TASCA Go4 Analysis

OpenOffice document tascaGo4intro.odt (H.Essel, 8. July 2009) SVN rev. 347

Table of Contents

Set up account

The **tasca** account should be customized for more convenience. One should define a variable for the repository path:

export SVN=https://subversion:443/goofy/go4/applications/tasca

To create a new working copy of the repository, create a directory and

```
mkdir myws
svn checkout $SVN myws
cd myws
svn info
```

Then one can use **svn** commands like

```
svn list $SVN
```

to get a listing of the subversion repository. Some useful alias:

```
svndiff='svn diff --diff-cmd /usr/bin/diff -x "-EwbB" '
svndiffl='svn diff --diff-cmd /usr/bin/diff -x "-qEwbB" '
```

On a workspace directory these give a list of files different from repository (second line file list only).
Above has been added to .bashrc file (HE). Other useful alias can be defined here.

Set up working directory

Once the directory is made an **svn** working directory (by checking out a repository to it) there are few commands to deal with the repository:

```
svn info
```
      show the repository the workspace belongs to

```
svn list $SVN
```
      list of repository

```
svn update
```
      update workspace from repository

```
svn commit -m "enter here comment" [file]
```

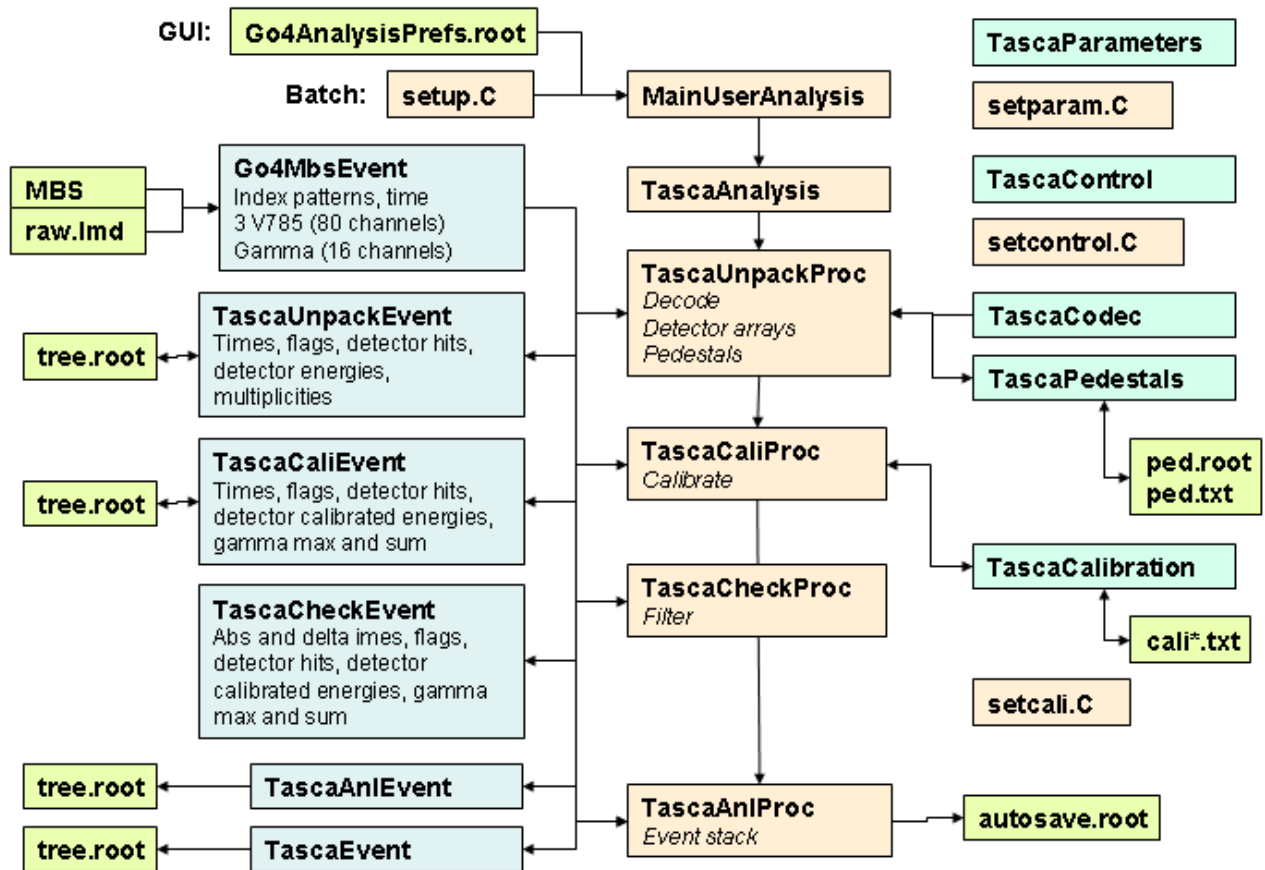copies all changed files to repository. If a file is specified, only this file is copied (if modified).

After login

Setup everything for Go4 (**now already done in .bashrc**)

. go4login 403-00

. lealogin

(Note the space behind the dot.)

Go4 analysis steps

The Go4 analysis

To build the Tasca analysis, simply:

make

The executable made is

MainUserAnalysis

It can be called from shell or is started from GUI. In principle it does the same in both cases.

Batch mode

The analysis is steered by a ROOT macro file setup.C. You can edit this file before running the analysis. There are the following lines:

```
TString unpackProcess("yes");
TString unpackStore("no");
TString unpackOverWrite("yes");

TString caliProcess("yes");
TString caliStore("no");
TString caliOverWrite("yes");

TString checkProcess("yes");
TString checkStore("no");
TString checkOverWrite("yes");

TString analysisProcess("yes");
TString analysisStore("no");
TString analysisOverWrite("yes");

TString autosave("yes");
Int_t autosaveinterval=0; // after n seconds, 0 = at termination of event loop
```

Examples:

MainUserAnalysis -f file.lmd
MainUserAnalysis -f @file.lml

processes file or list of files. respectively.

MainUserAnalysis -t r4-4 10000

connects to MBS transport node R4-4 and processes 10000 events.

Usually in batch mode one either writes an auto-save file (containing all histograms, parameters, etc.), and/or any event file. The auto-save file name and the event file names are prefixed by the input file or node name

b_r4-4_AS.root, b_r4-4_Unpacked.root, b_r4-4_Calibrated.root, b_r4-4_Checked.root, b_r4-4_Analysis.root

The b_ is added in batch mode only. Any of these can be opened by ROOT or in the GUI. To process these in batch:

MainUserAnalysis -f r4-4

The pre and postfixes are added automatically.

To process files from a data directory, the variable

export TASCASTORE=/data.local3/x/x/x

must be set. Then all files are read and stored from/to it. Currently no files can be stored on a directory different from the source directory.

Interactive mode

In interactive mode the analysis is started by the GUI. In this case, the file name prefix is the analysis name specified in the Start Client panel. This name is saved by Save Settings . In addition the prefix b_ is changed to i_ . Further setup is specified in the configuration panel coming up after starting the analysis. Default settings are the ones from setup.C. This setup can be modified interactively and can be stored (NOTE: after Submit!) in

4

Go4AnalysisPrefs.root

from where it is retrieved next time the analysis is started. If this file is present, the settings from setup.C are overwritten.

The analysis steps

The analysis is divided into four steps as shown in the figure.

Unpacker step

Input: LMD file or MBS (transport, stream server, event server)

Output: ROOT tree with values of all detector channels and detector hit lists. Details in TascaUnpackEvent.h

Autosave: Controls, Parameters, Pedestals and Codec
Histograms in directory Unpack: Adc_nn GammaE_n GammaT_n Pedestals Contents AdcAllRaw AdcAllCal TraceRaw_nn TraceE_nn Hist_nn Pileup_nn

Processing: TascaUnpackProc constructor creates the parameters, histograms and pictures. Method *TascaUnpack* uses parameter class TascaCodec to decode Adc values, gamma values, and fills the data fields of TascaUnpackEvent. TascaCodec also contains the mapping tables for the multiplexed channels.

Calibrator step

Input: TascaUnpackEvent (from Unpack step or from file)

Output: ROOT tree with calibrated values of all detector channels and gammas. Hit indices of all detectors and their values. Details in TascaCaliEvent.h

Autosave: Controls, Parameters, Calibration, CaliFitter
Histograms in directory Cali: All detector channels, gamma channels, Sum of detector channels.

Processing: Filling histograms and TascaCaliEvent data fields.

Checker step

Input: TascaCaliEvent (from Unpack step or from file)

Output: ROOT tree with calibrated hits. Hit indices of all detectors and their values.
Condition filters: EvrH, AlphaL, Alpha1L, Alpha2L, Fission1H, Fission2H, BackH
Limits set in setparam.C
Details in TascaCheckEvent.h

Histograms in directory Check: 2d histograms of stop detector (Energy-Xstripe) for each Ystripe.
Autosave: Controls, Parameter

Processing: Filling histograms and TascaCheckEvent data fields.

Analysis step

Input: TascaCheckEvent (from Checker step or from file)

Output: ROOT tree with data from TascaAnlEvent.h (currently none) or TascaEvent.h

Autosave: Creates parameters Controls, Parameters
Processing: Looking for chains, Create plain ROOT tree from TascaEvent

Control files

There are some ROOT macro files to setup several parameter values.

setcontrol.C : Lines to change:

```
    fControl->writeChainTree =kTRUE; // used by Analyzer
    //fControl->ChainCounter =0; // used by Analyzer. Without Autosave: will be 0
    fControl->UnpackHisto  =kFALSE; // used by Unpacker
    fControl->CaliHisto    =kFALSE; // used by Calibrator
    fControl->CheckHisto   =kFALSE; // used by Checker
    fControl->AnlHisto     =kFALSE; // used by Analysis
    fControl->checkTof     =kFALSE; // used by unpacker
    fControl->checkChopper =kFALSE; // used by unpacker
    fControl->checkMacro   =kFALSE; // used by unpacker
    fControl->checkMicro   =kFALSE; // used by unpacker
    fControl->TofMustbe    =kTRUE;  // used by unpacker
    fControl->ChopperMustbe=kTRUE;  // used by unpacker
    fControl->MacroMustbe  =kFALSE; // used by unpacker
    fControl->MicroMustbe  =kFALSE; // used by unpacker
```

setparam.C : Lines to change:

```
// Used by Checker
// Energy windows MeV
        Float_t EvrHmin     = 4.000,   EvrHmax      = 15.000;
        Float_t Alpha0Lmin = 9.800,   Alpha0Lmax  = 10.200;
        Float_t Alpha1Lmin = 9.700,   Alpha1Lmax  = 10.100;
        Float_t Alpha2Lmin = 8.970,   Alpha2Lmax  =  9.3700;
        Float_t Fission1Hmin=60.000,  Fission1Hmax=220.0000;
        Float_t Fission2Hmin=60.000,  Fission2Hmax=220.0000;
        Float_t BackHmin    =10.000,  BackHmax     = 80.000;
// Time windows sec
        Float_t fAlphaTmin   =0.,     fAlphaTmax   =900.;
        Float_t fAlpha1Tmin  =0.,     fAlpha1Tmax  = 20.;
        Float_t fAlpha2Tmin  =0.,     fAlpha2Tmax  =180.;
        Float_t fFission1Tmin=0.,     fFission1Tmax=900.;
        Float_t fFission2Tmin=0.,     fFission2Tmax= 70.;
...
        fp->shift=5;               // Unpacker gamma decoder for energies
        fp->Adc80TofMin=300;       // signals Tof (instead of TOF register)
        fp->AdcThreshold=100;      // Unpacker uses this is minimum raw value
        fp->EventStackSize=100000; // used in Analysis
        fp->AlphaMaxL=16000.;      // Calibrator take low value up to this limit. Above
        fp->AlphaMaxH=30000.;      // take high value up to this limit as low
        fp->AlphaMinL=1000.;       // Unpacker raw minimum value for alpha
        fp->AlphaMinH=1000.;       // Unpacker raw minimum value for alpha
```

setcali.C steers the calibration:

```
  fCalibration->EnableCalibration(kTRUE);   // use calibration or not
  fCalibration->SetPrefix("cali2");         // prefix for coefficient files
```

Processing LMD files

To process several LMD files at once and store the results in one root file, one must create a text file with extension .lml and specify this file preceded by an @ instead of the LMD filename. The runbatch.sh script does that on the fly (see below). File names are t018fRRRFFFF.lmd, where RRR is the run number, FFFF the file number.

Example t018f0790.lml

```
/data.local1/tasca/t018f0790381.lmd
/data.local1/tasca/t018f0790382.lmd
/data.local1/tasca/t018f0790383.lmd
/data.local1/tasca/t018f0790384.lmd
/data.local1/tasca/t018f0790385.lmd
/data.local1/tasca/t018f0790386.lmd
/data.local1/tasca/t018f0790387.lmd
/data.local1/tasca/t018f0790388.lmd
/data.local1/tasca/t018f0790389.lmd
```

I recommend to process in batch mode Unpacker and Calibration steps from one file set into one root file. Then run Checker from this root file. Append output of all inputs (output files from one file set of 4 GB are few 10 MB). Resulting ROOT file can be fast scanned by Analysis step.

It might be necessary to find events by event number in LMD files. For this purpose in each event the run and file number is stored (Run is high two bytes, file number low two bytes). In the ROOT files these events can be found easily

6

via macros like filter...C or print...C macros. If one wants to create an LMD subset,

Create the LML files by changing into LMD file directory, then:

lmlrmake t018f 3 146

This creates files t018fRRR.lml with RRR=003 to 146 containing lists of files t018fRRR*.lmd including full path. Create the LMD directory files by command:

lmdirmake <directory of LMD files>
lmdirmake -f file

The second command processes only one file. Search for events by command:

lmdirshow <directory> [event number]
lmdirshow -f file [event number]

Again the second command checks only one file.

