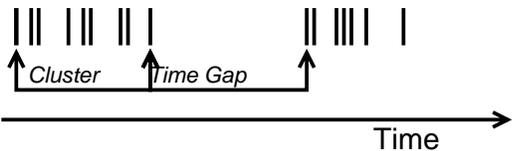
A sequence of Hits satisfying some trigger.
Has a starting time and ending time.

Online Trigger:



Reads Hits sequentially, testing for the trigger condition within a Search Window (50 ticks).
If the trigger is satisfied all Hits within the Read In Window (100 ticks) are formed into a Snarl.
The next Search Window begins at the end of the previous Read in Window.
If the trigger is not satisfied, the Search Window is moved forward by one Hit.

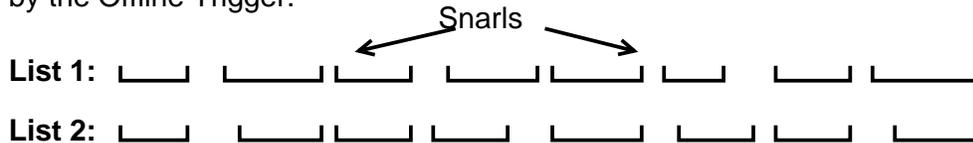
Offline Trigger:



Groups Hits into Clusters by looking for a Time Gap (100 ticks) between adjacent Hits. Tests Clusters for trigger condition. Clusters passing the trigger condition become Snarls.
Works offline on Branch Readout Processor files.

Comparison Procedure

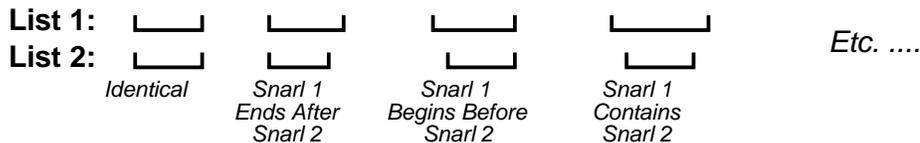
Take two lists (TTrees) of snarls, one constructed by the Online Trigger, the other constructed by the Offline Trigger.



Iterate through each Snarl in List 1. For each Snarl in List 1, search in List 2 for Snarls that overlap it in time.

Various Categories

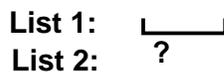
One Overlap:



Two Overlaps:



No Overlaps:



More?:



Statistics

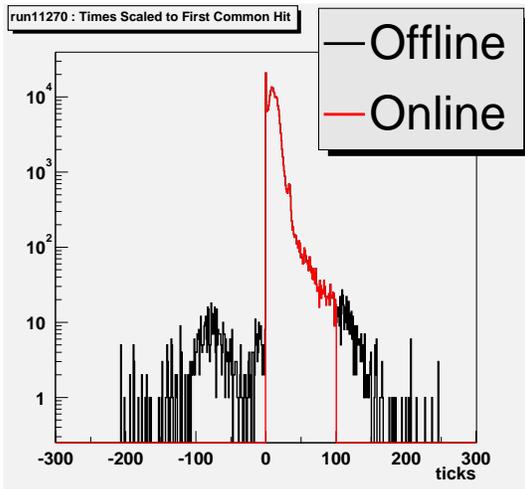
Overlap Statistics - 10000 Entries

Run	No Overlaps	One Overlap	Two Overlaps	More Overlaps	Comments
11239	70	9886	43	1	+3.5 GeV
11270	69	9908	23	0	+0.5 GeV
11281	33	9940	27	0	+2.5 GeV

