# HyCal TDC Offset Calibration for $^{12}C$ $\pi^0$-production Runs

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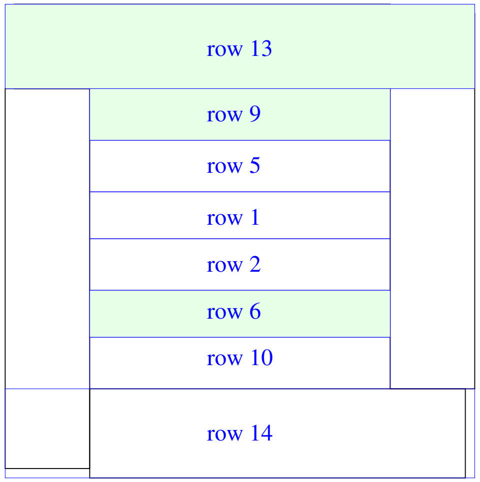
# Review: Fall 2004 HyCal TDC Configuration

Total # of TDCs: 16
- 8 vetical
- 8 horizontal

for Crystal: 12 TDCs
for Glass: 4 TDCs

crystal TDCs need 6 offsets
glass TDCs need 5 offsets

Total # of TDC offsets: 92



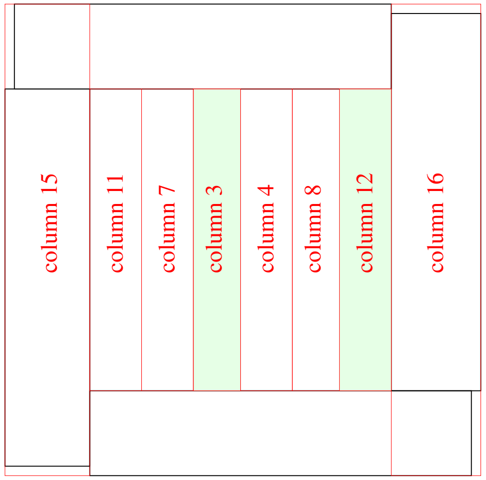

EXAMPLE
Event 62953
Run 5058, Carbon

HTRIGT:

| row | id | TDC |
|---|---|---|
| 0 | 3 | 25030 |
| 1 | 6 | 25029 |
| 2 | 9 | 509 |
| 3 | 12 | 509 |
| 4 | 13 | 478 |

HYCALCLUSTER:

| row | scheme | nhtits | id | E |
|---|---|---|---|---|
| 0 | 5 | 10 | 13 | 2.054 |
| 1 | 5 | 14 | 1166 | 2.214 |