LMD files have been moved to directories

/d/ship01/tasca/t018/badfiles
/d/ship01/tasca/t018/backup
/d/ship01/tasca/t018/calibration
/d/ship01/tasca/t018/targettest

Because working directly from /d was incredible slow, we first copy the data to local disk, then process, and remove the LMD files (from local disk). The place for the processed ROOT files and LMDIR files is on lxg0708:

/data.local3/offlinedata
/u/tasca/GO4_offline_t018/data

second being a soft link to the first for convenience.

GO4 analysis is in directories of

/u/tasca/GO4_offline_t018

The code for the actual batch run is in checked01, data on data/stepdata/lmdir,calibrated0x,checked0x. There is also a shell script to execute:

runbatch.sh first last

First and last are numbers xxx mentioned above.

collectchecked.C(dirfile,rootfile,events)

root -b -l "collectchecked.C(\"p01.list\",\"b_p01_Checked.root\",0)"

copies all checked ROOT files from a container text file into one. Additional filters could be applied.

filtercheckedY.C

copies all checked ROOT files with fast filter. Similar to collectchecked.C but uses partial read. One event cane be printed by

printcheckevent.C

root -b -l "printcheckevent.C(\"b_p01_Checked.root\",event)"

Analysis chain

1. Produce ROOT files with calibrated and checked events. All LMD files of a run go into one ROOT file. Adjust runbatch.sh script to the correct directories. In **setup.C** activate the Unpacker, Calibrator, and Checker. Activate output for Calibrator and Checker.
   time runbatch.sh 196 206 >> runbatch196-206.log

2. Collect ROOT files with checked events into phase ROOT files like phase p04:
   time root -b -l "collectchecked.C(\"t018p04-196-206.list\",\"../data/stepdata/checked03/b_p04_Checked.root\",0)"

3. Run GO4 Analysis to search for chains. In **setcontrol.C** parameter **writeChainTree** steers the production of ROOT tree file with the chains named xxx_Chains.root, where xxx is the first name part of the input tree file. In setup.C Deactivate all steps and activate Analysis.
   ./MainUserAnalysis -f p04 >> chainsSFoffp04.log

4. To get a complete printout of the data of a chain, use
   printevent.C(rootfile,chain number)
   root -b -l "printevent.C(\"b_p04_Chains.root\",23)"

Analysis results

Unpacker sets isTof when adc[80] is above Adc80TofMin (set to 300 in setparam.C).
Unpacker sets isVeto when any VetoL is above 0.
Unpacker calculates multiplicities for StopXY above AdcThreshold (set to 100 in setparam.C).
Unpacker calculates System time in msec with offset SystemTimeSecOff=1243462631 from first file.

Calibrator copies XH(YH) to XL(YL) when XL(YL) is above AlphaMaxL (set to 16000 KeV in setparams.C).
Calibrator skips events with true isVeto.

Checker filters out Evr, SF and Alpha.
Evr: isTof & isMacro & energy XH in [4 , 15] MeV.
Alpha: NOT isTof & energy XL or energy (XL+BL if BL>4) in [8.97, 10.2] MeV.
SF: NOT isTof & energy XH in [60 , 220] MeV.

Analyzer looks for SF & NOT isMacro & YHindex>=0. Then it steps back 250 [s] (10 s for short run) looking for Alphas and Evrs which have the same X and Y±1 stripe.
Runs 32-222 show 84 chain candidates. All raw data files containing chain fragments (114 files, 52GB) were composed into ROOT files with calibrated events (8 files, 8.5 GB) and checked events (1 file, 0,6GB).

This takes 140m

Time covered: 275.722 s (~3d).

Unpacker writes 230,006,511events.
Calibrator writes 181,529,526 events (79%) 8 GB
Checker writes   12,715,418 events (6%) 0.6 GB
Analyzer reads   12,715,418 events, SF 3,931,482 (processed 726), Alphas 260,536, EVRs 8,523,436
Analyzer writes 84 chains with 553 events. (Some Alphas and Evrs are counted double when chains overlap). 59KB

This takes 7m

Following the results of long chain window (250s). Only chains found by other program are shown. In two chains there are missing members. In run 163 the EVR has Veto=275 and is skipped. In run 179 EVR is below Energy, and one Alpha is in X=123 instead of 122. The events marked `CaliEvent` are printouts by event number as identified by other program.