One Overlap Category: Details

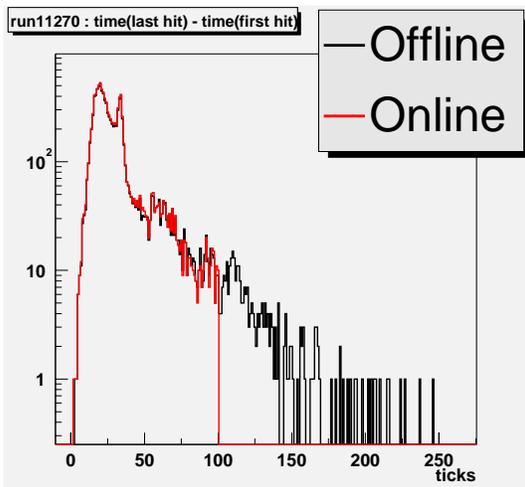
Run	Same Beginning and Ending Time	Same Beginning, Offline Finishes Later Than Online	Same Ending, Offline Starts Before Online	Offline Contains Online	Other
11239	8949	576	326	34	1
11270	9491	205	199	12	1
11281	9199	520	202	19	0

Run11270: Timing Information



Hit Times:

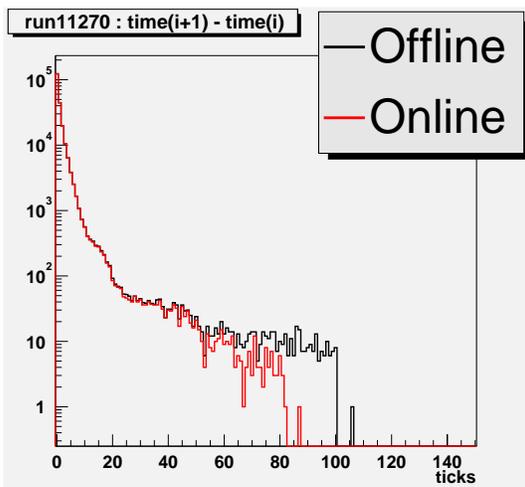
Earliest Common Hit Sets $t=0$



Snarl Duration:

100 Tick Online Read In Window

Clearly Visible.



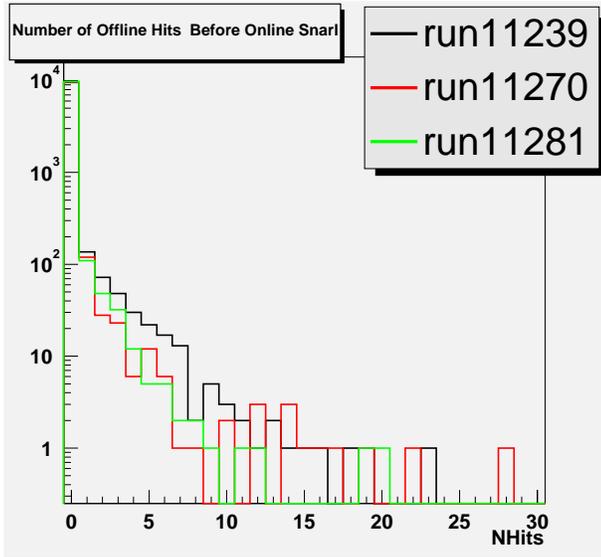
Time Between Adjacent Hits:

Offline Cut-Off At 100 Ticks Shows

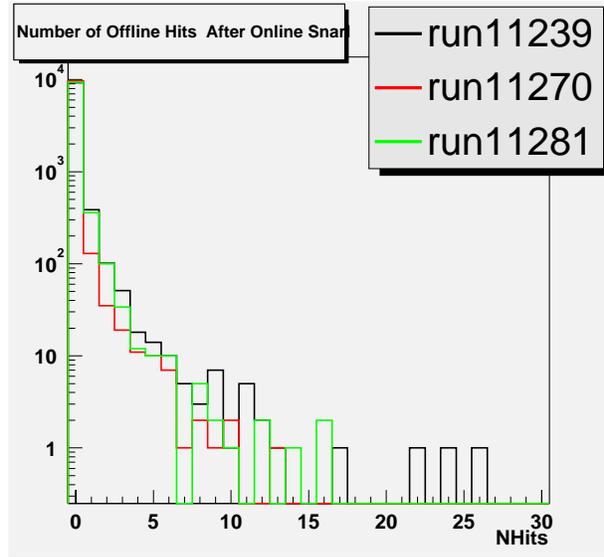
Clustering Window.