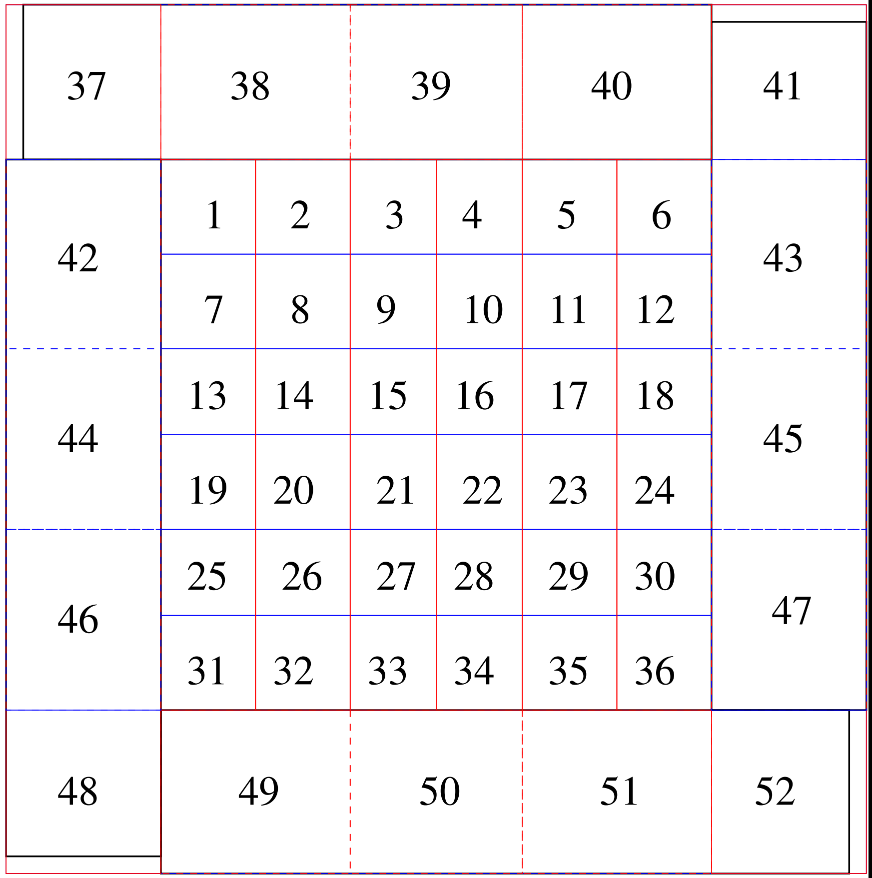


# Review: Trigger Square Id

52 groups:
groups contain ~36 channels

For crystal:
each group posseses 2 TDCs–
–a vertical and horizontal;
=>2 x 36 = 72 offsets needed.

For Glass:
only corner groups possess 2
TDCs, the others have only 1;
=>2 x 4 + 12 = 20 offsets.



# PrimEx CalDB System and Method of Calibration

hycal_timing system is a repository for hycal TDC offset calibration constants on run by run basis.

Attributes: each are 92 element arrays.

offset –– TDC offsets for verical and horizontal htrigt strip sums for each trigger square.

sigma –– Standard deviation of timing peak distribution used to determine. TDC offset.

Carbon Run range:[04502,05242]

––Started with I. Larin's 92 offsets.

––Reconstructed cluster times and linked clusters in time–coincidence with both each other and tagged photons.

––Passed all potential cluster pairs. (both with at least 1 time each) through pi0 filter;

––If pair passes pi0 filter, and is linked to a tagm photon, then the time diff. (cluster – tagger) is formed for each cluster and binned as a function of timing index.

## Calibration Details: Carbon Timing Run Regions

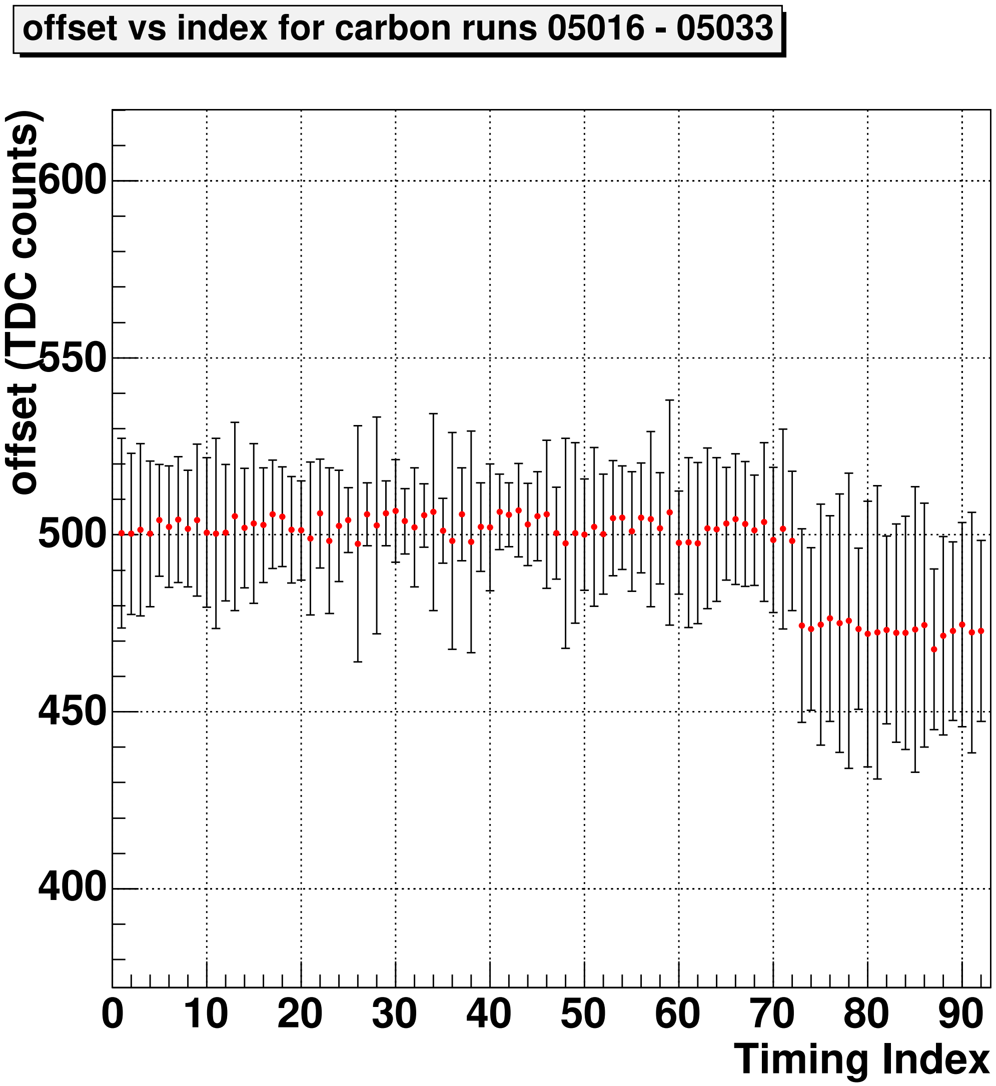
Carbon Run range:[04502,05242]

