Subject: Multihit TDCs in the PreSPEC setup (CAENv1290)
Posted by miree on Tue, 07 Oct 2014 12:18:37 GMT
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The CAENv1290 multihit TDC is a very common module in the PreSPEC setup.
In addition, there is more than one way to analyze v1290 data.
This topic is a place to collect successful methods for multihit-TDC analysis.

A CAENv1290 module has 32 channels with 25ps each. The trigger signal, to which the individual channels are referenced, has a resolution of (25ns I believe). You can think about it as if all of the 32channels have a 25ns random jitter. That jitter disappears if you look at differences between two channels. If there are several v1290 in one VME crate, the jitter is common to all channels in all modules, i.e. you can make differences even between channels of different modules.

A nice description of the module can be found in the first part of this document:
http://docs.nscl.msu.edu/daq/samples/CAEN%20V1290/CAEN_V1290_1.0.pdf
If you need really detailed information, read the v1290 manual:
http://www.tunl.duke.edu/documents/public/electronics/CAEN/caen_v1290.pd f

One way to do the reference subtraction: A single channel of one v1290 is said to be the "reference". This reference is then subtracted from all other channels. This is implemented for example in the UTILS.MhTdcPreprocessor (there are other versions of multihit TDC preprocessors around).
It gets some channels from a v1290 module into the input array called "input". It subtracts the value in "reference" from all of the values in "input". The differences are then calibrated (channel into units of ns) and written to the "diff" output array.
Because the active window of the module is very long (typically 10us) and the events of interest are typically within a few hundred ns, it is possible to set a gate around the interesting region in "diff". Every value outside that gate is dropped. All values of "diff" inside that gate survive and will be copied to "ouptut" array after subtracting the left border of the respective gate. Subtracting the gate boundary shifts the outputs in the range from 0 to a few hundred nanoseconds (depending on the size of the gate).

Subject: Re: Multihit TDCs in the PreSPEC setup (CAENv1290)
Posted by mlcortes on Wed, 28 Jan 2015 09:09:07 GMT
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I am trying a way to analyze the MhTDC of the FRS scintillators. The idea is to make all the possible differences between hits in both scintillators and take the first combination that gives a reasonable ToF.
I implemented this in a processor called TofSystemMhTDCSc un the UTILS plugin.
I use it like

```
processor MhTof/TofSystemMhTDC  UTILS.TofSystemMhTDCSc
  input_array[0] <- LyccaTargetTofCrate.mhtdc0[16] #Sc21L
  input_array[1] <- LyccaTargetTofCrate.mhtdc0[18] #Sc21r
  input_array[2] <- LyccaTargetTofCrate.mhtdc0[20] #Sc41l
  input_array[3] <- LyccaTargetTofCrate.mhtdc0[22] #Sc41r
```

```
   reference[0] <- LyccaTargetTofCrate.mhtdc0[31] #Trigger

   display hit_mult 100,0,100 in TofSystemMhTDC/Multiplicity

   display diff_visu_Tof_Left |  time_gate_Tof_Left  in TofSystemMhTDC/TofLeft
   display SelectedTime_Tof_Left       in TofSystemMhTDC/TofLeft

   display diff_visu_Tof_Right |  time_gate_Tof_Right in TofSystemMhTDC/TofRight
   display SelectedTime_Tof_Right       in TofSystemMhTDC/TofRight
end
```

After that I can take the Selected Time for left and right PMT and use the TofSystemTacCal processor.
It is still at testing stage, but maybe someone finds it useful.