Note that by a bug in the printout the absolute System time in [ms] is printed negativ (%d instead of %u). But the delta times are calculated and printed correctly.

```
/data.local1/tasca/b_t018selection_Chains.root
Event Chain    2 Run  42 File  196 Evt  74546917 Tof:1 Off:0 EVR:1 Al:0 SF:0
  [ms] 475187373 [mysec] Sys    373588 Gam        0 Adc 2640062660, d [msec] Sys  0.000 Gam  0.000 Adc 17.946
  StopXL(H) i  22 ( 22), [MeV]   5.556 ( 5.504) StopYL(H) i  11 ( 11), [MeV]   2.064 ( 1.473)
  BackL(H)  i  -1 ( -1), [MeV]   0.603 ( -2.878) VetoL(H)  i  -1 ( -1), [MeV]   0.000 ( 0.000)
  Gamma [MeV] Sum 7.600589 Max 7.233443  XMulti  1 ( 1)
Event Chain    2 Run  42 File  196 Evt  74612240 Tof:1 Off:0 EVR:1 Al:0 SF:0
  [ms] 475267016 [mysec] Sys     16379 Gam        0 Adc 2719706683, d [msec] Sys 79.643 Gam  0.000 Adc 55.580
  StopXL(H) i  22 ( 22), [MeV]   9.956 ( 10.072) StopYL(H) i  11 ( 11), [MeV]   9.961 ( 10.129)
  BackL(H)  i  -1 ( -1), [MeV]   0.603 ( -2.878) VetoL(H)  i  -1 ( -1), [MeV]   0.000 ( 0.000)
  Gamma [MeV] Sum 0.709099 Max 0.709699  XMulti  1 ( 1)
Event Chain    2 Run  42 File  196 Evt  74632116 Tof:1 Off:0 EVR:1 Al:0 SF:0
  [ms] 475291217 [mysec] Sys    217849 Gam        0 Adc 2743908524, d [msec] Sys 24.201 Gam  0.000 Adc 38.748
  StopXL(H) i  59 ( 22), [MeV]   4.577 ( 4.577) StopYL(H) i  10 ( 10), [MeV]   4.610 ( 4.358)
  BackL(H)  i  -1 ( -1), [MeV]   0.603 ( -2.878) VetoL(H)  i  -1 ( -1), [MeV]   0.000 ( 0.000)
  Gamma [MeV] Sum 12.459943 Max 7.103706  XMulti  2 ( 2)
Event Chain    2 Run  42 File  197 Evt  74694172 Tof:1 Off:0 EVR:1 Al:0 SF:0
  [ms] 475367111 [mysec] Sys    111299 Gam        0 Adc 2819803149, d [msec] Sys 75.894 Gam  0.000 Adc 21.505
  StopXL(H) i  22 ( 22), [MeV]  11.274 ( 11.462) StopYL(H) i  12 ( 12), [MeV]  11.267 ( 11.118)
  BackL(H)  i  -1 ( -1), [MeV]   0.603 ( -2.878) VetoL(H)  i  -1 ( -1), [MeV]   0.000 ( 0.000)
  Gamma [MeV] Sum -0.000500 Max 0.000300  XMulti  1 ( 1)
Event Chain    2 Run  42 File  197 Evt  74695731 Tof:1 Off:0 EVR:1 Al:0 SF:0
  [ms] 475368970 [mysec] Sys    970763 Gam        0 Adc 2821662642, d [msec] Sys  1.859 Gam  0.000 Adc  0.553
  StopXL(H) i  22 ( 22), [MeV]   9.119 ( 9.145) StopYL(H) i  12 ( 12), [MeV]   9.093 ( 8.972)
  BackL(H)  i  -1 ( -1), [MeV]   0.603 ( -2.878) VetoL(H)  i  -1 ( -1), [MeV]   0.000 ( 0.000)
  Gamma [MeV] Sum -0.000500 Max 0.000300  XMulti  1 ( 1)
Event Chain    2 Run  42 File  197 Evt  74701476 Tof:1 Off:0 EVR:1 Al:0 SF:0
  [ms] 475376071 [mysec] Sys     71825 Gam        0 Adc 2828763814, d [msec] Sys  7.101 Gam  0.000 Adc  1.130
  StopXL(H) i  22 ( 22), [MeV]   6.406 ( 6.364) StopYL(H) i  11 ( 11), [MeV]   6.370 ( 6.282)
  BackL(H)  i  -1 ( -1), [MeV]   0.603 ( -2.878) VetoL(H)  i  -1 ( -1), [MeV]   0.000 ( 0.000)
  Gamma [MeV] Sum 8.031973 Max 7.192440  XMulti  1 ( 1)
Event Chain    2 Run  42 File  197 Evt  74704396 Tof:1 Off:1 EVR:0 Al:1 SF:0
  [ms] 475379660 [mysec] Sys    660687 Gam        0 Adc 2832352732, d [msec] Sys  3.589 Gam  0.000 Adc  8.862
  StopXL(H) i  22 ( 22), [MeV]   9.896 ( 10.006) StopYL(H) i  11 ( 11), [MeV]   9.900 ( 9.992)
  BackL(H)  i  -1 ( -1), [MeV]   0.603 ( -2.878) VetoL(H)  i  -1 ( -1), [MeV]   0.000 ( 0.000)
  Gamma [MeV] Sum -0.000500 Max 0.000300  XMulti  1 ( 1)
Event Chain    2 Run  42 File  197 Evt  74722476 Tof:0 Off:1 EVR:0 Al:1 SF:0
  [ms] 475401807 [mysec] Sys    807987 Gam        0 Adc 2854500375, d [msec] Sys 22.147 Gam  0.000 Adc 21.269
  StopXL(H) i  22 ( 22), [MeV]   9.259 ( 9.344) StopYL(H) i  11 ( 11), [MeV]   9.263 ( 9.374)
  BackL(H)  i  -1 ( -1), [MeV]   0.603 ( -2.878) VetoL(H)  i  -1 ( -1), [MeV]   0.000 ( 0.000)
  Gamma [MeV] Sum -0.000500 Max 0.000300  XMulti  1 ( 1)
Event Chain    2 Run  42 File  197 Evt  74727109 Tof:0 Off:1 EVR:0 Al:0 SF:1
  [ms] 475407500 [mysec] Sys    500177 Gam        0 Adc 2860192654, d [msec] Sys  0.004 Gam  0.000 Adc  4.052
  StopXL(H) i  22 ( 22), [MeV] 136.062 (178.575) StopYL(H) i  11 ( 11), [MeV] 135.172 (135.172)
  BackL(H)  i  51 ( 51), [MeV]  18.345 ( 42.513) VetoL(H)  i  -1 ( -1), [MeV]   0.000 ( 0.000)
  Gamma [MeV] Sum -0.000500 Max 0.000300  XMulti  3 ( 3)
---------------------------------------
Event Chain   16 Run  59 File  278 Evt  83423174 Tof:1 Off:0 EVR:1 Al:0 SF:0
  [ms] 690737305 [mysec] Sys    305031 Gam        0 Adc 455613435, d [msec] Sys  0.000 Gam  0.000 Adc 23.749
  StopXL(H) i  59 ( 59), [MeV]  13.517 ( 13.792) StopYL(H) i  26 ( 26), [MeV]  13.513 ( 13.771)
  BackL(H)  i  -1 ( -1), [MeV]   0.603 ( -2.878) VetoL(H)  i  -1 ( -1), [MeV]   0.000 ( 0.000)
  Gamma [MeV] Sum 11.353019 Max 6.999854  XMulti  1 ( 1)
Event Chain   16 Run  59 File  278 Evt  83459103 Tof:1 Off:0 EVR:1 Al:0 SF:0
  [ms] 690780714 [mysec] Sys    714829 Gam        0 Adc 499023902, d [msec] Sys 43.409 Gam  0.000 Adc  0.483
  StopXL(H) i  59 ( 59), [MeV]   6.779 ( 6.714) StopYL(H) i  24 ( 24), [MeV]   6.767 ( 6.563)
  BackL(H)  i  -1 ( -1), [MeV]   0.603 ( -2.878) VetoL(H)  i  -1 ( -1), [MeV]   0.000 ( 0.000)
  Gamma [MeV] Sum 1.026585 Max 0.731617  XMulti  3 ( 3)
Event Chain   16 Run  59 File  278 Evt  83469984 Tof:1 Off:0 EVR:1 Al:0 SF:0
  [ms] 690793806 [mysec] Sys    806402 Gam        0 Adc 512115677, d [msec] Sys 13.092 Gam  0.000 Adc 19.263
  StopXL(H) i  59 ( 59), [MeV]   5.478 ( 5.341) StopYL(H) i  24 ( 24), [MeV]   5.474 ( 5.305)
  BackL(H)  i  -1 ( -1), [MeV]   0.603 ( -2.878) VetoL(H)  i  -1 ( -1), [MeV]   0.000 ( 0.000)
  Gamma [MeV] Sum 0.947235 Max 0.667122  XMulti  1 ( 1)
Event Chain   16 Run  59 File  278 Evt  83537291 Tof:1 Off:0 EVR:1 Al:0 SF:0
  [ms] 690874675 [mysec] Sys    675958 Gam        0 Adc 592986481, d [msec] Sys 80.869 Gam  0.000 Adc 22.073
  StopXL(H) i  59 ( 59), [MeV]   5.593 ( 5.413) StopYL(H) i  24 ( 24), [MeV]   5.582 ( 5.371)
  BackL(H)  i  -1 ( -1), [MeV]   0.603 ( -2.878) VetoL(H)  i  -1 ( -1), [MeV]   0.000 ( 0.000)
  Gamma [MeV] Sum 0.727135 Max 0.727835  XMulti  1 ( 1)
Event Chain   16 Run  59 File  278 Evt  83539772 Tof:0 Off:0 EVR:0 Al:1 SF:0
  [ms] 690877700 [mysec] Sys    700722 Gam        0 Adc 596011292, d [msec] Sys  3.025 Gam  0.000 Adc  2.372
  StopXL(H) i  59 ( -1), [MeV]   9.997 ( -5.985) StopYL(H) i  25 ( -1), [MeV]   0.597 ( -4.436)
  BackL(H)  i   7 (  7), [MeV]   9.314 ( 9.222) VetoL(H)  i  -1 ( -1), [MeV]   0.000 ( 0.000)
  Gamma [MeV] Sum -0.000500 Max 0.000300  XMulti  1 ( 1)
Event Chain   16 Run  59 File  278 Evt  83545501 Tof:0 Off:1 EVR:0 Al:1 SF:0
  [ms] 690884655 [mysec] Sys    655893 Gam        0 Adc 602966568, d [msec] Sys  6.955 Gam  0.000 Adc 13.553
  StopXL(H) i  59 ( -1), [MeV]   9.261 ( -5.985) StopYL(H) i  25 ( -1), [MeV]   0.615 ( -4.436)
  BackL(H)  i  42 ( 42), [MeV]   8.566 ( 8.555) VetoL(H)  i  -1 ( -1), [MeV]   0.000 ( 0.000)
  Gamma [MeV] Sum -0.000500 Max 0.000300  XMulti  1 ( 1)
Event Chain   16 Run  59 File  278 Evt  83547306 Tof:0 Off:1 EVR:0 Al:0 SF:1
  [ms] 690886833 [mysec] Sys    833853 Gam        0 Adc 605144563, d [msec] Sys  2.178 Gam  0.000 Adc 89.755
  StopXL(H) i  59 ( 59), [MeV] 165.836 (195.177) StopYL(H) i  25 ( 25), [MeV] 151.843 (151.843)
  BackL(H)  i  45 ( 45), [MeV]  18.387 ( 29.341) VetoL(H)  i  -1 ( -1), [MeV]   0.000 ( 0.000)
  Gamma [MeV] Sum -0.000500 Max 0.000300  XMulti  4 ( 4)
---------------------------------------
Event Chain   29 Run  67 File  316 Evt  32415799 Tof:1 Off:0 EVR:1 Al:0 SF:0
  [ms] 787281271 [mysec] Sys    271469 Gam        0 Adc 2509981432, d [msec] Sys  0.000 Gam  0.000 Adc 39.920
  StopXL(H) i  91 ( 91), [MeV]   6.587 ( 6.436) StopYL(H) i  66 ( 66), [MeV]   6.605 ( 6.364)
  BackL(H)  i  -1 ( -1), [MeV]   0.603 ( -2.878) VetoL(H)  i  -1 ( -1), [MeV]   0.000 ( 0.000)
  Gamma [MeV] Sum 0.145004 Max 0.145204  XMulti  1 ( 1)
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Event Chain   29 Run  67 File  316 Evt  32490150 Tof:1 Off:0 EVR:1 Al:0 SF:0
  [ms] 787372594 [mysec] Sys    594093 Gam         0 Adc 2601281933, d [msec] Sys 91.323 Gam  0.000 Adc 77.630
  StopXL(H) i  91 ( 91), [MeV]    6.844 (  6.696) StopYL(H) i  66 ( 66), [MeV]   6.845 (  6.695)
  BackL(H)  i  -1 ( -1), [MeV]    0.603 ( -2.878) VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
  Gamma [MeV] Sum 3.467192 Max 1.391349  XMulti  1 ( 1)
Event Chain   29 Run  67 File  316 Evt  32577430 Tof:1 Off:0 EVR:1 Al:0 SF:0
  [ms] 787480009 [mysec] Sys      9865 Gam         0 Adc 2708653542, d [msec] Sys 107.415 Gam  0.000 Adc 18.430
  StopXL(H) i  91 ( 91), [MeV]    6.522 (  6.371) StopYL(H) i  66 ( 66), [MeV]   6.521 (  6.364)
  BackL(H)  i  -1 ( -1), [MeV]    0.603 ( -2.878) VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
  Gamma [MeV] Sum 2.376957 Max 1.765118  XMulti  1 ( 1)
Event Chain   29 Run  67 File  316 Evt  32577619 Tof:0 Off:0 EVR:0 Al:1 SF:0
  [ms] 787480251 [mysec] Sys    251775 Gam         0 Adc 2708895455, d [msec] Sys  0.242 Gam  0.000 Adc  2.360
  StopXL(H) i  91 ( 91), [MeV]   10.034 (  9.948) StopYL(H) i  66 ( 66), [MeV]   9.991 (  9.939)
  BackL(H)  i  -1 ( -1), [MeV]    0.603 ( -2.878) VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
  Gamma [MeV] Sum 1.535911 Max 0.879197  XMulti  1 ( 1)
Event Chain   29 Run  67 File  316 Evt  32577729 Tof:0 Off:1 EVR:0 Al:0 SF:1
  [ms] 787480382 [mysec] Sys    382207 Gam         0 Adc 2709025889, d [msec] Sys  0.131 Gam  0.000 Adc 109.607
  StopXL(H) i  91 ( 91), [MeV] 195.023 (203.766) StopYL(H) i  66 ( 66), [MeV] 181.280 (181.280)
  BackL(H)  i   9 (  9), [MeV]    8.696 (  8.743) VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
  Gamma [MeV] Sum -0.000500 Max 0.000300  XMulti  3 ( 3)
----------------------------------------
Event Chain   38 Run  72 File  345 Evt  88298931 Tof:1 Off:0 EVR:1 Al:0 SF:0
  [ms] 859389924 [mysec] Sys    924937 Gam         0 Adc 1603883621, d [msec] Sys  0.000 Gam  0.000 Adc  3.498
  StopXL(H) i 103 (103), [MeV]    5.561 (  5.363) StopYL(H) i  80 ( 80), [MeV]   3.279 (  3.186)
  BackL(H)  i  -1 ( -1), [MeV]    0.603 ( -2.878) VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
  Gamma [MeV] Sum 5.696070 Max 5.033726  XMulti  1 ( 1)
Event Chain   38 Run  72 File  345 Evt  88390045 Tof:1 Off:0 EVR:1 Al:0 SF:0
  [ms] 859500986 [mysec] Sys    986420 Gam         0 Adc 1714905767, d [msec] Sys 111.062 Gam  0.000 Adc  2.859