Extra Hits

Number Of Extra Offline Hits

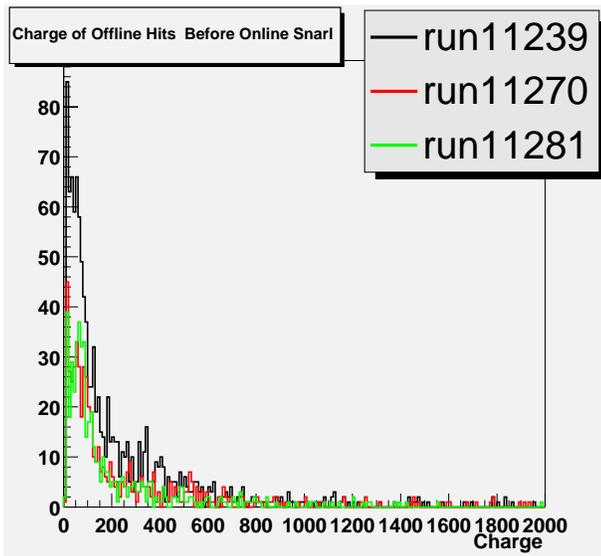


Number Of Offline Hits Arriving Before The First Online Hit

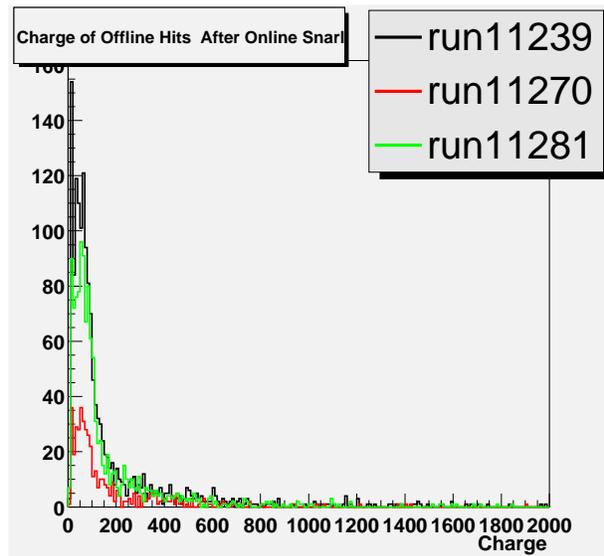


Number Of Offline Hits Arriving After The Last Online Hit

Charge Spectrum Of Extra Offline Hits



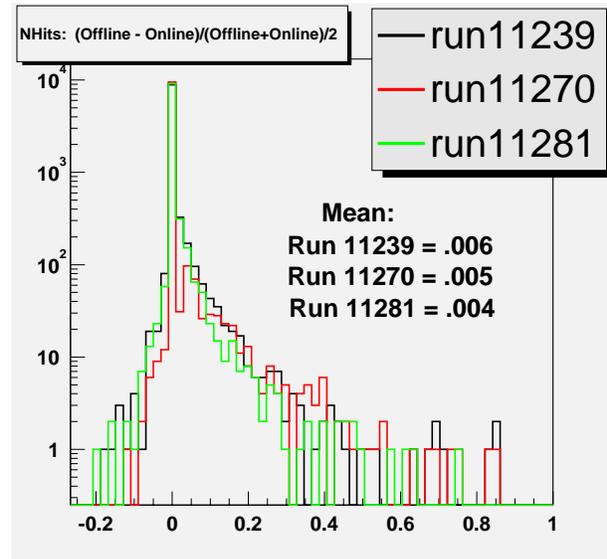
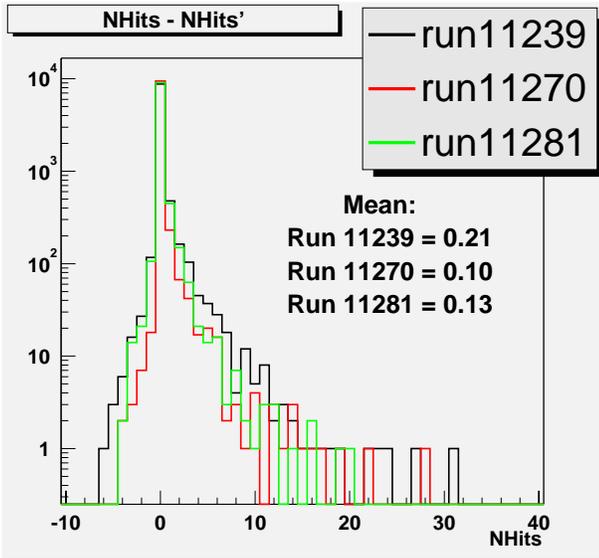
Charge Of Offline Hits Arriving Before The First Online Hit