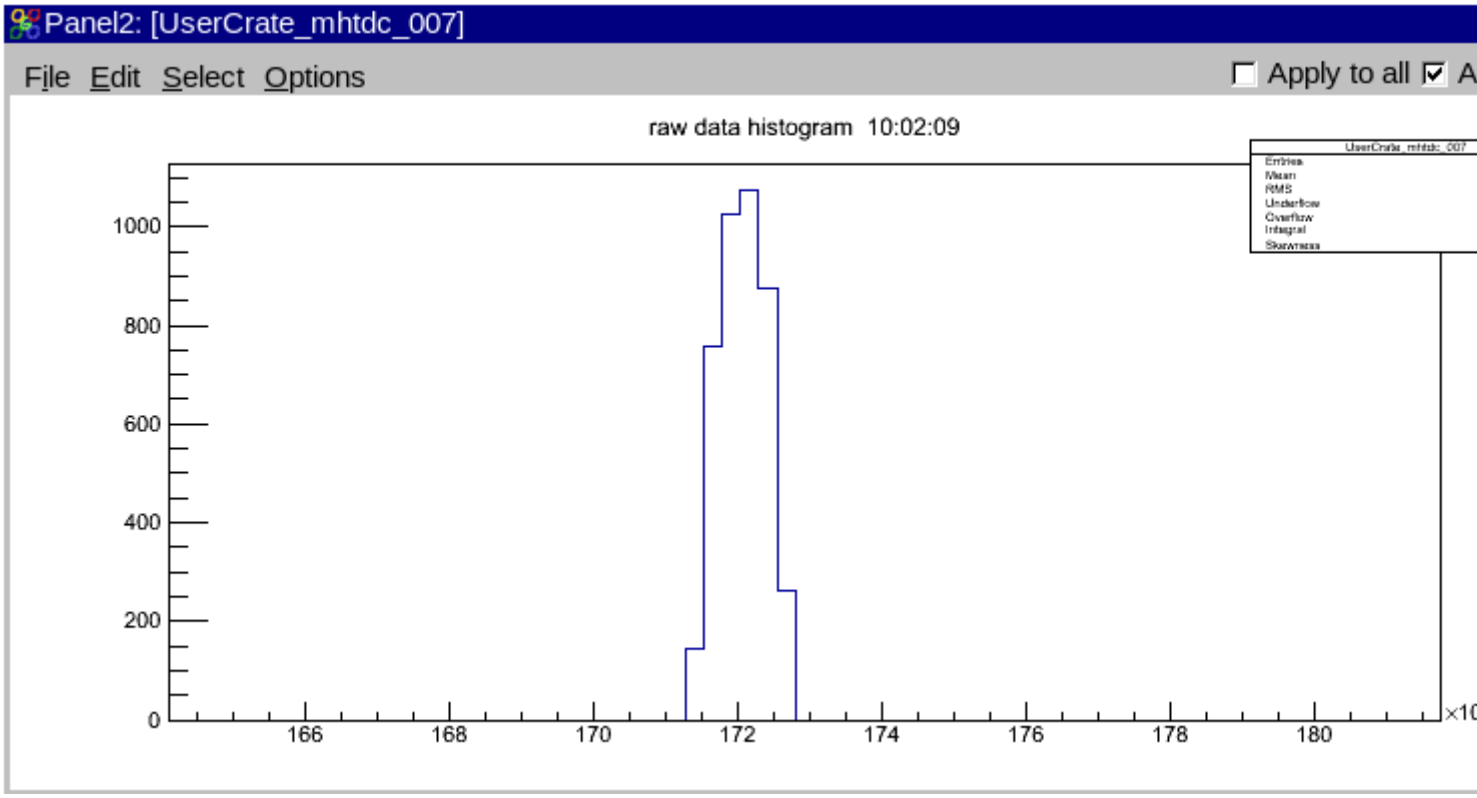
Subject: Re: Multihit TDCs in the PreSPEC setup (CAENv1290)
Posted by thuyuk on Tue, 23 Jun 2015 08:09:08 GMT
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Hi,

I was wondering what would be the reference signal in USER MHTDC (ch#7 in October 2012 run). According to what Liliana has posted, this would be the trigger. But, which trigger is this? It looks like this:

File Attachments

1) Screenshot from 2015-06-23 10:02:45.png, downloaded 1376 times



Subject: Re: Multihit TDCs in the PreSPEC setup (CAENv1290)
Posted by Damian Ralet on Tue, 23 Jun 2015 08:15:21 GMT
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Hi Tayfun,

I need to veryfy the lookup table, but from the shape of the signal this really look like the Master trigger signal.
The master trigger is the signal sent to all modules for any accepted trigger. A copy of it is put in one of the MH-TDC channel.

Cheers,
Damian

Subject: Re: Multihit TDCs in the PreSPEC setup (CAENv1290)
Posted by thuyuk on Tue, 23 Jun 2015 08:19:02 GMT
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Hi Damian,

Thank you for your answer. That makes sense.

cheers,
tayfun

Subject: Re: Multihit TDCs in the PreSPEC setup (CAENv1290)
Posted by thuyuk on Mon, 17 Aug 2015 11:16:10 GMT
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Dear All,

I agreed previously on Damian's idea on the ref signal in the MHTDC, but now we (Andres and myself) have strong suspicions that it should be the Master Trigger, because then we should see a spike instead of a distribution that is ~25 ns wide. what do you think?

Then, we need to know what is the Trigger of MHTDC and what is really the ref signal. Does anybody have the lookup table of the signals connected to the module channels for the 2012 runs?

Thanks,
Tayfun

Subject: Re: Multihit TDCs in the PreSPEC setup (CAENv1290)
Posted by miree on Wed, 26 Aug 2015 19:09:07 GMT
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Hi Tayfun,

With the v1290 multihit-TDC the full resolution of 25ps is only achieved for channel differences. If you make a histogram of one single multihit-TDC channel, it will always show the time distribution of the signal that was put into the channel, but folded with a ~25ns wide jitter. Because the jitter is identical on all channels, it disappears when you look at channel differences.

Concerning your trigger signal: You should see a spike - folded with a 25ns wide jitter signal - which gives a 25ns wide peak.

Michael

Subject: Re: Multihit TDCs in the PreSPEC setup (CAENv1290)
Posted by Damian Ralet on Tue, 15 Sep 2015 14:16:32 GMT
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Hi Tayfun,

Passing on the forum... sorry for the delay.
I think that the lookup table should be in the elog. Did you look for it there?

Cheers,
Damian

Subject: Re: Multihit TDCs in the PreSPEC setup (CAENv1290)

Posted by Damian Ralet on Tue, 15 Sep 2015 22:39:54 GMT
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Hi Tayfun,

These are the entry corresponding to the lookup table of 1290 of the user crate.

https://lxagata0.ganil.fr:8989/2012-04-26/8
https://lxagata0.ganil.fr:8989/2012-04-26/24
https://lxagata0.ganil.fr:8989/2012-08-27-perf-com/11
https://lxagata0.ganil.fr:8989/2012-10-01/29

I think that you can assume that the cabling was not changed after the last entry.
Damian

Subject: Re: Multihit TDCs in the PreSPEC setup (CAENv1290)
Posted by thuyuk on Wed, 16 Sep 2015 08:31:57 GMT
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Hi Damian,

That was very useful, thanks a lot.

Tayfun