  StopXL(H) i 103 (103), [MeV]   10.014 (  9.984) StopYL(H) i  80 ( 80), [MeV]   9.235 (  9.344)
  BackL(H)  i  -1 ( -1), [MeV]    0.603 ( -2.878) VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
  Gamma [MeV] Sum 1.841992 Max 1.576165  XMulti  2 ( 2)
Event Chain   38 Run  72 File  345 Evt  88491887 Tof:0 Off:0 EVR:1 Al:0 SF:0
  [ms] 859624203 [mysec] Sys    203916 Gam         0 Adc 1838125155, d [msec] Sys 123.217 Gam  0.000 Adc 37.076
  StopXL(H) i 103 (103), [MeV]   11.904 ( 11.874) StopYL(H) i  79 ( 80), [MeV]   0.731 (  1.134)
  BackL(H)  i  -1 ( -1), [MeV]    0.603 ( -2.878) VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
  Gamma [MeV] Sum 4.854714 Max 4.461099  XMulti  1 ( 1)
Event Chain   38 Run  72 File  345 Evt  88500429 Tof:1 Off:0 EVR:1 Al:0 SF:0
  [ms] 859634570 [mysec] Sys    570488 Gam         0 Adc 1848491890, d [msec] Sys 10.367 Gam  0.000 Adc  0.246
  StopXL(H) i 103 (103), [MeV]    7.592 (  7.533) StopYL(H) i  79 ( 79), [MeV]   7.597 (  7.725)
  BackL(H)  i  -1 ( -1), [MeV]    0.603 ( -2.878) VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
  Gamma [MeV] Sum -0.000500 Max 0.000300  XMulti  1 ( 1)
Event Chain   38 Run  72 File  345 Evt  88501551 Tof:0 Off:1 EVR:0 Al:1 SF:0
  [ms] 859635918 [mysec] Sys    918969 Gam         0 Adc 1849840391, d [msec] Sys  1.348 Gam  0.000 Adc 27.477
  StopXL(H) i 103 ( -1), [MeV]    9.690 ( -5.985) StopYL(H) i  79 ( 79), [MeV]   1.421 (  1.198)
  BackL(H)  i  13 ( 13), [MeV]    8.294 (  8.427) VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
  Gamma [MeV] Sum -0.000500 Max 0.000300  XMulti  1 ( 1)
Event Chain   38 Run  72 File  345 Evt  88501605 Tof:0 Off:1 EVR:0 Al:0 SF:1
  [ms] 859635977 [mysec] Sys    977564 Gam         0 Adc 1849898985, d [msec] Sys  0.059 Gam  0.000 Adc 42.361
  StopXL(H) i 103 (103), [MeV] 129.841 (175.959) StopYL(H) i  79 ( 79), [MeV] 128.302 (128.302)
  BackL(H)  i  16 ( 16), [MeV]   17.069 ( 46.118) VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
  Gamma [MeV] Sum 0.426496 Max 0.318658  XMulti  3 ( 3)
----------------------------------------
Event Chain    6 Run  73 File  352 Evt 101485164 Tof:1 Off:0 EVR:1 Al:0 SF:0
  [ms] 875747568 [mysec] Sys    568280 Gam         0 Adc 781591216, d [msec] Sys  0.000 Gam  0.000 Adc 18.087
  StopXL(H) i  83 ( 83), [MeV]    5.972 (  5.801) StopYL(H) i  66 ( 66), [MeV]   5.997 (  5.768)
  BackL(H)  i  -1 ( -1), [MeV]    0.603 ( -2.878) VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
  Gamma [MeV] Sum 0.664826 Max 0.254703  XMulti  1 ( 1)
Event Chain    6 Run  73 File  352 Evt 101485719 Tof:0 Off:1 EVR:0 Al:1 SF:0
  [ms] 875748217 [mysec] Sys    217528 Gam         0 Adc 782240474, d [msec] Sys  0.649 Gam  0.000 Adc 27.839
  StopXL(H) i  83 ( -1), [MeV]    9.984 ( -5.985) StopYL(H) i  66 ( -1), [MeV]   0.699 ( -4.436)
  BackL(H)  i  37 ( 37), [MeV]    9.268 (  9.176) VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
  Gamma [MeV] Sum -0.000500 Max 0.000300  XMulti  1 ( 1)
Event Chain    6 Run  73 File  352 Evt 101485846 Tof:0 Off:0 EVR:0 Al:0 SF:1
  [ms] 875748388 [mysec] Sys    388307 Gam         0 Adc 782411255, d [msec] Sys  0.171 Gam  0.000 Adc 38.492
  StopXL(H) i  83 ( 83), [MeV] 167.807 (178.793) StopYL(H) i  66 ( 66), [MeV] 156.056 (156.056)
  BackL(H)  i  15 ( 15), [MeV]   10.905 ( 10.987) VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
  Gamma [MeV] Sum 1.901649 Max 0.896988  XMulti  3 ( 3)
----------------------------------------
Event Chain   46 Run  86 File  422 Evt 237942673 Tof:1 Off:0 EVR:1 Al:0 SF:0
  [ms] 1057001958 [mysec] Sys    958744 Gam         0 Adc 1646692288, d [msec] Sys  0.000 Gam  0.000 Adc  2.498
  StopXL(H) i 102 (102), [MeV]    8.537 (  8.483) StopYL(H) i  71 ( 71), [MeV]   8.548 (  8.483)
  BackL(H)  i  -1 ( -1), [MeV]    0.603 ( -2.878) VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
  Gamma [MeV] Sum -0.000500 Max 0.000300  XMulti  1 ( 1)
Event Chain   46 Run  86 File  422 Evt 238022029 Tof:1 Off:0 EVR:1 Al:0 SF:0
  [ms] 1057104359 [mysec] Sys    359551 Gam         0 Adc 1749094674, d [msec] Sys 102.401 Gam  0.000 Adc  0.735
  StopXL(H) i 102 (102), [MeV]    8.690 (  8.615) StopYL(H) i  72 ( 72), [MeV]   8.679 (  8.615)
  BackL(H)  i  -1 ( -1), [MeV]    0.603 ( -2.878) VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
  Gamma [MeV] Sum 1.002754 Max 1.002954  XMulti  1 ( 1)
Event Chain   46 Run  86 File  422 Evt 238022363 Tof:0 Off:1 EVR:0 Al:1 SF:0
  [ms] 1057104805 [mysec] Sys    805637 Gam         0 Adc 1749540765, d [msec] Sys  0.446 Gam  0.000 Adc 26.686
  StopXL(H) i 102 (102), [MeV]    9.977 (  9.939) StopYL(H) i  72 ( 72), [MeV]   9.921 (  9.873)
  BackL(H)  i  -1 ( -1), [MeV]    0.603 ( -2.878) VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
  Gamma [MeV] Sum -0.000500 Max 0.000300  XMulti  1 ( 1)
Event Chain   46 Run  86 File  422 Evt 238022435 Tof:0 Off:1 EVR:0 Al:0 SF:1
  [ms] 1057104892 [mysec] Sys    892197 Gam         0 Adc 1749627327, d [msec] Sys  0.087 Gam  0.000 Adc 17.031
  StopXL(H) i 102 (102), [MeV] 189.887 (189.887) StopYL(H) i  72 ( 72), [MeV] 178.500 (178.500)
  BackL(H)  i  35 ( -1), [MeV]    1.159 ( -2.878) VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
  Gamma [MeV] Sum 0.701475 Max 0.701675  XMulti  5 ( 5)
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10

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Event Chain   47 Run  89 File   428 Evt    2042375 Tof:1 Off:0 EVR:1 Al:0 SF:0
  [ms] 1069867040 [mysec] Sys      40572 Gam        0 Adc 1626795135, d [msec] Sys  0.000 Gam  0.000 Adc 40.852
  StopXL(H) i 110 (110), [MeV]  13.726 ( 14.045)  StopYL(H) i  68 ( 68), [MeV]  12.566 ( 12.654)
  BackL(H)  i  -1 ( -1), [MeV]   0.603 ( -2.878)  VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
  Gamma [MeV] Sum 0.935364 Max 0.721272  XMulti  1 ( 1)
Event Chain   47 Run  89 File   428 Evt    2053036 Tof:1 Off:0 EVR:1 Al:0 SF:0
  [ms] 1069880261 [mysec] Sys     261238 Gam        0 Adc 1640016003, d [msec] Sys 13.221 Gam  0.000 Adc  1.745
  StopXL(H) i 110 (110), [MeV]   9.738 (  9.854)  StopYL(H) i  66 ( 66), [MeV]   9.738 (  9.675)
  BackL(H)  i  -1 ( -1), [MeV]   0.603 ( -2.878)  VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
  Gamma [MeV] Sum 3.317190 Max 2.208689  XMulti  2 ( 2)
Event Chain   47 Run  89 File   428 Evt    2122701 Tof:1 Off:0 EVR:1 Al:0 SF:0
  [ms] 1069966731 [mysec] Sys     731913 Gam        0 Adc 1726488005, d [msec] Sys 86.470 Gam  0.000 Adc 22.929
  StopXL(H) i 110 (110), [MeV]   7.086 (  6.969)  StopYL(H) i  67 ( 67), [MeV]   7.101 (  7.038)
  BackL(H)  i  -1 ( -1), [MeV]   0.603 ( -2.878)  VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
  Gamma [MeV] Sum 1.911466 Max 1.912166  XMulti  2 ( 2)
Event Chain   47 Run  89 File   428 Evt    2240128 Tof:1 Off:0 EVR:1 Al:0 SF:0
  [ms] 1070112465 [mysec] Sys     465113 Gam        0 Adc 1872223444, d [msec] Sys 145.734 Gam  0.000 Adc  0.212
  StopXL(H) i 110 (110), [MeV]   7.982 (  7.999)  StopYL(H) i  67 ( 67), [MeV]   5.841 (  5.801)
  BackL(H)  i  -1 ( -1), [MeV]   0.603 ( -2.878)  VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
  Gamma [MeV] Sum 1.568638 Max 1.568838  XMulti  1 ( 1)
Event Chain   47 Run  89 File   428 Evt    2241099 Tof:0 Off:1 EVR:0 Al:1 SF:0
  [ms] 1070113629 [mysec] Sys     629140 Gam        0 Adc 1873387489, d [msec] Sys  1.164 Gam  0.000 Adc 25.609
  StopXL(H) i 110 (110), [MeV]   9.945 ( 10.061)  StopYL(H) i  68 ( 67), [MeV]   5.447 (  4.564)
  BackL(H)  i  -1 ( -1), [MeV]   0.603 ( -2.878)  VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
  Gamma [MeV] Sum -0.000500 Max 0.000300  XMulti  1 ( 1)
Event Chain   47 Run  89 File   428 Evt    2241393 Tof:0 Off:1 EVR:0 Al:0 SF:1
  [ms] 1070113972 [mysec] Sys     972201 Gam        0 Adc 1873730554, d [msec] Sys  0.343 Gam  0.000 Adc  9.970
  StopXL(H) i 110 (110), [MeV] 157.776 (183.718)  StopYL(H) i  67 ( 67), [MeV]  97.934 ( 97.934)
  BackL(H)  i  17 ( 17), [MeV]  17.345 ( 25.942)  VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
  Gamma [MeV] Sum 1.057711 Max 1.057911  XMulti  2 ( 2)
----------------------------------------
Event Chain   48 Run  89 File   428 Evt    2590881 Tof:1 Off:0 EVR:1 Al:0 SF:0
  [ms] 1070548244 [mysec] Sys     244598 Gam        0 Adc 2308009625, d [msec] Sys  0.000 Gam  0.000 Adc 60.143
  StopXL(H) i 119 (119), [MeV]   9.454 (  9.410)  StopYL(H) i  76 ( 76), [MeV]   9.475 (  9.410)
  BackL(H)  i  -1 ( -1), [MeV]   0.603 ( -2.878)  VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
  Gamma [MeV] Sum 6.183044 Max 3.669946  XMulti  1 ( 1)
Event Chain   48 Run  89 File   428 Evt    2790005 Tof:1 Off:0 EVR:1 Al:0 SF:0
  [ms] 1070795225 [mysec] Sys     225862 Gam        0 Adc 2554994682, d [msec] Sys 246.981 Gam  0.000 Adc 60.609
  StopXL(H) i 119 (119), [MeV]   9.112 (  9.079)  StopYL(H) i  77 ( 77), [MeV]   9.135 (  9.781)
  BackL(H)  i  -1 ( -1), [MeV]   0.603 ( -2.878)  VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
  Gamma [MeV] Sum 0.798545 Max 0.798545  XMulti  1 ( 1)
Event Chain   48 Run  89 File   428 Evt    2790208 Tof:0 Off:1 EVR:0 Al:1 SF:0
  [ms] 1070795468 [mysec] Sys     468072 Gam        0 Adc 2555236896, d [msec] Sys  0.243 Gam  0.000 Adc 41.980
  StopXL(H) i 119 (119), [MeV]  10.022 ( 10.006)  StopYL(H) i  77 ( 77), [MeV]  10.035 ( 10.864)
  BackL(H)  i  -1 ( -1), [MeV]   0.603 ( -2.878)  VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
  Gamma [MeV] Sum -0.000500 Max 0.000300  XMulti  1 ( 1)
Event Chain   48 Run  89 File   428 Evt    2790226 Tof:0 Off:1 EVR:0 Al:0 SF:1
  [ms] 1070795494 [mysec] Sys     494392 Gam        0 Adc 2555263216, d [msec] Sys  0.026 Gam  0.000 Adc 26.320
  StopXL(H) i 119 (119), [MeV] 184.524 (184.524)  StopYL(H) i  77 ( 77), [MeV] 200.141 (200.141)
  BackL(H)  i  12 ( -1), [MeV]   0.828 ( -2.878)  VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
  Gamma [MeV] Sum 1.004251 Max 0.747463  XMulti  4 ( 4)
----------------------------------------
Event Chain   77 Run 114 File   559 Evt   58617751 Tof:1 Off:0 EVR:1 Al:0 SF:0
  [ms] 1384231230 [mysec] Sys     230961 Gam        0 Adc 2457176455, d [msec] Sys  0.000 Gam  0.000 Adc 22.457