Charge Of Offline Hits Arriving After The Last Online Hit

Multiple Run Comparisons

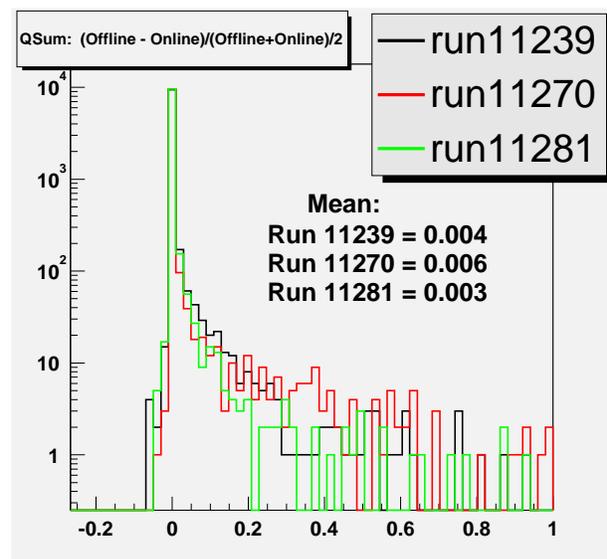
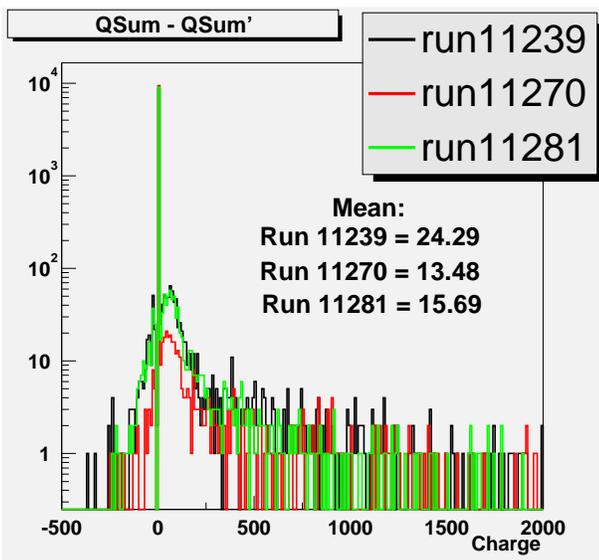
Number of Extra Hits



$$NHits(Offline) - NHits(Online)$$

$$\frac{NHits(Offline) - NHits(Online)}{TheirMean}$$

Extra Charge:



$$QSum(Offline) - QSum(Online)$$

$$\frac{QSum(Offline) - QSum(Online)}{TheirMean}$$

Conclusions

- Single Overlap : 99% Of Snarls
 - Large Majority Of Single Overlaps Are Exact Matches
 - Others Tend To Match At Beginning Or End
 - Offline Typically Has 0-2 Extra Hits
- Offline Has Longer Snarls Due To 100 Tick Clustering Window
- Overall Charge Difference Small

Future

- More Work On Other Cases (No Overlaps, etc)
- ToF Hits: Does One Trigger Produce More Than The Other?
- Look for Rate Dependence
- Trigger Accountability