Split into 17 regions:

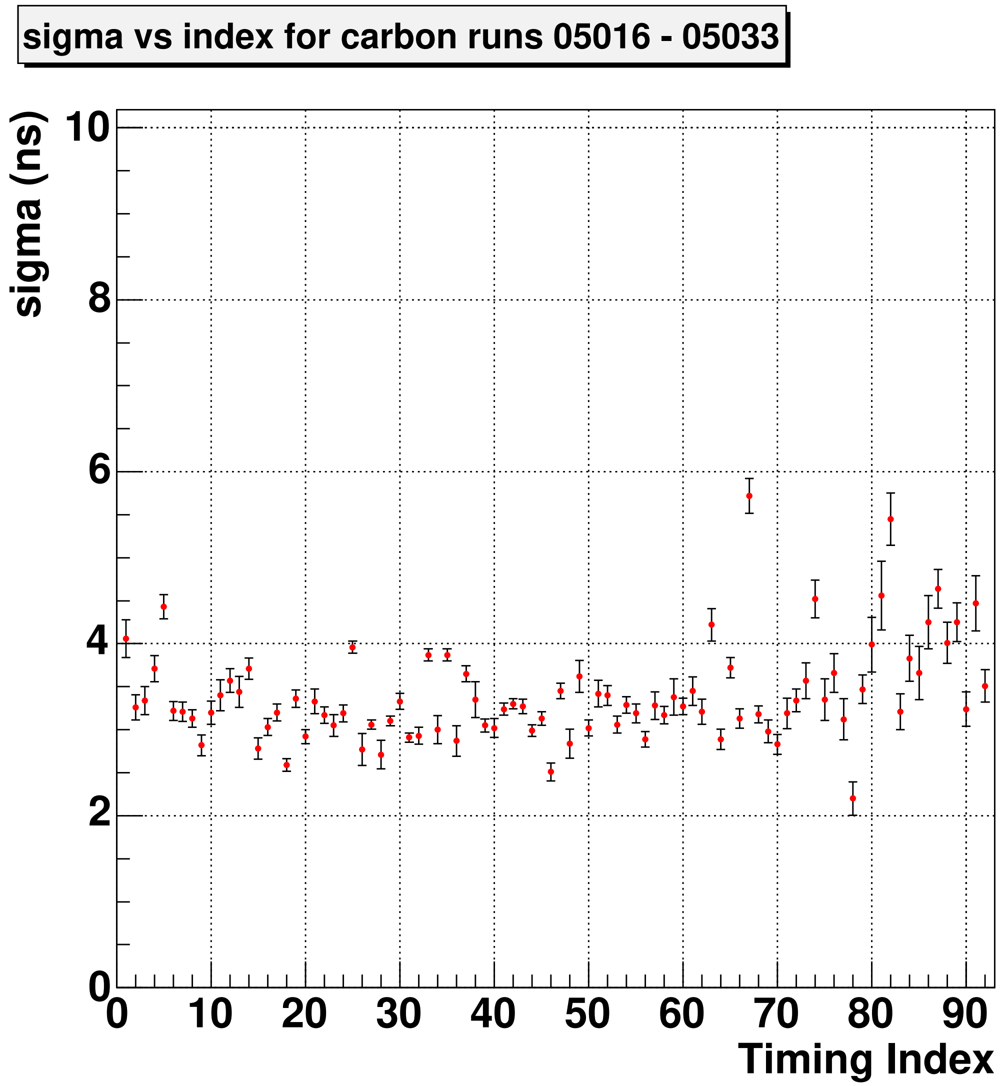
4502 – 4640
4717 – 4734 *
4738 – 4753 *
4754 – 4768 *
4976 – 4988
4989 – 5002
5016 – 5033
5034 – 5047
5048 – 5059
5060 – 5164
5165 – 5176
5177 – 5188
5189 – 5200
5201 – 5214
5215 – 5226
5227 – 5242