  StopXL(H) i  86 ( 86), [MeV]   6.565 (  6.364)  StopYL(H) i  69 ( 69), [MeV]   3.742 (  3.602)
  BackL(H)  i  -1 ( -1), [MeV]   0.603 ( -2.878)  VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
  Gamma [MeV] Sum 3.497565 Max 2.237984  XMulti  1 ( 1)
Event Chain   77 Run 114 File   559 Evt   58618108 Tof:0 Off:1 EVR:0 Al:1 SF:0
  [ms] 1384231575 [mysec] Sys     575942 Gam        0 Adc 2457521436, d [msec] Sys  0.345 Gam  0.000 Adc 26.632
  StopXL(H) i  86 ( 86), [MeV]  10.008 (  9.873)  StopYL(H) i  69 ( 69), [MeV]   5.865 (  5.664)
  BackL(H)  i  -1 ( -1), [MeV]   0.603 ( -2.878)  VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
  Gamma [MeV] Sum -0.000500 Max 0.000300  XMulti  1 ( 1)
Event Chain   77 Run 114 File   559 Evt   58674508 Tof:0 Off:1 EVR:0 Al:1 SF:0
  [ms] 1384282612 [mysec] Sys     612576 Gam        0 Adc 2508558867, d [msec] Sys 51.037 Gam  0.000 Adc 12.078
  StopXL(H) i  86 ( 86), [MeV]   9.279 (  9.145)  StopYL(H) i  69 ( 69), [MeV]   7.345 (  7.312)
  BackL(H)  i  -1 ( -1), [MeV]   0.603 ( -2.878)  VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
  Gamma [MeV] Sum -0.000500 Max 0.000300  XMulti  1 ( 1)
Event Chain   77 Run 114 File   559 Evt   58713496 Tof:0 Off:1 EVR:0 Al:0 SF:1
  [ms] 1384318088 [mysec] Sys      88960 Gam        0 Adc 2544035806, d [msec] Sys 35.476 Gam  0.000 Adc 12.784
  StopXL(H) i  86 ( 86), [MeV] 201.076 (201.076)  StopYL(H) i  69 ( 69), [MeV] 103.705 (103.705)
  BackL(H)  i  40 ( 40), [MeV]   3.338 (  3.245)  VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
  Gamma [MeV] Sum 0.224585 Max 0.124354  XMulti  8 ( 8)
----------------------------------------
Event Chain  109 Run 124 File   606 Evt  134861899 Tof:0 Off:0 EVR:0 Al:1 SF:0
  [ms] 1473821636 [mysec] Sys     636030 Gam        0 Adc 1852920615, d [msec] Sys  0.000 Gam  0.000 Adc 320.190
  StopXL(H) i 131 (102), [MeV]   8.549 (  8.549)  StopYL(H) i  75 ( 75), [MeV]   8.730 (  8.618)
  BackL(H)  i  -1 ( -1), [MeV]   0.603 ( -2.878)  VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
  Gamma [MeV] Sum -0.000500 Max 0.000300  XMulti  6 ( 6)
Event Chain  109 Run 124 File   606 Evt  134973068 Tof:1 Off:0 EVR:1 Al:0 SF:0
  [ms] 1474011423 [mysec] Sys     423905 Gam        0 Adc 2042711388, d [msec] Sys 189.787 Gam  0.000 Adc  2.348
  StopXL(H) i 131 (131), [MeV]   7.358 (  7.393)  StopYL(H) i  74 ( 74), [MeV]   7.325 (  7.093)
  BackL(H)  i  -1 ( -1), [MeV]   0.603 ( -2.878)  VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
  Gamma [MeV] Sum -0.000500 Max 0.000300  XMulti  4 ( 4)
Event Chain  109 Run 124 File   606 Evt  134973563 Tof:0 Off:1 EVR:0 Al:1 SF:0
  [ms] 1474012246 [mysec] Sys     246822 Gam        0 Adc 2043534321, d [msec] Sys  0.823 Gam  0.000 Adc 105.165
  StopXL(H) i 131 (131), [MeV]   9.997 (  1.232)  StopYL(H) i  74 ( -1), [MeV]   0.846 ( -4.436)
  BackL(H)  i  35 ( 35), [MeV]   9.163 (  9.176)  VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
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   Gamma [MeV] Sum 0.746787 Max 0.746787  XMulti  1 ( 1)
Event Chain  109 Run 124 File  606 Evt 134973601 Tof:0 Off:1 EVR:0 Al:0 SF:1
   [ms] 1474012309 [mysec] Sys    309876 Gam         0 Adc 2043597376, d [msec] Sys  0.063 Gam  0.000 Adc 27.325
   StopXL(H) i 131 (131), [MeV] 170.446 (170.446)  StopYL(H) i  74 ( 74), [MeV] 133.811 (133.811)
   BackL(H)  i  -1 ( -1), [MeV]   0.603 ( -2.878)  VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
   Gamma [MeV] Sum 1.449835 Max 0.438038  XMulti  2 ( 2)
-----------------------------------------
Event Chain  115 Run 156 File  707 Evt 136137319 Tof:1 Off:0 EVR:1 Al:0 SF:0
   [ms] 1841789274 [mysec] Sys    274476 Gam         0 Adc 451946690, d [msec] Sys  0.000 Gam  0.000 Adc 139.253
   StopXL(H) i  89 ( 89), [MeV]   8.789 ( 8.824)  StopYL(H) i  72 ( 72), [MeV]   8.787 ( 8.748)
   BackL(H)  i  -1 ( -1), [MeV]   0.603 ( -2.878)  VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
   Gamma [MeV] Sum -0.000500 Max 0.000300  XMulti  1 ( 1)
Event Chain  115 Run 156 File  707 Evt 136146267 Tof:1 Off:0 EVR:1 Al:0 SF:0
   [ms] 1841803782 [mysec] Sys    782697 Gam         0 Adc 466455133, d [msec] Sys 14.508 Gam  0.000 Adc 82.991
   StopXL(H) i  89 ( 89), [MeV]   8.697 ( 8.687)  StopYL(H) i  72 ( 72), [MeV]   8.715 ( 8.615)
   BackL(H)  i  -1 ( -1), [MeV]   0.603 ( -2.878)  VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
   Gamma [MeV] Sum 9.975562 Max 9.550147  XMulti  1 ( 1)
Event Chain  115 Run 156 File  707 Evt 136146568 Tof:0 Off:1 EVR:0 Al:1 SF:0
   [ms] 1841804265 [mysec] Sys    265100 Gam         0 Adc 466937544, d [msec] Sys  0.483 Gam  0.000 Adc 23.535
   StopXL(H) i  89 ( 89), [MeV]  10.011 ( 10.129)  StopYL(H) i  72 ( 72), [MeV]   9.903 ( 9.939)
   BackL(H)  i  -1 ( -1), [MeV]   0.603 ( -2.878)  VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
   Gamma [MeV] Sum -0.000500 Max 0.000300  XMulti  1 ( 1)
Event Chain  115 Run 156 File  707 Evt 136146841 Tof:0 Off:1 EVR:0 Al:0 SF:1
   [ms] 1841804665 [mysec] Sys    665604 Gam         0 Adc 467337998, d [msec] Sys  0.400 Gam  0.000 Adc 65.127
   StopXL(H) i  89 ( 89), [MeV] 161.417 (161.417)  StopYL(H) i  72 ( 72), [MeV] 142.086 (142.086)
   BackL(H)  i  -1 ( -1), [MeV]   0.603 ( -2.878)  VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
   Gamma [MeV] Sum 0.706054 Max 0.706654  XMulti  4 ( 4)
-----------------------------------------
CaliEvent Run 163 File  738 Evt  35315979 Tof:1 Off:0 Veto:0 Veto is 275!
   [ms] 1932122530 [mysec] Sys    530512 Gam         0 Adc 590542603 d [msec] Sys  0.774
   Multi StopXL 2 StopXH 1 StopYL 1 StopYH 1 BackL 0 BackH 0 VetoL 1 VetoH 0
   StopXL(H) i 100 (100), [MeV]   6.941 ( 6.713)  StopYL(H) i  53 ( 53), [MeV]   6.819 ( 6.761)
   BackL(H)  i  -1 ( -1), [MeV]   0.603 ( -2.878)  VetoL(H)  i  11 ( -1), [MeV]   0.275 (  0.000)
   Gamma Multi 0, [MeV] Sum -0.000500 Max 0.000300
CaliEvent Run 163 File  738 Evt  35316464 Tof:0 Off:1 Veto:0
   [ms] 1932123304 [mysec] Sys    304518 Gam         0 Adc 591316619
   Multi StopXL 2 StopXH 1 StopYL 2 StopYH 1 BackL 0 BackH 0 VetoL 0 VetoH 0
   StopXL(H) i 100 (100), [MeV]   9.913 ( 9.982)  StopYL(H) i  53 ( 53), [MeV]   9.879 ( 9.939)
   BackL(H)  i  -1 ( -1), [MeV]   0.603 ( -2.878)  VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
   Gamma Multi 0, [MeV] Sum -0.000500 Max 0.000300
CaliEvent Run 163 File  738 Evt  35322483 Tof:0 Off:1 Veto:0
   [ms] 1932132846 [mysec] Sys    846813 Gam         0 Adc 600859061
   Multi StopXL 4 StopXH 1 StopYL 2 StopYH 1 BackL 0 BackH 0 VetoL 0 VetoH 0
   StopXL(H) i 100 (100), [MeV]   9.293 ( 9.301)  StopYL(H) i  53 ( 53), [MeV]   9.279 ( 9.344)
   BackL(H)  i  -1 ( -1), [MeV]   0.603 ( -2.878)  VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
   Gamma Multi 0, [MeV] Sum -0.000500 Max 0.000300
CaliEvent Run 163 File  738 Evt  35340259 Tof:0 Off:1 Veto:0
   [ms] 1932161260 [mysec] Sys    260055 Gam         0 Adc 629272733
   Multi StopXL 4 StopXH 4 StopYL 2 StopYH 2 BackL 1 BackH 1 VetoL 0 VetoH 0
   StopXL(H) i 100 (100), [MeV] 154.109 (154.109)  StopYL(H) i  53 ( 53), [MeV] 141.689 (141.689)
   BackL(H)  i  29 ( 29), [MeV]  21.159 ( 39.112)  VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
   Gamma Multi 2, [MeV] Sum 0.272122 Max 0.219680
Event Chain  119 Run 163 File  738 Evt  35256655 Tof:1 Off:0 EVR:1 Al:0 SF:0
   [ms] 1932028149 [mysec] Sys    149899 Gam         0 Adc 496160551, d [msec] Sys  0.000 Gam  0.000 Adc 58.174
   StopXL(H) i 100 (100), [MeV]   8.507 ( 8.484)  StopYL(H) i  53 ( 53), [MeV]   7.839 ( 7.887)
   BackL(H)  i  -1 ( -1), [MeV]   0.603 ( -2.878)  VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
   Gamma [MeV] Sum 0.533983 Max 0.534583  XMulti  1 ( 1)
Event Chain  119 Run 163 File  738 Evt  35285660 Tof:1 Off:0 EVR:1 Al:0 SF:0
   [ms] 1932073816 [mysec] Sys    816623 Gam         0 Adc 541827970, d [msec] Sys 45.667 Gam  0.000 Adc 40.096
   StopXL(H) i 100 (100), [MeV]   7.690 ( 7.666)  StopYL(H) i  53 ( 53), [MeV]   7.689 ( 7.688)
   BackL(H)  i  -1 ( -1), [MeV]   0.603 ( -2.878)  VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
   Gamma [MeV] Sum 4.372772 Max 3.224428  XMulti  1 ( 1)
EVR missing with 6.926 MeV and following 0.774 sec Alpha. By Veto v=275, see above
***** Evt 35315979 Veto 1 v=275
Event Chain  119 Run 163 File  738 Evt  35316464 Tof:0 Off:1 EVR:0 Al:1 SF:0
   [ms] 1932123304 [mysec] Sys    304518 Gam         0 Adc 591316619, d [msec] Sys 49.488 Gam  0.000 Adc 52.059
   StopXL(H) i 100 (100), [MeV]   9.913 ( 9.982)  StopYL(H) i  53 ( 53), [MeV]   9.879 ( 9.939)
   BackL(H)  i  -1 ( -1), [MeV]   0.603 ( -2.878)  VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
   Gamma [MeV] Sum -0.000500 Max 0.000300  XMulti  2 ( 2)
Event Chain  119 Run 163 File  738 Evt  35322483 Tof:0 Off:1 EVR:0 Al:1 SF:0
   [ms] 1932132846 [mysec] Sys    846813 Gam         0 Adc 600859061, d [msec] Sys  9.542 Gam  0.000 Adc 15.179
   StopXL(H) i 100 (100), [MeV]   9.293 ( 9.301)  StopYL(H) i  53 ( 53), [MeV]   9.279 ( 9.344)
   BackL(H)  i  -1 ( -1), [MeV]   0.603 ( -2.878)  VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
   Gamma [MeV] Sum -0.000500 Max 0.000300  XMulti  4 ( 4)
Event Chain  119 Run 163 File  738 Evt  35340259 Tof:0 Off:1 EVR:0 Al:0 SF:1
   [ms] 1932161260 [mysec] Sys    260055 Gam         0 Adc 629272733, d [msec] Sys 28.414 Gam  0.000 Adc 15.554
   StopXL(H) i 100 (100), [MeV] 154.109 (193.221)  StopYL(H) i  53 ( 53), [MeV] 141.689 (141.689)
   BackL(H)  i  29 ( 29), [MeV]  21.159 ( 39.112)  VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
   Gamma [MeV] Sum 0.272122 Max 0.219680  XMulti  4 ( 4)
-----------------------------------------------------
CaliEvent Run 179 File  836 Evt 223527471 Tof:1 Off:0 Veto:0
   [ms] 2183255401 [mysec] Sys    401934 Gam         0 Adc 2614316254
   Multi StopXL 1 StopXH 1 StopYL 1 StopYH 1 BackL 0 BackH 0 VetoL 0 VetoH 0
   StopXL(H) i 122 (122), [MeV]   3.262 ( 3.120)  StopYL(H) i  88 ( 88), [MeV]   3.279 ( 3.186)
   BackL(H)  i  -1 ( -1), [MeV]   0.603 ( -2.878)  VetoL(H)  i  -1 ( -1), [MeV]   0.000 (  0.000)
   Gamma Multi 1, [MeV] Sum 0.368243 Max 0.368243
CaliEvent Run 179 File  836 Evt 223528283 Tof:0 Off:0 Veto:0 isAlpha d [msec] Sys 92.2
```

