

Trigger data blob

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- Information of each TDC is encoded in two 64-bits words:

Example

1011 1010 1110 0001 1000 1000 0110 0011 0000 0010 1010 1010 1111 1000 0000 0000

channel phase / fine time

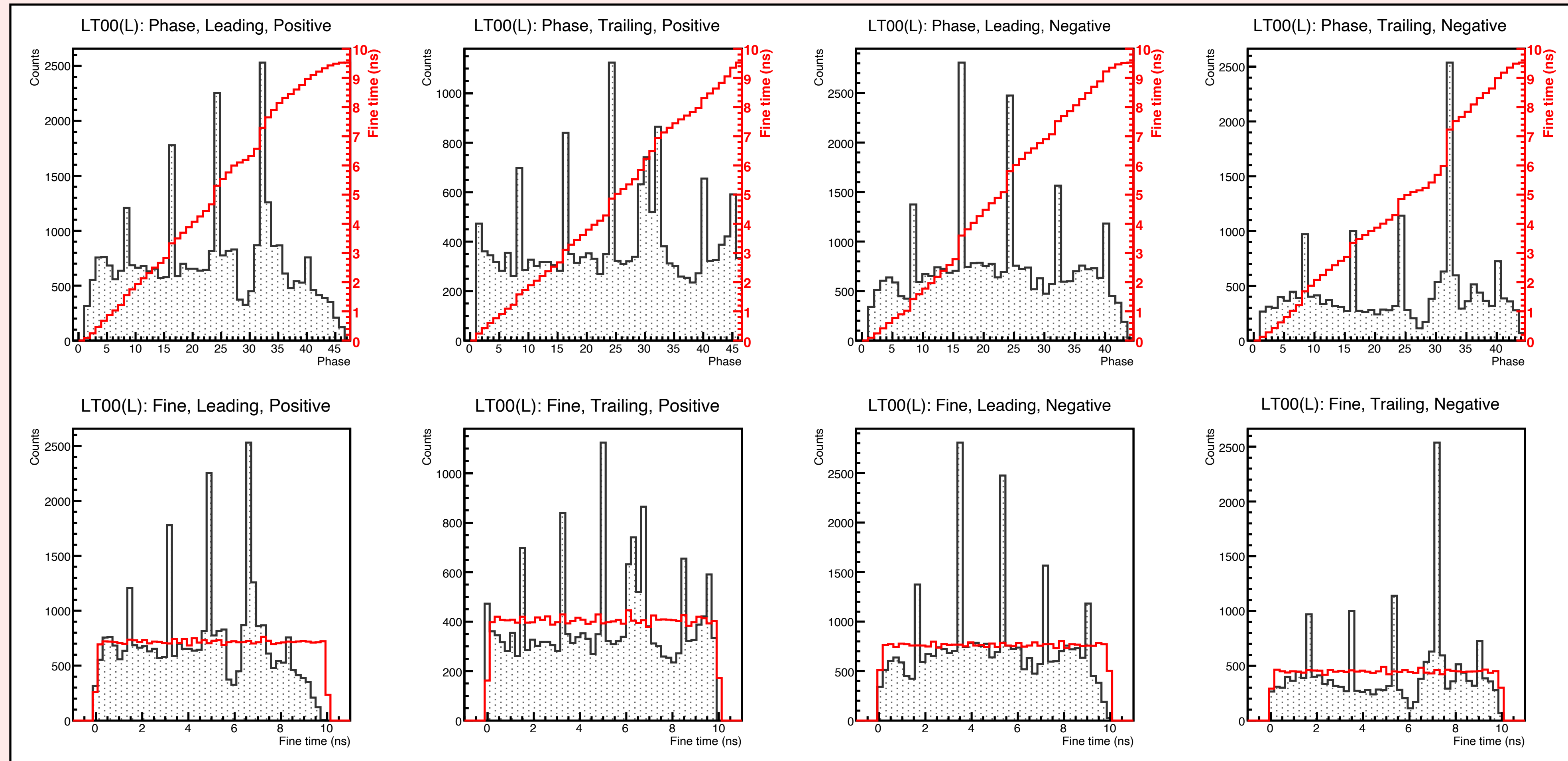
0111 1010 1110 0001 1000 1000 0110 0100 0000 0010 0010 0000 0000 0001 1111 1111

trailing edge

coarse time

- Overall time = coarse time + fine time
- 32 SiPM readout channels + A, B, T logic readout
 - A: OR of all channels on the left side
 - B: OR of all channels on the right side
 - T: A AND B
- Currently the analysis only looks at the 32 SiPM channels (because I am not sure what we need for ABT yet. Ideas?)

- Fine time are divided into a series of uneven bins covering the range of 1 - 10 ns
- For large enough number of event, the full distribution of fine time should be flat
- A lookup table is generated in the 1st event loop to convert phase to calibrated fine time



- The coarse bits record how many clock cycles ($T = 10 \text{ ns}$) have passed
- But the counting wraps around when the all bits are used (30 bits)
- Sorting is done in the 2nd event loop to find the wrap around points

Example

Raw time:

coarse: ... 1020 1021 1022 1023 0 1 2 3 ...
time: ... |----->|---WRAP--->|----->
epoch: ... n n+1 n+1

After sorting:

coarse: ... 1020 1021 1022 1023 1024 1025 1026 1027 ...

Time is monotonically increasing.

- Once we have the coarse time and calibrated fine time, all TDC overall times within the same channel are compared to sort them in order

recipes/trs.xml

```
[darklight]
  @include: init/all.ini
  source=DLMT
  destination=TrigScint

[plugins]
  TrigScint=libTrigScint

[startup]
  TrigScint=startup

[execute]
  TrigScint=decode
  TrigScint=load
  TrigScint=process_raw
  TrigScint=clear

[postprocess]
  TrigScint=calib

[execute2]
  TrigScint=decode
  TrigScint=sort
  TrigScint=load
  TrigScint=process_calib
  TrigScint=clear

[finalize]
  TrigScint=finalize
```

Load channel mapping and calibrations

Calibrate fine time

Sort coarse time
Calculate overall time
Plot calibrated time