* These run regions possess a −10ns cluster time shift relative to other regions.

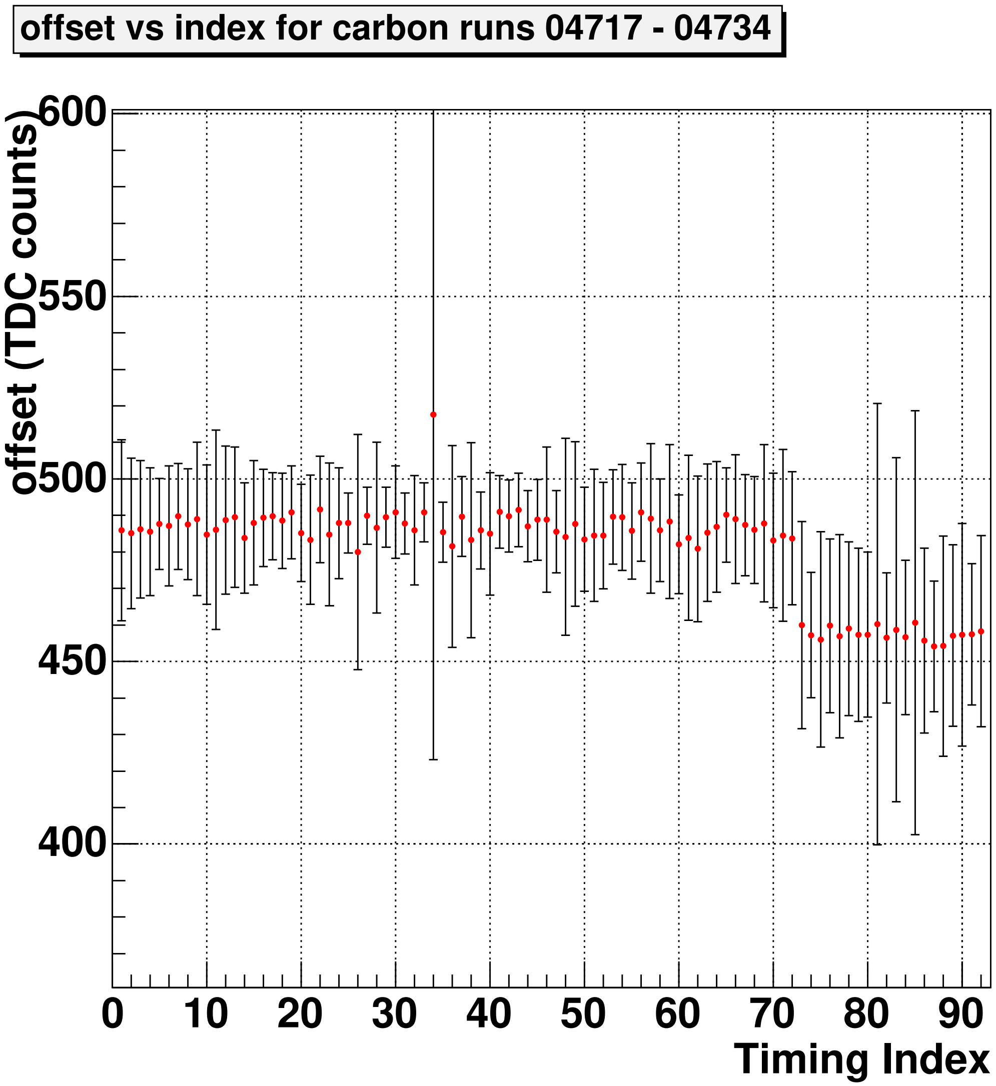
# Hycal TDC offset Results: runs 05016-05033