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    [ms] 2183256305 [mysec] Sys     305464 Gam         0 Adc 2615219799
   Multi StopXL 3 StopXH 1 StopYL 2 StopYH 2 BackL 0 BackH 0 VetoL 0 VetoH 0
   StopXL(H) i 123 (122), [MeV]    9.939 (  9.939)  StopYL(H) i  88 ( 64), [MeV]    9.914 (268.407)
   BackL(H)  i  -1 ( -1),  [MeV]   0.603 ( -2.878)  VetoL(H)  i  -1 ( -1),  [MeV]   0.000 (  0.000)
   Gamma Multi 3, [MeV] Sum 8.126687 Max 6.277769
CaliEvent Run 179 File  836 Evt 223604065 Tof:0 Off:1 Veto:0
   [ms] 2183348507 [mysec] Sys     507890 Gam         0 Adc 2707423644
   Multi StopXL 2 StopXH 1 StopYL 1 StopYH 1 BackL 0 BackH 0 VetoL 0 VetoH 0
   StopXL(H) i 122 (122), [MeV]    9.297 (  9.277)  StopYL(H) i  88 ( 88), [MeV]    9.299 (  9.344)
   BackL(H)  i  -1 ( -1),  [MeV]   0.603 ( -2.878)  VetoL(H)  i  -1 ( -1),  [MeV]   0.000 (  0.000)
   Gamma Multi 0, [MeV] Sum -0.000500 Max 0.000300
CaliEvent Run 179 File  836 Evt 223642101 Tof:0 Off:1 Veto:0
   [ms] 2183394790 [mysec] Sys     790910 Gam         0 Adc 2753707379
   Multi StopXL 2 StopXH 1 StopYL 1 StopYH 2 BackL 1 BackH 1 VetoL 0 VetoH 0
   StopXL(H) i 122 (122), [MeV] 102.098 (102.098)  StopYL(H) i  88 ( 88), [MeV]  88.460 ( 88.460)
   BackL(H)  i  14 ( 14),  [MeV]  18.182 ( 29.341)  VetoL(H)  i  -1 ( -1),  [MeV]   0.000 (  0.000)
   Gamma Multi 2, [MeV] Sum 0.563841 Max 0.407735
Event Chain  132 Run 179 File  836 Evt 223465063 Tof:1 Off:0 EVR:1 Al:0 SF:0
   [ms] -2111787873 [mysec] Sys     423212 Gam         0 Adc 2538336364, d [msec] Sys  0.000 Gam  0.000 Adc 19.203
   StopXL(H) i 122 (122), [MeV]    8.300 (  8.019)  StopYL(H) i  88 ( 88), [MeV]   0.812 (  1.134)
   BackL(H)  i  -1 ( -1),  [MeV]   0.603 ( -2.878)  VetoL(H)    -1 ( -1),  [MeV]   0.000 (  0.000)
   Gamma [MeV] Sum -0.000500 Max 0.000300  XMulti  1 ( 1)
Event Chain  132 Run 179 File  836 Evt 223479045 Tof:1 Off:0 EVR:1 Al:0 SF:0
   [ms] -2111770917 [mysec] Sys     379287 Gam         0 Adc 2555292696, d [msec] Sys 16.956 Gam  0.000 Adc 15.336
   StopXL(H) i 122 (122), [MeV]    5.521 (  5.371)  StopYL(H) i  88 ( 88), [MeV]   5.494 (  5.437)
   BackL(H)  i  -1 ( -1),  [MeV]   0.603 ( -2.878)  VetoL(H)  i  -1 ( -1),  [MeV]   0.000 (  0.000)
   Gamma [MeV] Sum -0.000500 Max 0.000300  XMulti  1 ( 1)
Event Chain  132 Run 179 File  836 Evt 223576595 Tof:1 Off:0 EVR:1 Al:0 SF:0
   [ms] -2111652219 [mysec] Sys      77780 Gam         0 Adc 2673993021, d [msec] Sys 118.698 Gam  0.000 Adc  0.900
   StopXL(H) i 122 (122), [MeV]    8.391 (  8.350)  StopYL(H) i  87 ( 87), [MeV]   7.278 (  7.244)
   BackL(H)  i  -1 ( -1),  [MeV]   0.603 ( -2.878)  VetoL(H)  i  -1 ( -1),  [MeV]   0.000 (  0.000)
   Gamma [MeV] Sum 11.749644 Max 6.669339  XMulti  3 ( 3)
EVR missing with 3.26 MeV and following 0.9 sec Alpha below energy threshold
Alpha missing with 9.995 MeV and 92.2 sec see above, x=123
Event Chain  132 Run 179 File  836 Evt 223604065 Tof:0 Off:1 EVR:0 Al:1 SF:0
   [ms] -2111618789 [mysec] Sys     507890 Gam         0 Adc 2707423644, d [msec] Sys 33.430 Gam  0.000 Adc 25.326
   StopXL(H) i 122 (122), [MeV]    9.297 (  9.277)  StopYL(H) i  88 ( 88), [MeV]   9.299 (  9.344)
   BackL(H)  i  -1 ( -1),  [MeV]   0.603 ( -2.878)  VetoL(H)  i  -1 ( -1),  [MeV]   0.000 (  0.000)
   Gamma [MeV] Sum -0.000500 Max 0.000300  XMulti  2 ( 2)
Event Chain  132 Run 179 File  836 Evt 223629649 Tof:0 Off:1 EVR:1 Al:0 SF:0
   [ms] -2111587559 [mysec] Sys     737747 Gam         0 Adc 2738653985, d [msec] Sys 31.230 Gam  0.000 Adc 19.837
   StopXL(H) i 122 (122), [MeV]   14.070 ( 14.243)  StopYL(H) i  88 ( 88), [MeV]  14.041 ( 14.243)
   BackL(H)  i  -1 ( -1),  [MeV]   0.603 ( -2.878)  VetoL(H)  i  -1 ( -1),  [MeV]   0.000 (  0.000)
   Gamma [MeV] Sum -0.000500 Max 0.000300  XMulti  1 ( 1)
Event Chain  132 Run 179 File  836 Evt 223642101 Tof:0 Off:1 EVR:0 Al:0 SF:1
   [ms] -2111572506 [mysec] Sys     790910 Gam         0 Adc 2753707379, d [msec] Sys 15.053 Gam  0.000 Adc 13.729
   StopXL(H) i 122 (122), [MeV] 102.098 (131.439)  StopYL(H) i  88 ( 88), [MeV]  88.460 ( 88.460)
   BackL(H)  i  14 ( 14),  [MeV]  18.182 ( 29.341)  VetoL(H)  i  -1 ( -1),  [MeV]   0.000 (  0.000)
   Gamma [MeV] Sum 0.563841 Max 0.407735  XMulti  2 ( 2)
----------------------------------------
Event Chain  138 Run 198 File  904 Evt 106958183 Tof:1 Off:0 EVR:1 Al:0 SF:0
   [ms] -1881425015 [mysec] Sys     281998 Gam         0 Adc 972044888, d [msec] Sys  0.000 Gam  0.000 Adc 46.018
   StopXL(H) i  59 ( 59), [MeV]    4.459 (  4.258)  StopYL(H) i  47 ( 47), [MeV]   4.451 (  4.152)
   BackL(H)  i  10 ( -1),  [MeV]   0.819 ( -2.878)  VetoL(H)  i  -1 ( -1),  [MeV]   0.000 (  0.000)
   Gamma [MeV] Sum -0.000500 Max 0.000300  XMulti  1 ( 1)
Event Chain  138 Run 198 File  904 Evt 106997000 Tof:1 Off:0 EVR:1 Al:0 SF:0
   [ms] -1881358171 [mysec] Sys     125689 Gam         0 Adc 1038889619, d [msec] Sys 66.844 Gam  0.000 Adc 41.288
   StopXL(H) i  59 ( 59), [MeV]    9.139 (  9.169)  StopYL(H) i  46 ( 46), [MeV]   8.968 (  7.133)
   BackL(H)  i  -1 ( -1),  [MeV]   0.603 ( -2.878)  VetoL(H)  i  -1 ( -1),  [MeV]   0.000 (  0.000)
   Gamma [MeV] Sum 0.592514 Max 0.593014  XMulti  1 ( 1)
Event Chain  138 Run 198 File  904 Evt 107083748 Tof:0 Off:0 EVR:1 Al:0 SF:0
   [ms] -1881209527 [mysec] Sys     769395 Gam         0 Adc 1187535611, d [msec] Sys 148.644 Gam  0.000 Adc 78.274
   StopXL(H) i  59 ( 59), [MeV]    8.459 (  8.447)  StopYL(H) i  47 ( 47), [MeV]   8.445 (  8.412)
   BackL(H)  i  -1 ( -1),  [MeV]   0.603 ( -2.878)  VetoL(H)  i  -1 ( -1),  [MeV]   0.000 (  0.000)
   Gamma [MeV] Sum 4.443708 Max 3.279788  XMulti  1 ( 1)
Event Chain  138 Run 198 File  904 Evt 107084412 Tof:0 Off:1 EVR:0 Al:1 SF:0
   [ms] -1881208395 [mysec] Sys     901624 Gam         0 Adc 1188667857, d [msec] Sys  1.132 Gam  0.000 Adc 34.593
   StopXL(H) i  59 ( 59), [MeV]   10.004 ( 10.108)  StopYL(H) i  47 ( 47), [MeV]  10.012 ( 10.061)
   BackL(H)  i  -1 ( -1),  [MeV]   0.603 ( -2.878)  VetoL(H)  i  -1 ( -1),  [MeV]   0.000 (  0.000)
   Gamma [MeV] Sum -0.000500 Max 0.000300  XMulti  1 ( 1)
Event Chain  138 Run 198 File  904 Evt 107084434 Tof:0 Off:1 EVR:0 Al:0 SF:1
   [ms] -1881208352 [mysec] Sys     944776 Gam         0 Adc 1188711009, d [msec] Sys  0.043 Gam  0.000 Adc 43.152
   StopXL(H) i  59 ( 59), [MeV] 210.041 (210.041)  StopYL(H) i  47 ( 47), [MeV] 193.159 (193.159)
   BackL(H)  i  -1 ( -1),  [MeV]   0.603 ( -2.878)  VetoL(H)  i  -1 ( -1),  [MeV]   0.000 (  0.000)
   Gamma [MeV] Sum 1.744879 Max 1.148250  XMulti  4 ( 4)
----------------------------------------
Event Chain  139 Run 219 File 1000 Evt  67896741 Tof:1 Off:0 EVR:1 Al:0 SF:0
   [ms] -1562182506 [mysec] Sys     790288 Gam         0 Adc 2385684616, d [msec] Sys  0.000 Gam  0.000 Adc 57.063
   StopXL(H) i  89 ( 89), [MeV]    8.151 (  7.999)  StopYL(H) i  49 ( 49), [MeV]   1.899 (  1.429)
   BackL(H)  i  -1 ( -1),  [MeV]   0.603 ( -2.878)  VetoL(H)  i  -1 ( -1),  [MeV]   0.000 (  0.000)
   Gamma [MeV] Sum 1.040753 Max 1.041353  XMulti  2 ( 2)
Event Chain  139 Run 219 File 1000 Evt  67933718 Tof:1 Off:0 EVR:1 Al:0 SF:0
   [ms] -1562123567 [mysec] Sys     729816 Gam         0 Adc 2444625035, d [msec] Sys 58.939 Gam  0.000 Adc 80.479
   StopXL(H) i  89 ( 89), [MeV]   10.238 ( 10.267)  StopYL(H) i  48 ( 48), [MeV]  10.205 ( 10.143)
   BackL(H)  i  41 ( 41),  [MeV]   3.393 (  3.246)  VetoL(H)  i  -1 ( -1),  [MeV]   0.000 (  0.000)
   Gamma [MeV] Sum -0.000500 Max 0.000300  XMulti  1 ( 1)
Event Chain  139 Run 219 File 1000 Evt  67960814 Tof:1 Off:0 EVR:1 Al:0 SF:0
   [ms] -1562080292 [mysec] Sys       4228 Gam         0 Adc 2487900108, d [msec] Sys 43.275 Gam  0.000 Adc 322.037
```

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    StopXL(H)  i  89 ( 89), [MeV]    9.968 (  9.992)  StopYL(H) i  48 ( 48), [MeV]    8.581 (  8.452)
    BackL(H)   i  -1 ( -1), [MeV]    0.603 ( -2.878)  VetoL(H)  i  -1 ( -1), [MeV]    0.000 (  0.000)
    Gamma [MeV] Sum 1.202417 Max 0.604794  XMulti  1 ( 1)
Event Chain  139 Run 219 File 1000 Evt  68020658 Tof:1 Off:0 EVR:1 Al:0 SF:0
  [ms] -1561985359 [mysec] Sys    937313 Gam        0 Adc 2582834633, d [msec] Sys 94.933 Gam  0.000 Adc 41.069
  StopXL(H)  i  89 ( 89), [MeV]    7.623 (  7.519)  StopYL(H) i  48 ( 48), [MeV]    7.636 (  7.476)
  BackL(H)   i  -1 ( -1), [MeV]    0.603 ( -2.878)  VetoL(H)  i  -1 ( -1), [MeV]    0.000 (  0.000)
  Gamma [MeV] Sum 0.723408 Max 0.558537  XMulti  1 ( 1)
Event Chain  139 Run 219 File 1000 Evt  68021261 Tof:0 Off:0 EVR:0 Al:1 SF:0
  [ms] -1561984438 [mysec] Sys    858020 Gam        0 Adc 2583755354, d [msec] Sys  0.921 Gam  0.000 Adc 39.576
  StopXL(H)  i  89 ( 89), [MeV]    9.895 (  9.992)  StopYL(H) i  48 ( 48), [MeV]    9.880 (  9.818)
  BackL(H)   i  -1 ( -1), [MeV]    0.603 ( -2.878)  VetoL(H)  i  -1 ( -1), [MeV]    0.000 (  0.000)
  Gamma [MeV] Sum -0.000500 Max 0.000300  XMulti  1 ( 1)
Event Chain  139 Run 219 File 1000 Evt  68021522 Tof:0 Off:1 EVR:0 Al:0 SF:1
  [ms] -1561984049 [mysec] Sys    247890 Gam        0 Adc 2584145229, d [msec] Sys  0.389 Gam  0.000 Adc 51.728
  StopXL(H)  i  89 ( 89), [MeV] 196.388 (196.388)  StopYL(H) i  48 ( 48), [MeV] 176.164 (176.164)
  BackL(H)   i  -1 ( -1), [MeV]    0.603 ( -2.878)  VetoL(H)  i  -1 ( -1), [MeV]    0.000 (  0.000)
  Gamma [MeV] Sum 0.190875 Max 0.191675  XMulti  4 ( 4)
```

