

INTT Weekly Meeting

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June 26, 2024



- Asked to compare results of my classification to Jaein/Yuka's results
 - The results are dissimilar
- Conducted additional study of my classification algorithm's internal consistency
 - It is very consistent
 - Studied number of events (physic events/GL1 triggers) needed for classification
 - Succeeds in as few as 50k events, which takes minutes to run

For two runs A and B

- let $S_A = \{\vec{c}\}_A$ be the set of channels classified as “bad” in run A
- let $S_B = \{\vec{c}\}_B$ be the set of channels classified as “bad” in run B
- I write \vec{c} to emphasize each element is a unique channel of INTT

$$\text{overlap} = \frac{S_A \cap S_B}{S_A \cup S_B} \quad (1)$$

This is sensitive to *which* channels are classified as “bad” in each run (“bad” meaning hot/cold/dead/hal)

Overlap	# Inconsistent	# Consistent Bad
21.74%	22784	6331

Joseph

- Total 9164 channels as “bad”
- 50K events

Jaein/Yuka

- Total 26315 channels as “bad”
- 500K events

Note that

$$\text{overlap} = \frac{\# \text{ Consistent bad}}{\# \text{ Consistent bad} + \# \text{ Inconsistent}} \quad (2)$$

- Gaussian fits may not do well since the distribution has a “fat” tail
 - The peak value is left of the IQR; the shape is categorically wrong
 - σ -based cuts assume a certain rate of falloff
 - Since the falloff is slower, you mask more of the detector
- The current treatment of “half” entry channels is not able to be automated
 - Defined [here](#) in hardcoded list
 - Used [here](#) in flag assignment

- The order of BCO filtering and hot channel filtering is reversed
 - My code finds hot channels, and filters them before finding BCO peaks
 - Jaein/Yuka finds BCO peak and filters by BCO before finding hot channels
 - Hot channels may have stuck BCO values
 - Hot channels are read out away from the BCO peak more than other channels
 - Hot channels can pollute the BCO distribution as regularly seen in Online Monitoring (but the peak value is usually the same)
- We did not have timing for run 20869

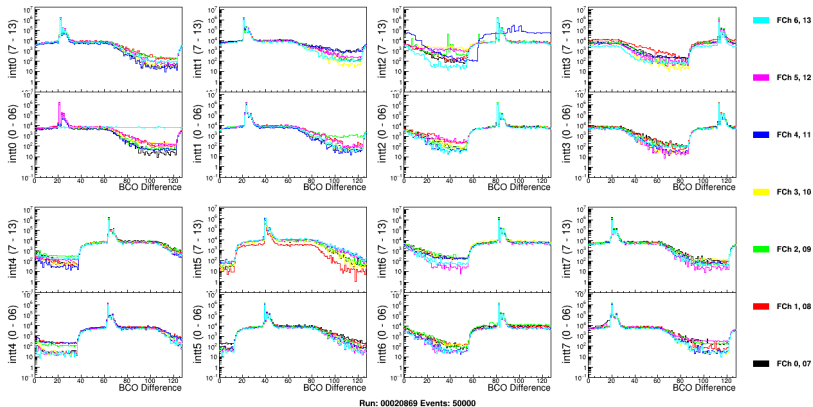


Figure: The BCO difference distributions for run 20869, showing it is not timed in

Classification with 50K Events

	46525	46619	46620	46622	46676	46677
46525	-	93.53%	93.58%	93.54%	93.71%	92.25%
46619		-	99.06%	99.07%	97.58%	94.82%
46620			-	99.30%	97.79%	94.96%
46622				-	97.77%	94.90%
46676					-	95.25%
46677						-

Classification with 500K Events

	46525	46619	46620	46622	46676	46677
46525	-	98.31%	98.45%	98.43%	98.91%	98.96%
46619		-	99.79%	99.78%	98.72%	98.30%
46620			-	99.91%	98.85%	98.44%
46622				-	98.86%	98.40%
46676					-	99.07%
46677						-