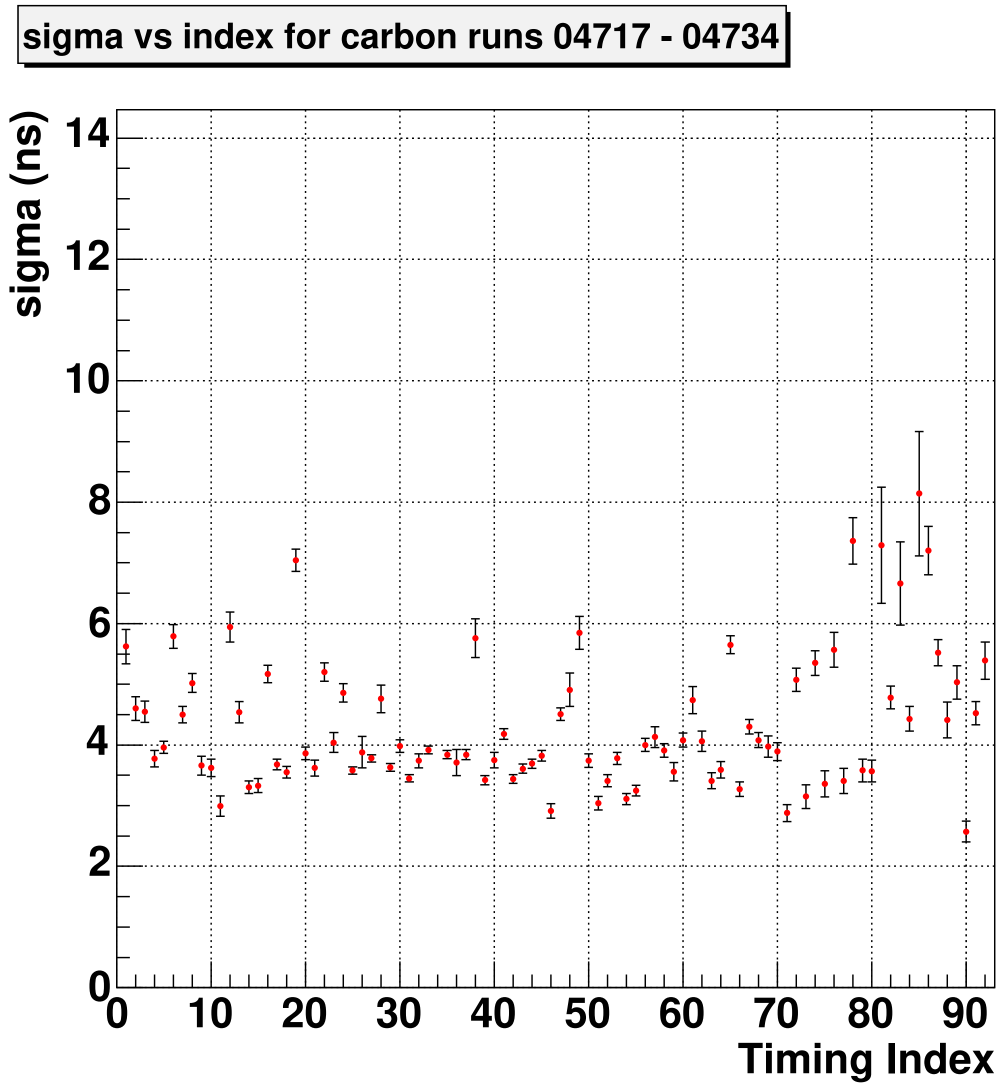
# Hycal TDC sigma Results: runs 05016-05033