Background

Picture shows Alpha background 250 s before off-beam SF (t018selection250s_AS.root). Red pixels mark positions of approved chains.

Alpha hits before SF 19:10:00 2009-07-07 b_t018selection250s_AS.root/Histograms/Anl/XYLhitsAlphaDT
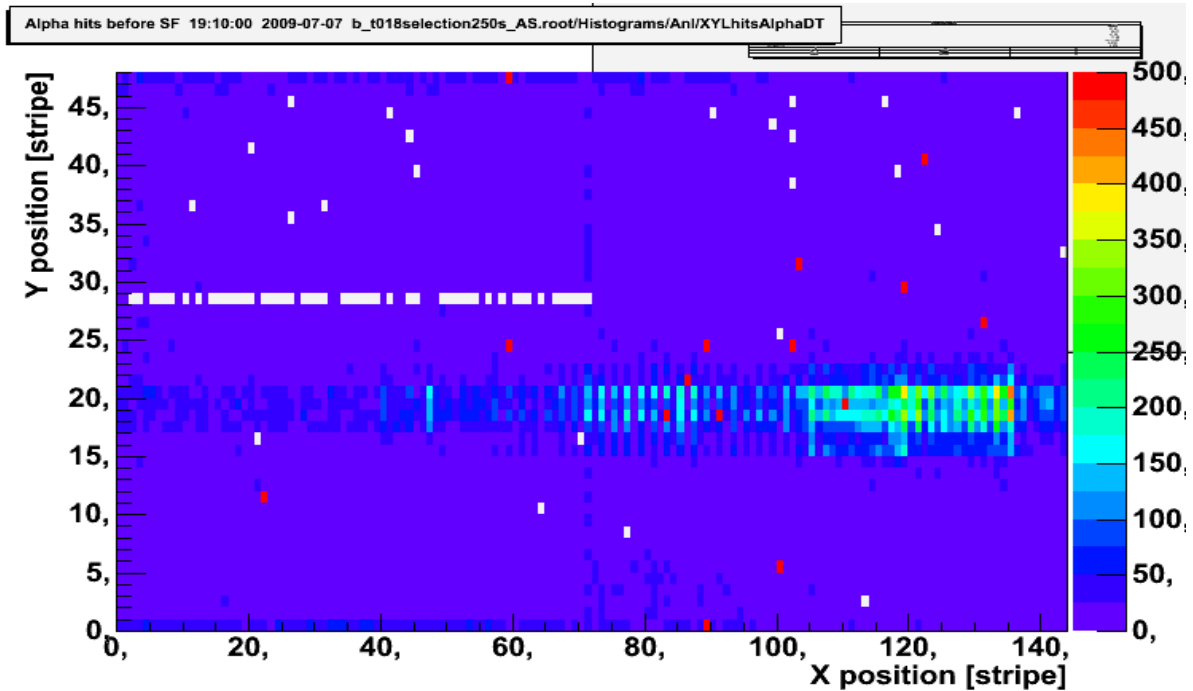
Probability of background based on the LMD files containing chain candidates.
Mechanism:
When detecting an off-beam SF (processed fissions) we go back 250 (150) sec and
look for EVR and Alpha matching X,Y(+-1) of SF.
If at least one of each has been found, all EVR and Alpha
together with the SF form a chain candidate (chains).
All EVR and Alpha NOT matching the SF position are accumulated in XY histograms
regardless of wether a chain candidate was found.
The following table gives the counting rates at the positions of approved chains,
normalized to the integrated time slices.
The probability of chains is mainly the one for Alphas which is
below 10^-4/s except the three at Y=18,19 where it is still below 10^-3/s.

```
Tasca> TascaAnlProc:    Processed 12715418 selected 553
                stack Processed 11634950
                total Fissions 3931482 processed 726 chains 84 sec 181500
                total Alphas   260536
                total EVRs    8523436
                Timewindow [s] 250
          X   Y   counts normalized to sum of time slices
    All   91, 18  1122    6182 10^-6/s
    All  103, 31   370    2039 10^-6/s
    All   83, 18  1426    7857 10^-6/s
    All  102, 24   340    1873 10^-6/s
    All  110, 19   794    4375 10^-6/s
    All  119, 29   300    1653 10^-6/s
    All  131, 26   141     777 10^-6/s
    All   22, 11  1072    5906 10^-6/s
    All   59, 24   711    3917 10^-6/s
    All   86, 21   733    4039 10^-6/s
    All   89, 24   399    2198 10^-6/s
    All  100,  5   412    2270 10^-6/s
    All  122, 40   133     733 10^-6/s
    All   59, 47   510    2810 10^-6/s
    All   89,  0   278    1532 10^-6/s
    Evr   91, 18  1024    5642 10^-6/s 91%
```

```
Evr    103, 31    353   1945 10^-6/s 95%
Evr     83, 18   1235   6804 10^-6/s 86%
Evr    102, 24    328   1807 10^-6/s 96%
Evr    110, 19    720   3967 10^-6/s 90%
Evr    119, 29    283   1559 10^-6/s 94%
Evr    131, 26    122    672 10^-6/s 86%
Evr     22, 11   1065   5868 10^-6/s 99%
Evr     59, 24    704   3879 10^-6/s 99%
Evr     86, 21    728   4011 10^-6/s 99%
Evr     89, 24    390   2149 10^-6/s 97%
Evr    100,  5    400   2204 10^-6/s 97%
Evr    122, 40    126    694 10^-6/s 94%
Evr     59, 47    487   2683 10^-6/s 95%
Evr     89,  0    255   1405 10^-6/s 91%
Alpha   91, 18     98    540 10^-6/s  8%
Alpha  103, 31     17     94 10^-6/s  4%
Alpha   83, 18    191   1052 10^-6/s 13%
Alpha  102, 24     12     66 10^-6/s  3%
Alpha  110, 19     74    408 10^-6/s  9%
Alpha  119, 29     17     94 10^-6/s  5%
Alpha  131, 26     19    105 10^-6/s 13%
Alpha   22, 11      7     39 10^-6/s  0%
Alpha   59, 24      7     39 10^-6/s  0%
Alpha   86, 21      5     28 10^-6/s  0%
Alpha   89, 24      9     50 10^-6/s  2%
Alpha  100,  5     12     66 10^-6/s  2%
Alpha  122, 40      7     39 10^-6/s  5%
Alpha   59, 47     23    127 10^-6/s  4%
Alpha   89,  0     23    127 10^-6/s  8%
```
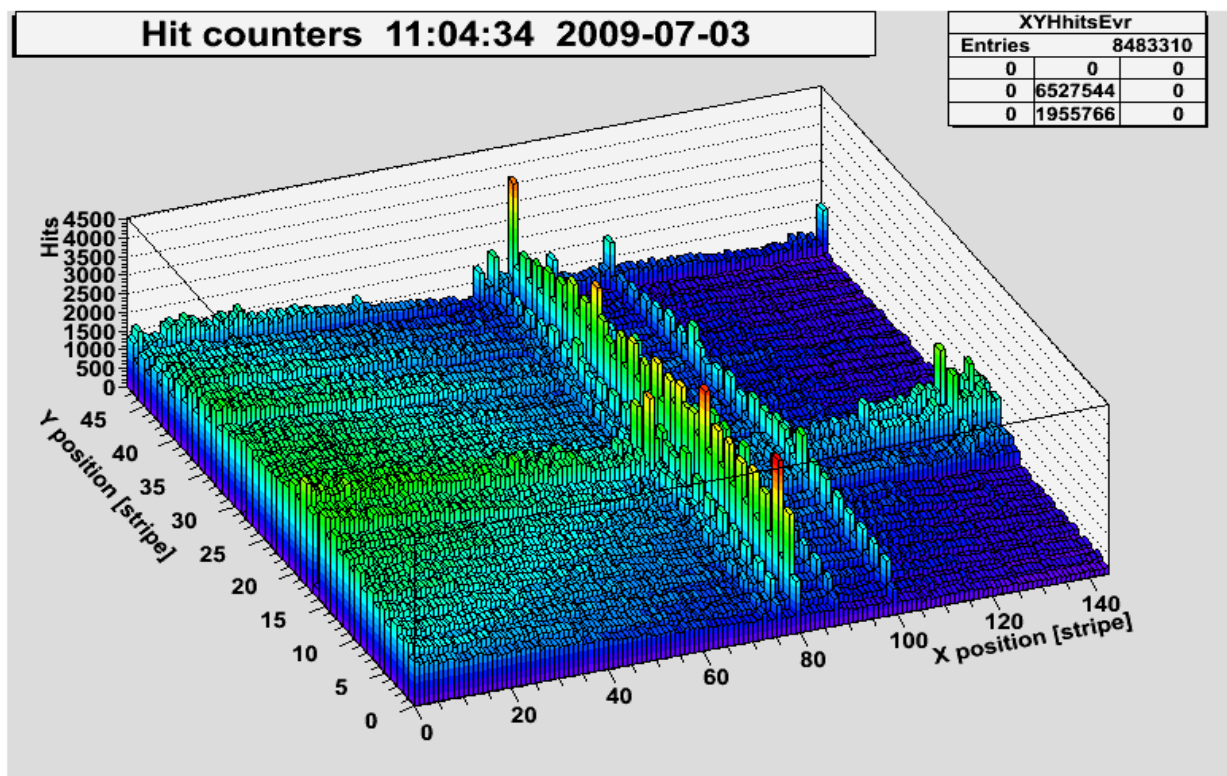
This run is with shorter time slice of 150 s.
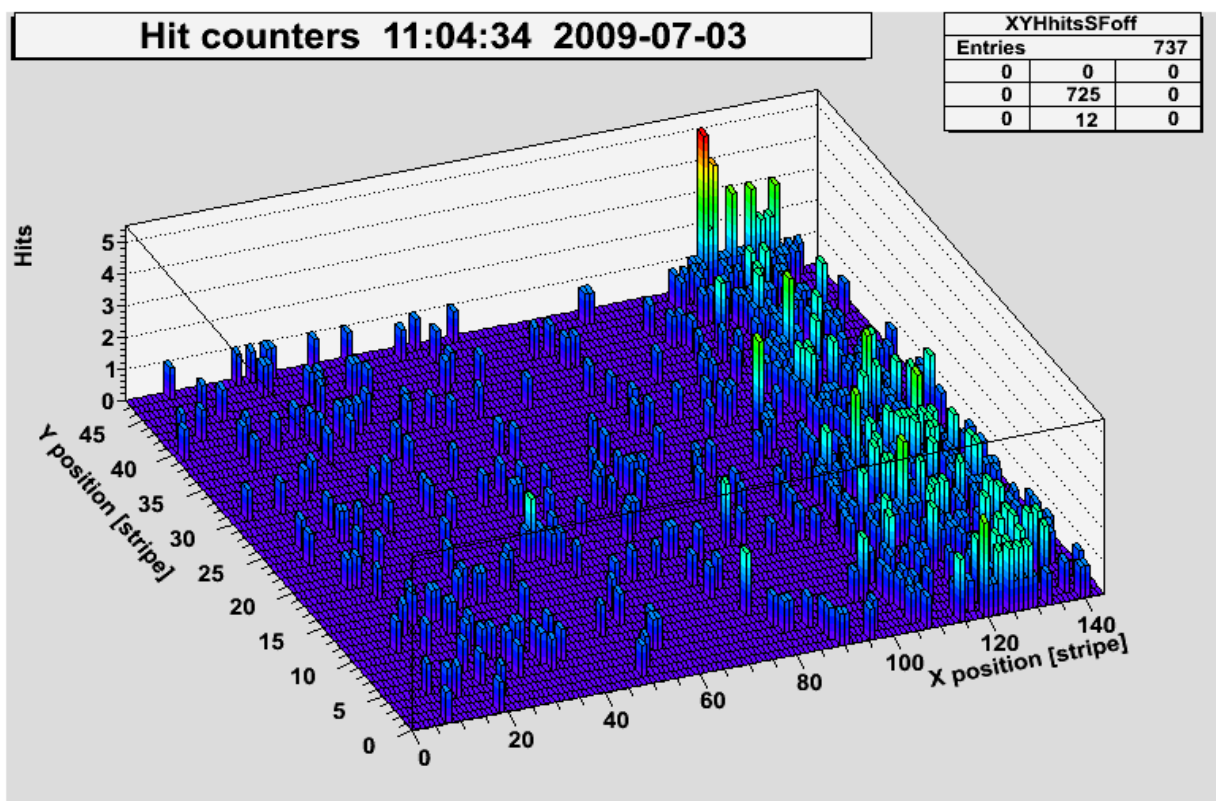The values are very similar..
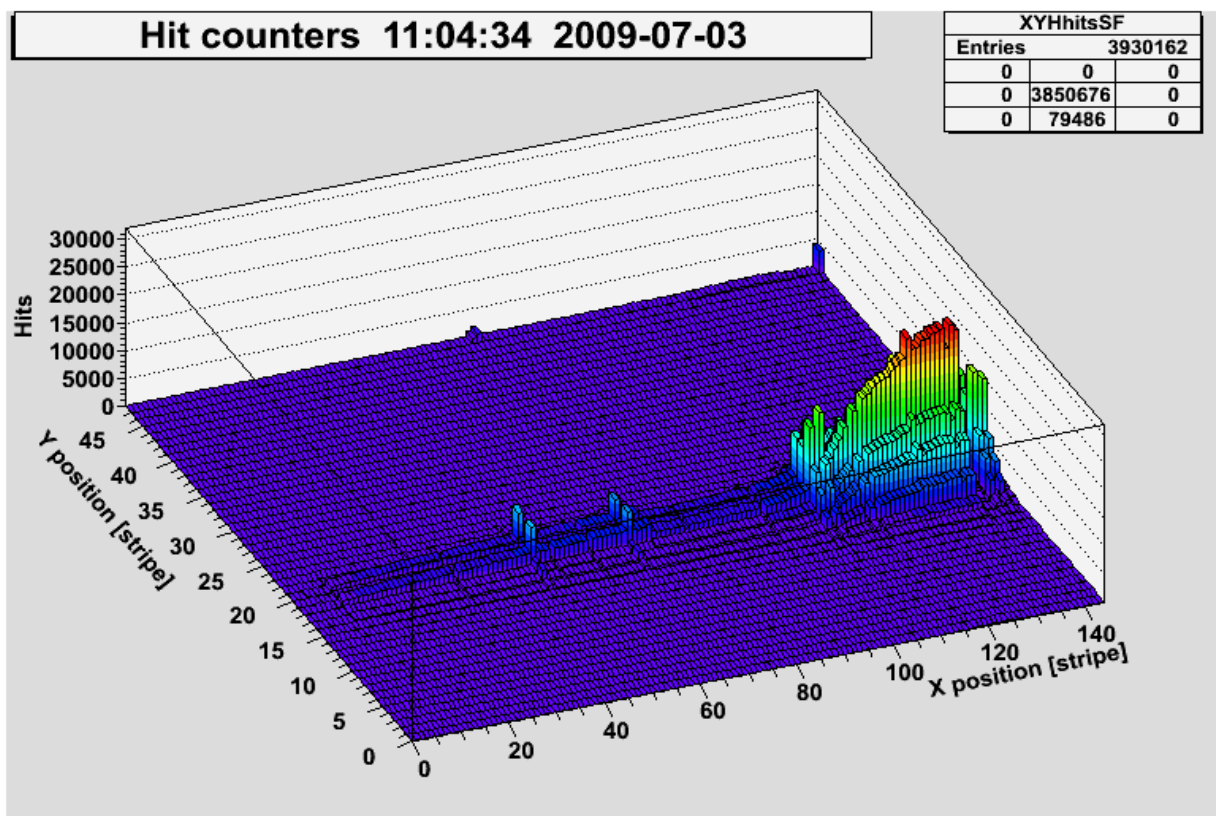
```
Tasca> TascaAnlProc:    Processed 12715418 selected 287
                  stack Processed 7062032
                  total Fissions 3931482 processed 726 chains 55 sec 108900
                  total Alphas   260536
                  total EVRs    8523436
                  Timewindow [s] 150
All     91, 18    676   6208 10^-6/s
All    103, 31    220   2020 10^-6/s
All     83, 18    868   7971 10^-6/s
All    102, 24    196   1800 10^-6/s
All    110, 19    489   4490 10^-6/s
All    119, 29    176   1616 10^-6/s
All    131, 26     79    725 10^-6/s
All     22, 11    659   6051 10^-6/s
All     59, 24    444   4077 10^-6/s
All     86, 21    428   3930 10^-6/s
All     89, 24    258   2369 10^-6/s
All    100,  5    257   2360 10^-6/s
All    122, 40     76    698 10^-6/s
All     59, 47    320   2938 10^-6/s
All     89,  0    161   1478 10^-6/s
Evr     91, 18    616   5657 10^-6/s 91%
Evr    103, 31    210   1928 10^-6/s 95%
Evr     83, 18    754   6924 10^-6/s 86%
Evr    102, 24    191   1754 10^-6/s 97%
Evr    110, 19    444   4077 10^-6/s 90%
Evr    119, 29    167   1534 10^-6/s 94%
Evr    131, 26     69    634 10^-6/s 87%
Evr     22, 11    656   6024 10^-6/s 99%
Evr     59, 24    440   4040 10^-6/s 99%
Evr     86, 21    425   3903 10^-6/s 99%
Evr     89, 24    256   2351 10^-6/s 99%
Evr    100,  5    247   2268 10^-6/s 96%
Evr    122, 40     72    661 10^-6/s 94%
Evr     59, 47    304   2792 10^-6/s 95%
Evr     89,  0    147   1350 10^-6/s 91%
Alpha   91, 18     60    551 10^-6/s  8%
Alpha  103, 31     10     92 10^-6/s  4%
Alpha   83, 18    114   1047 10^-6/s 13%
Alpha  102, 24      5     46 10^-6/s  2%
Alpha  110, 19     45    413 10^-6/s  9%
Alpha  119, 29      9     83 10^-6/s  5%
```
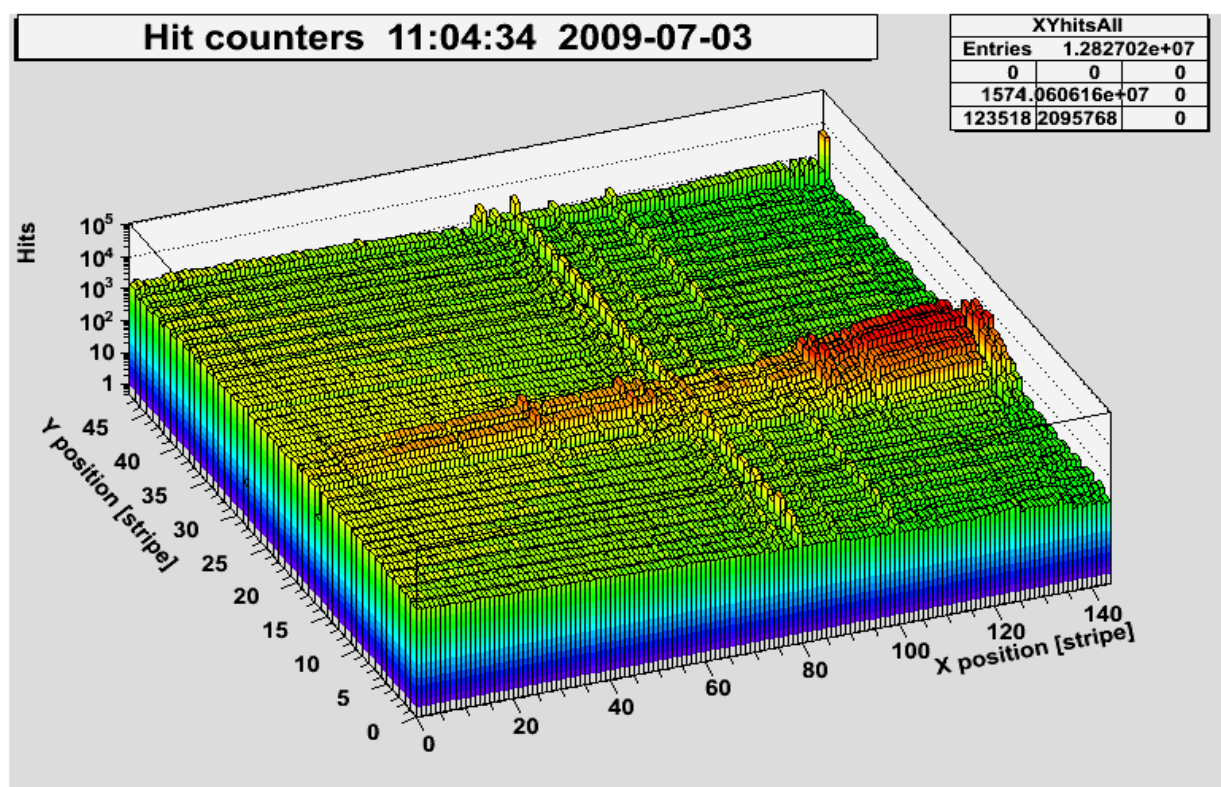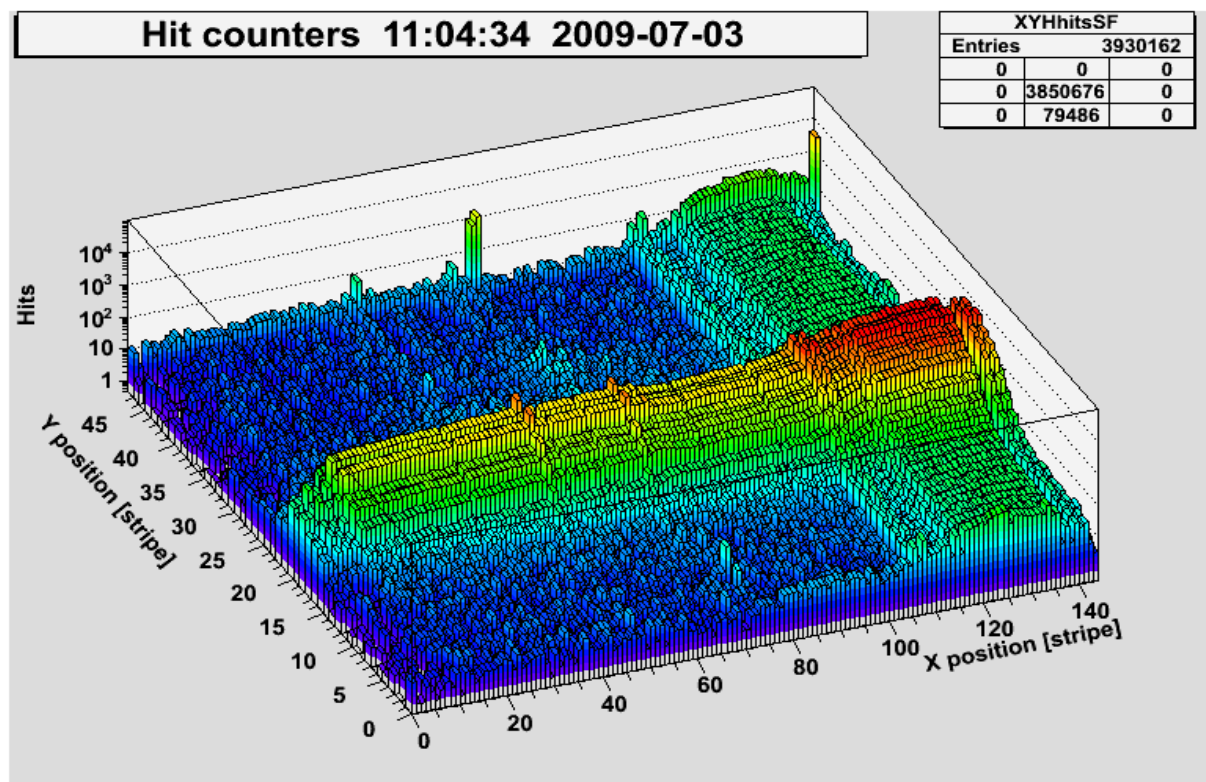
```
Alpha 131, 26      10      92 10^-6/s 12%
Alpha  22, 11       3      28 10^-6/s  0%
Alpha  59, 24       4      37 10^-6/s  0%
Alpha  86, 21       3      28 10^-6/s  0%
Alpha  89, 24       2      18 10^-6/s  0%
Alpha 100,  5      10      92 10^-6/s  3%
Alpha 122, 40       4      37 10^-6/s  5%
Alpha  59, 47      16     147 10^-6/s  5%
Alpha  89,  0      14     129 10^-6/s  8%
```

