EXP1803 - Analyzing #194

Analyzing # 183 (Открыта): Express analysis of experimental data

Calibration of time signals

05/18/2018 04:26 PM - Vratislav Chudoba

Status:	Открыта	**Start date:**	05/18/2018
Priority:	Высокий	**Due date:**	
Assignee:	Ivan Muzalevsky	**% Done:**	70%
Category:	Software	**Estimated time:**	0.00 hour
Target version:			

Description

We need to obtain calibration parameters for time information of all Si detectors. Value of one TDC channel is 0.3 ns for all of them. Calibrated file should be readible by "standart" TNeDet class and the main task is to determine offset for each strip. Calibration should be based on dE-tau figures for each picture. We need to find parameter b in

time = a*time_channel + b,

where "time" is in nanoseconds and "time_channel" is measured in channels. The parameterer a is equal to 0.3 ns.

History

#1 - 05/19/2018 01:10 AM - Ivan Muzalevsky

- File drawData.C added

- File CsI_fill.C added

Для файлов из 14 run, с помощью макроса Csi_fill.C сырые файлы склеивались, в данном случае сливались 20 файлов, а данные для телескопов пересчитывались в энергии, используя калибровочные параметры.

Первоначальная картинка Amp:Time для X стрипов (лицевой стороны) левого 1-мм детектора выглядела так: слева - данные с одного стрипа. справа - суммарная картинка

times.png

Для определения offset-ов использовался cut: Энергопотеря>14 МэВ. (гипербола выходит на прямой участок). С помощью макроса drawData.C строились проекции гипербол с выбранным катом на временную ось ось (горизонтальную), фитировались гауссом, положения пика записывались в файл. Для изучаемых стрипов было обнаружен следующий эффект:

- в стрипах 0-15 событий мало, положение пика в районе 1100 у.е. для стрипов 16-31 положение пика около 1450, статистика больше.
- Статистика становится омерзительно большой только в последних 8 стрипах. с 16 по 23 статистика такого же порядка, как и в 0-15.
- Пробовал двигать, убирать cut Энергопотеря>14 МэВ, формы, положения, количества событий остались в таком же соотношении.

time2.png time1.png

#2 - 05/20/2018 10:14 PM - Ivan Muzalevsky

- File positions.txt added

Получены предварительные параметры, делённые на 0.3 (для использования умножить на 0.3). И картинка сложения гипербол

timesShifted.png

#3 - 05/21/2018 03:43 PM - Ivan Muzalevsky

- File tPar.clb added

#4 - 05/21/2018 03:47 PM - Ivan Muzalevsky

- File deleted (tPar.clb)

#5 - 05/21/2018 03:49 PM - Ivan Muzalevsky

- File tPar.clb added

#6 - 05/23/2018 11:38 AM - Ivan Muzalevsky

- File deleted (CsI_fill.C)

#7 - 05/23/2018 11:38 AM - Ivan Muzalevsky

- File deleted (drawData.C)

#8 - 05/23/2018 11:38 AM - Ivan Muzalevsky

- File deleted (positions.txt)

#9 - 05/23/2018 11:38 AM - Ivan Muzalevsky

- File deleted (tPar.clb)

#10 - 05/23/2018 12:43 PM - Ivan Muzalevsky

- File CsI_fill.C added

- File drawData.C added

- File tParY_L.clb added

- File tParX_L.clb added

For analysis data was taked from: 159.93.80.161:/LynxOS/mbsusr/mbsdaq/mbsrun/exp201804/data/h5_14_00??.lmd (10-49). I was using 40 raw files from this run.

For data processing and drawing pictures two macroses were uses CsI_fill.C drawData.C. In the CsI_fill.C the thresholds taken from issue 187 were used for all strips in order to cut pedestals. Also data from Si detectors was recalculated into energy spectrums by using calibration parameters obtained in issue 187.

- Top left: Amp-Time correlation from strip №8 on the front side. We see expected shape of the distribution. For from side 2 TDCs were used (0-15 and 16-31 with different offsets)
- Top right: Amp-Time correlation from strip №28 on the front side. We see weird shape of distribution. Staticstics is higher. The different in statictics can be explaned by the mapping of X strips. Strips with bigger numbers were placed closer to the beam.
- Bottom left: Summ distribution of all strips on the from side
- Bottom right: Summ distribution for all stips with the selection of events with multiplicity=1 (multiplicity was calculated as the number of strips in which the amplitude was overpassed the threshold energy of this strip)

X_Lbefore.png

For calibration the linear approximation was used: time(ns) = k*channel + b.
Where the k was taked as 0.3 .
b was calculating as a difference of the positions of the distributions in the strip №0 and selected one.
Thats why after calibration all distribution should be replaced on the position of the one of the strip №0.

For calculating the position of the 2-d distribution showed above the 1-d time distribution (for example tSQX_L) was considered with the cut (amp>14MeV). The cut let us to get the position of the distr without analysing its curve. The obtained 1-d distruibution was fitted by gaus function from the left 50% to the right 50% of the peak maximum.

Pics are related to the last 4 SQX_L strips. you can clearly see the raising statistics as we going closer to the beam.

fitGauss.png

obtained calibration parameters for SQX_L were written into the file tParX_L.clb

By using this parameters calibrated 2-d distributions were obtained:
same distrutions, we can see that horizontal axis is in [ns] and summ distr has become more narrow.

X_Lafter.png

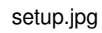
Same methods was used for SQY_L strips. Same pictures. We dont see different statistics here cuz the strips was placed almost in the same position with the beam.
By selection multiplicity =1 the weird distribution, not curved at all, was obtained (bottom right). From the top right pic we can still see events which are in not curved areas positions. (SQY_L

Y_Lbefore.png

Calibration parameters for Y_L were writted into tParY_L.clb. After calibration the following pic was obtained:
from these pics after calibration it can be suggested that calibration parameters are correct

Y_Lafter.png

Setup scheme



setup.jpg

#11 - 05/23/2018 12:52 PM - Ivan Muzalevsky

- % Done changed from 0 to 70

Files

CsI_fill.C	8.89 KB	05/23/2018	Ivan Muzalevsky
drawData.C	9.72 KB	05/23/2018	Ivan Muzalevsky
tParY_L.clb	216 Bytes	05/23/2018	Ivan Muzalevsky
tParX_L.clb	441 Bytes	05/23/2018	Ivan Muzalevsky