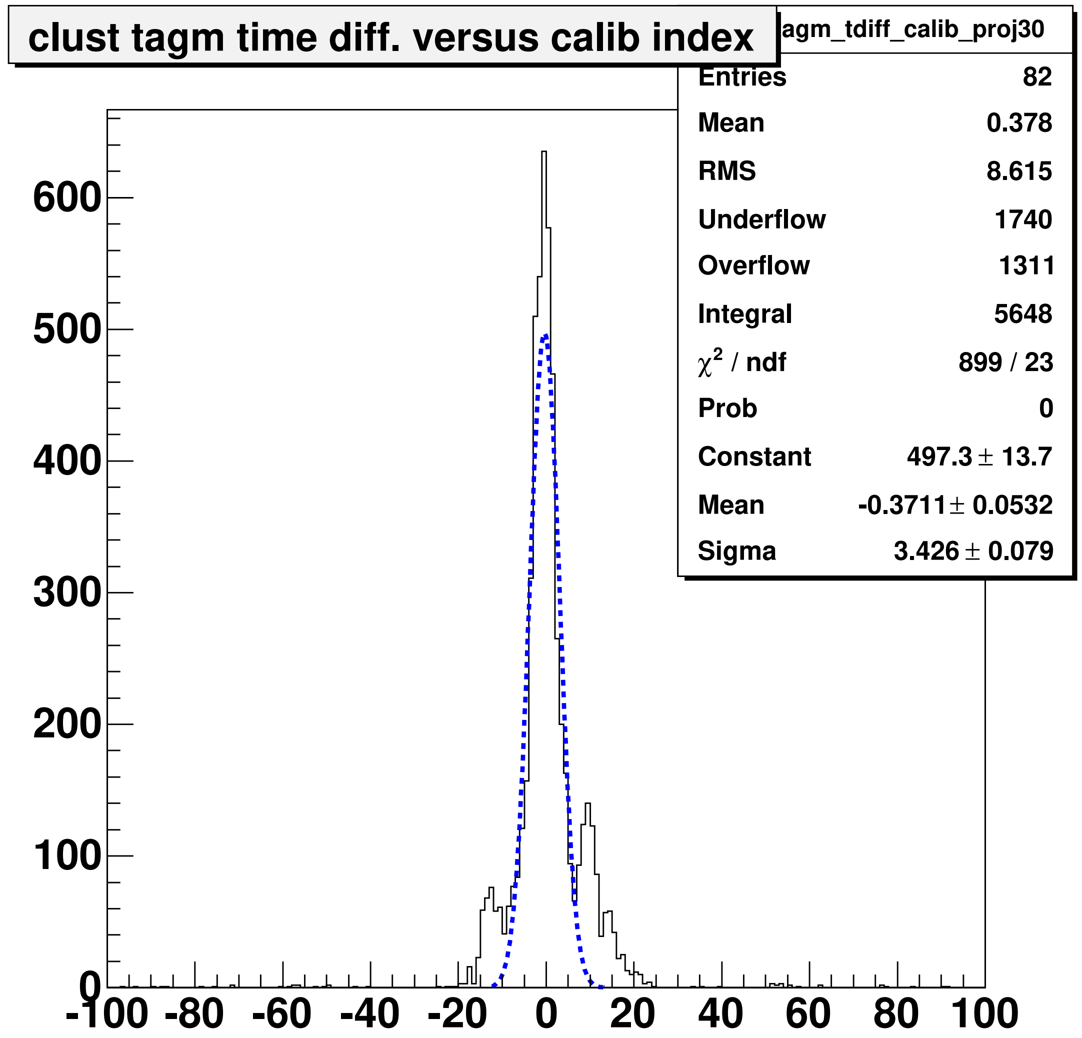
# Hycal TDC offset Results: runs 04717-04734