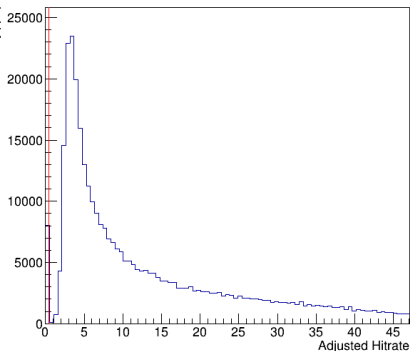
Consistency as function of events processed

Comparison between 50K event and 500K event version of same run

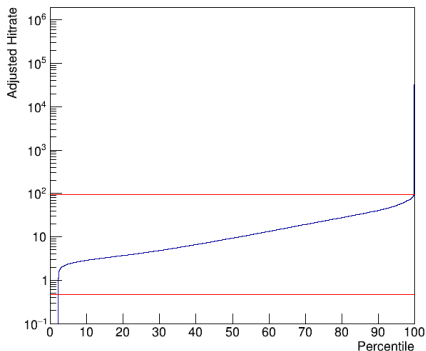
Run#	Overlap	# Inconsistent	# Consistent Bad
46525	94.81%	442	8069
46619	99.32%	56	8136
46620	99.66%	28	8136
46622	99.61%	32	8132
46676	98.86%	93	8100
46677	96.04%	334	8090

- We see high pairwise consistency even as low as 50K events
 - The exceptions, runs 46625 and 46677, had low internal consistency going out to 500K events
- Every run sees the a similar set of ~ 8.1 K bad channels
- High consistency between consecutive runs
 - e.g. 46619-46620
 - Suggests classification scheme is highly stable
 - Converse implies some different channels become hot between different runs

Hitrate PDF



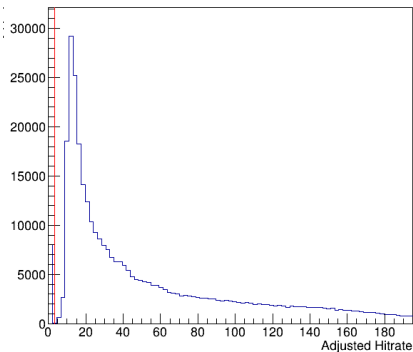
Hitrate Inverse CDF



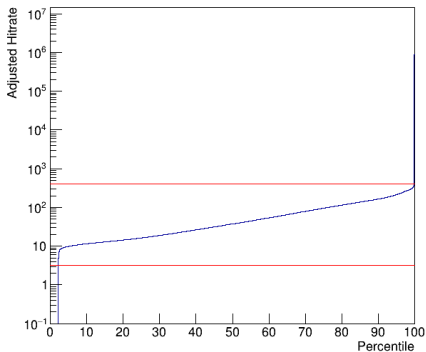
Run: 00046525 Events: 50000

4.614E-01 <= [hitrate] excludes 02.159%
[hitrate] <= 9.586E+01 excludes 00.121%
Keeping 97.720%

Hitrate PDF



Hitrate Inverse CDF



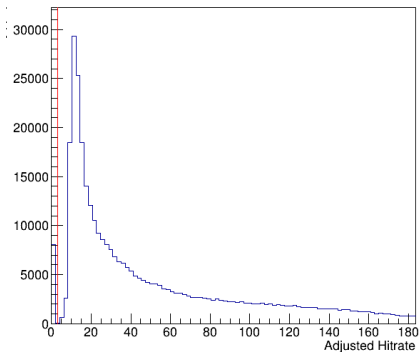
Run: 00046619 Events: 50000

3.149E+00 \leq [hitrate] excludes 02.162%

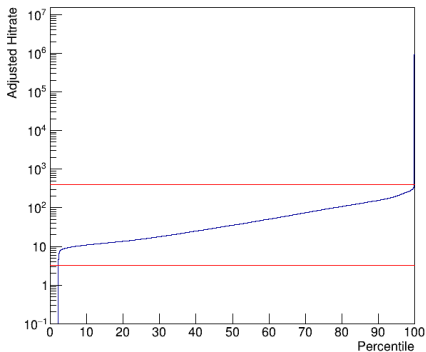
[hitrate] \leq 4.086E+02 excludes 00.033%