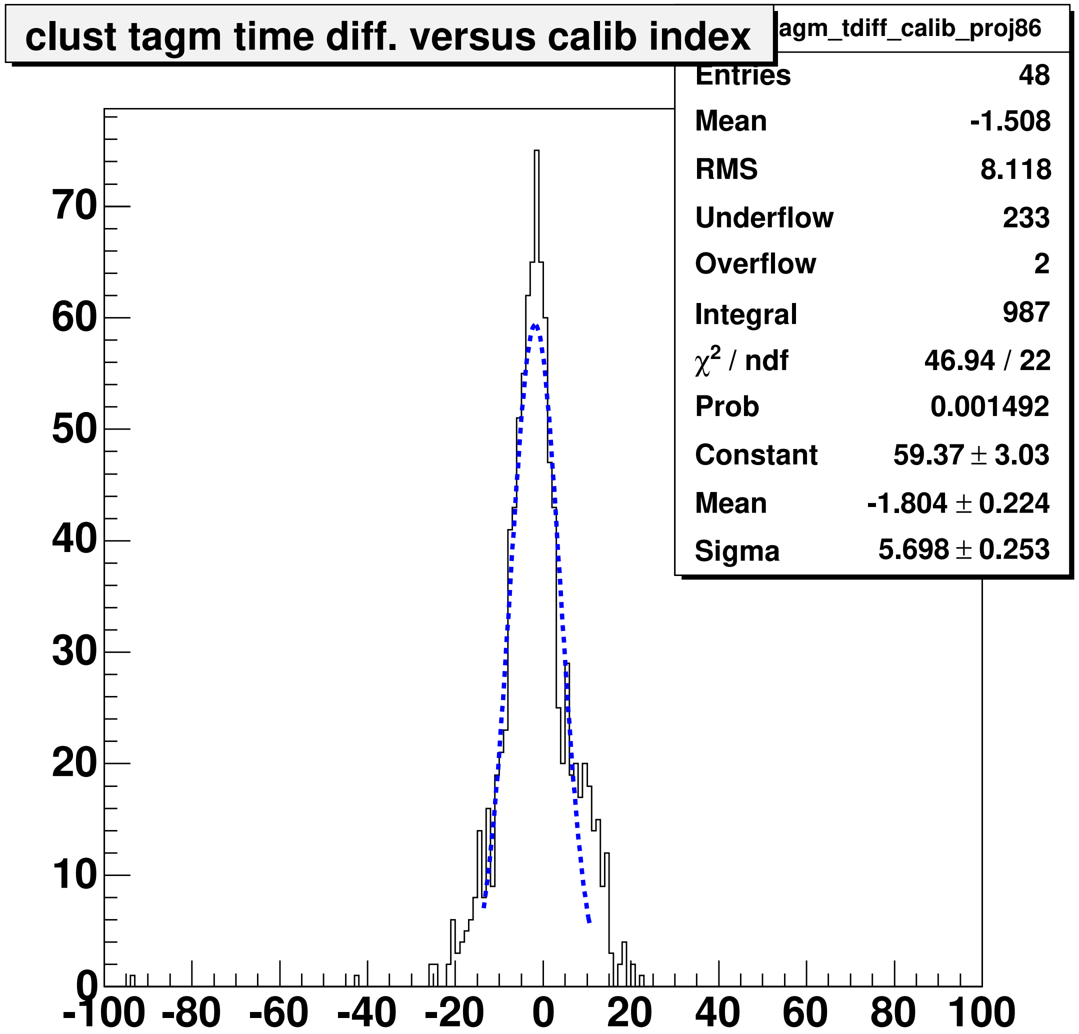
# Hycal TDC sigma Results: runs 04717-04734



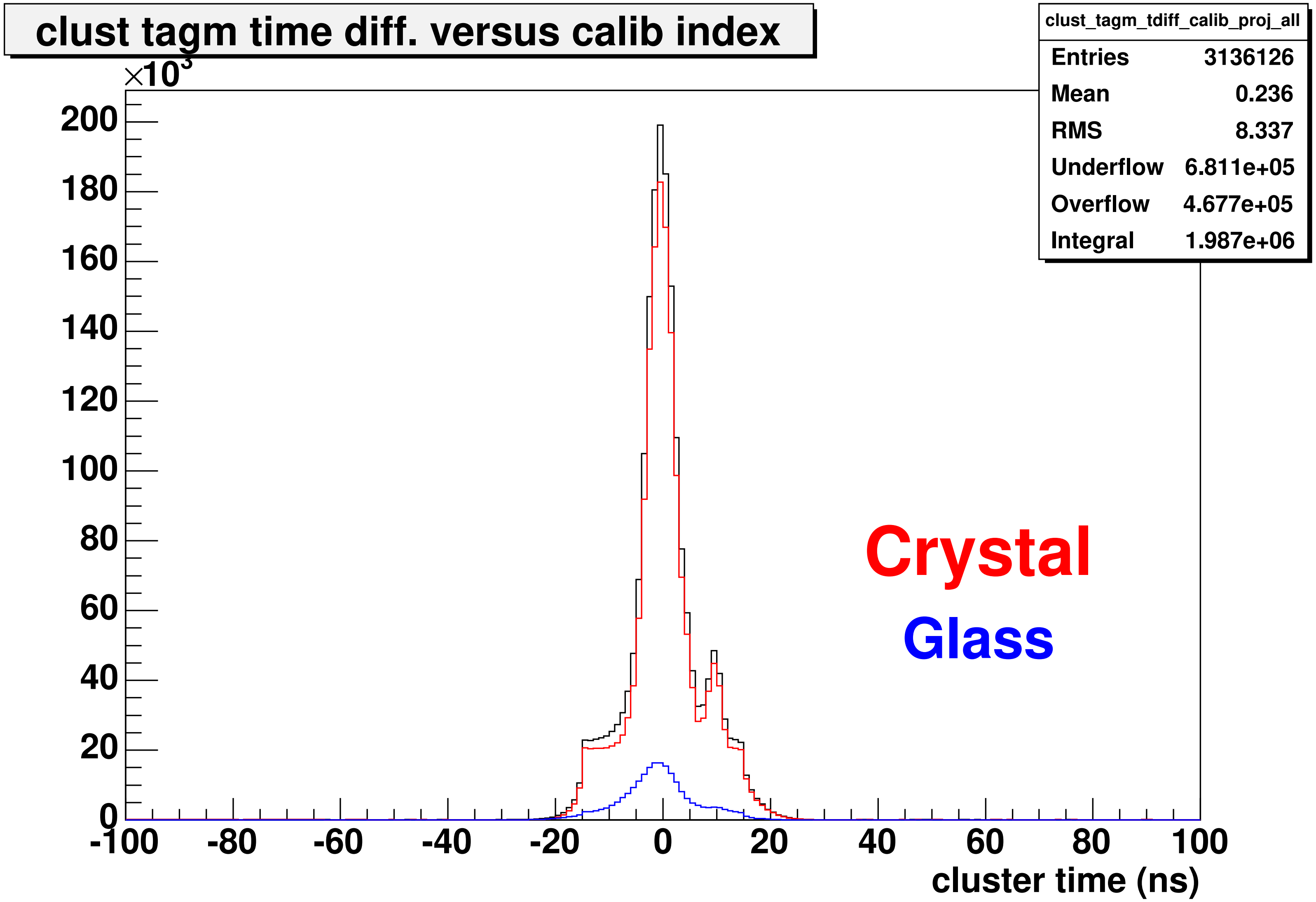
# Fit Example: runs 05016-05033, index 31 “crystal”



# Fit Example: runs 05016-05033, index 87 “glass”



# Sum of all Carbon Runs and timing Indices



# Sum of all Carbon Runs and timing Indices with Fit