Keeping 97.805%

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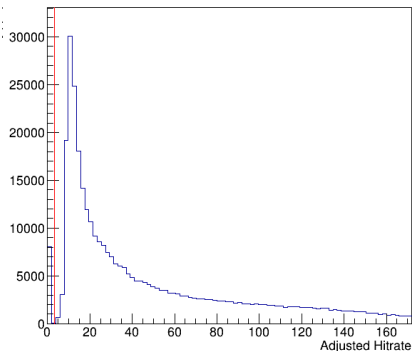
Hitrate Inverse CDF



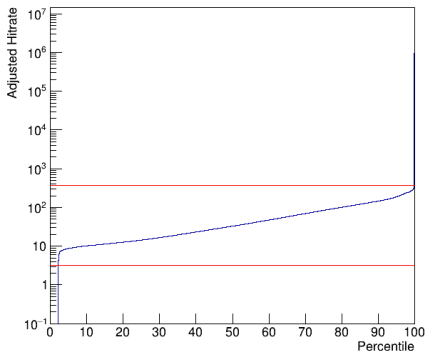
Run: 00046620 Events: 50000

3.249E+00 <= [hitrate] excludes 02.162%
[hitrate] <= 3.910E+02 excludes 00.027%
Keeping 97.810%

Hitrate PDF



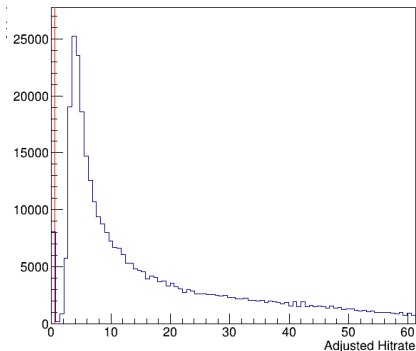
Hitrate Inverse CDF



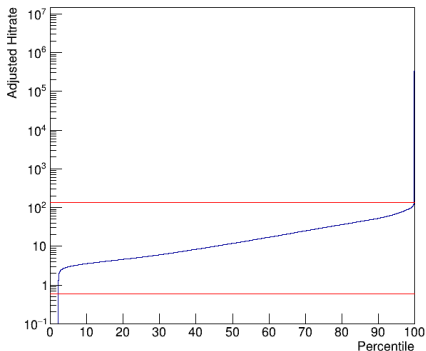
Run: 00046622 Events: 50000

3.166E+00 <= [hitrate] excludes 02.161%
[hitrate] <= 3.711E+02 excludes 00.028%
Keeping 97.811%

Hitrate PDF



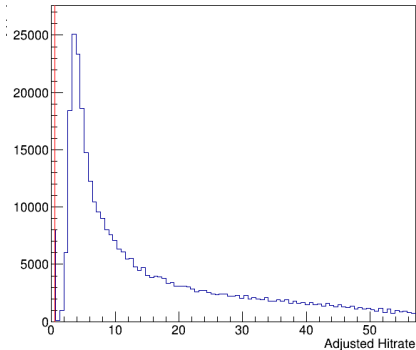
Hitrate Inverse CDF



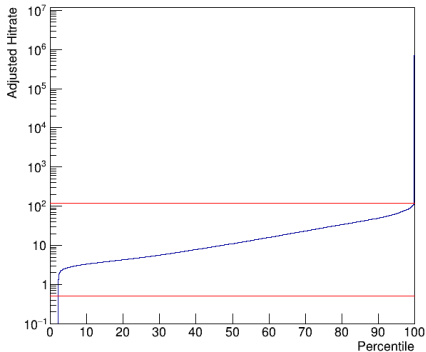
Run: 00046676 Events: 50000

5.842E-01 \leq [hitrate] excludes 02.163%
[hitrate] \leq 1.360E+02 excludes 00.032%
Keeping 97.806%

Hitrate PDF



Hitrate Inverse CDF



Run: 00046677 Events: 50000

5.001E-01 <= [hitrate] excludes 02.158%
[hitrate] <= 1.191E+02 excludes 00.096%
Keeping 97.746%