Hit counters 11:04:34 2009-07-03

XYHhitsEvr		
Entries		8483310
0	0	0
0	6527544	0
0	1955766	0

Hit counters 11:04:34 2009-07-03

XYLhitsAlpha		
Entries		412806
0	0	0
3969	271836	0
78447	58554	0

18

Hit counters   11:04:34   2009-07-03

XYHhitsSF		
Entries		3930162
0	0	0
0	3850676	0
0	79486	0

Hit counters   11:04:34   2009-07-03

XYHhitsSFoff		
Entries		737
0	0	0
0	725	0
0	12	0

19

Hit counters 11:04:34 2009-07-03

XYHhitsSF		
Entries		3930162
0	0	0
0	3850676	0
0	79486	0

Hit counters 11:04:34 2009-07-03

XYhitsAll		
Entries		1.282702e+07
0	0	0
1574.0	60616e+07	0
123518	2095768	0

Hit counters before SF 11:04:34 2009-07-03

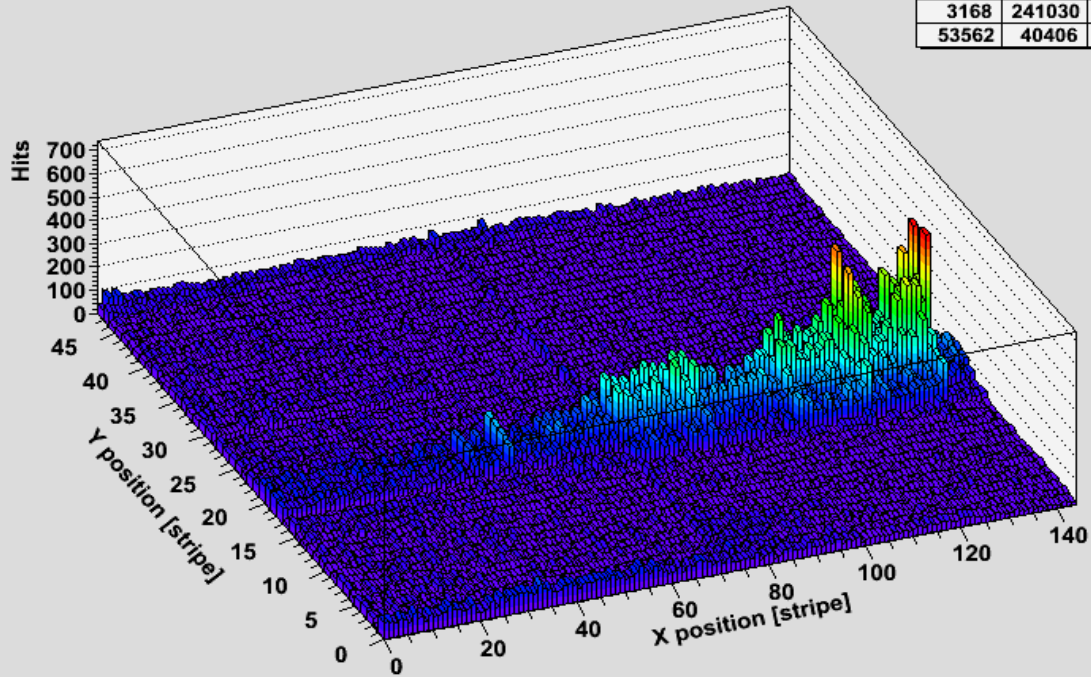| XYhitsAllDT		
Entries		6058048
0	0	0
3168	4632844	0
53562	1368474	0
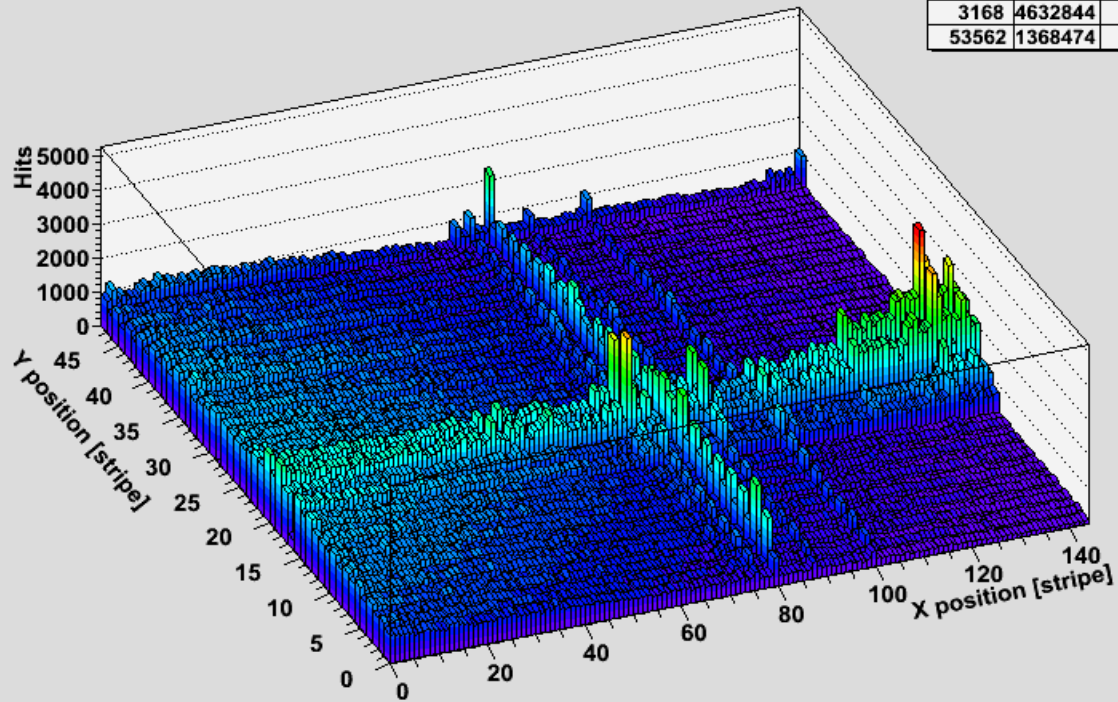
Hit counters before SF 11:04:34 2009-07-03

XYHhitsEvrDT		
Entries		5719882
0	0	0
0	4391814	0
0	1328068	0
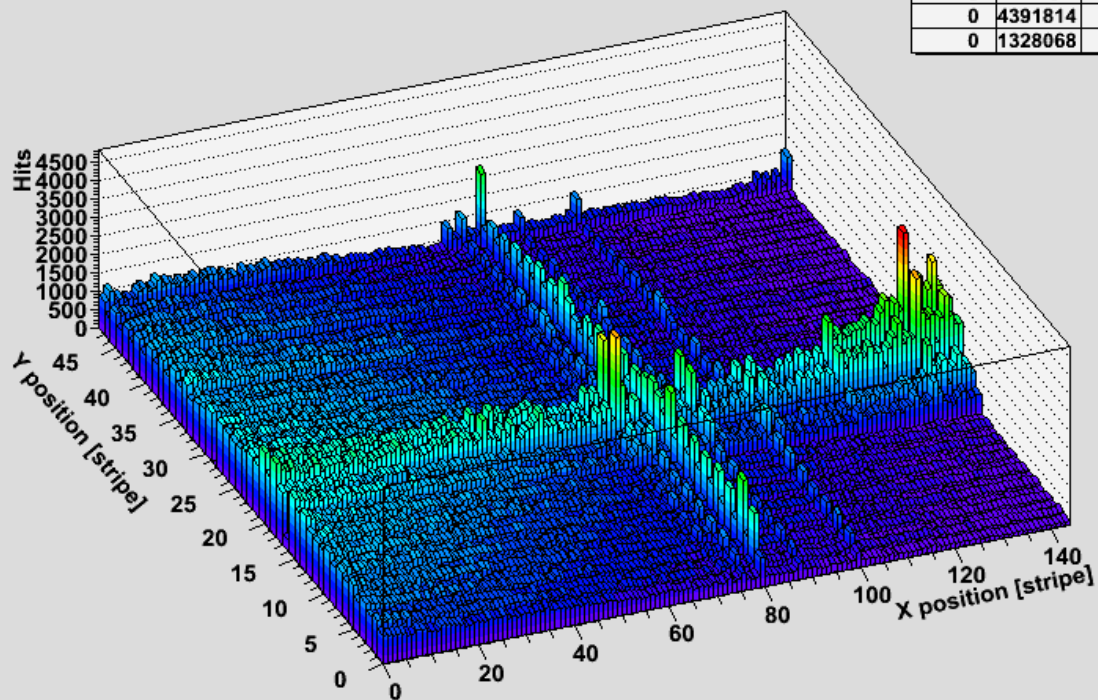
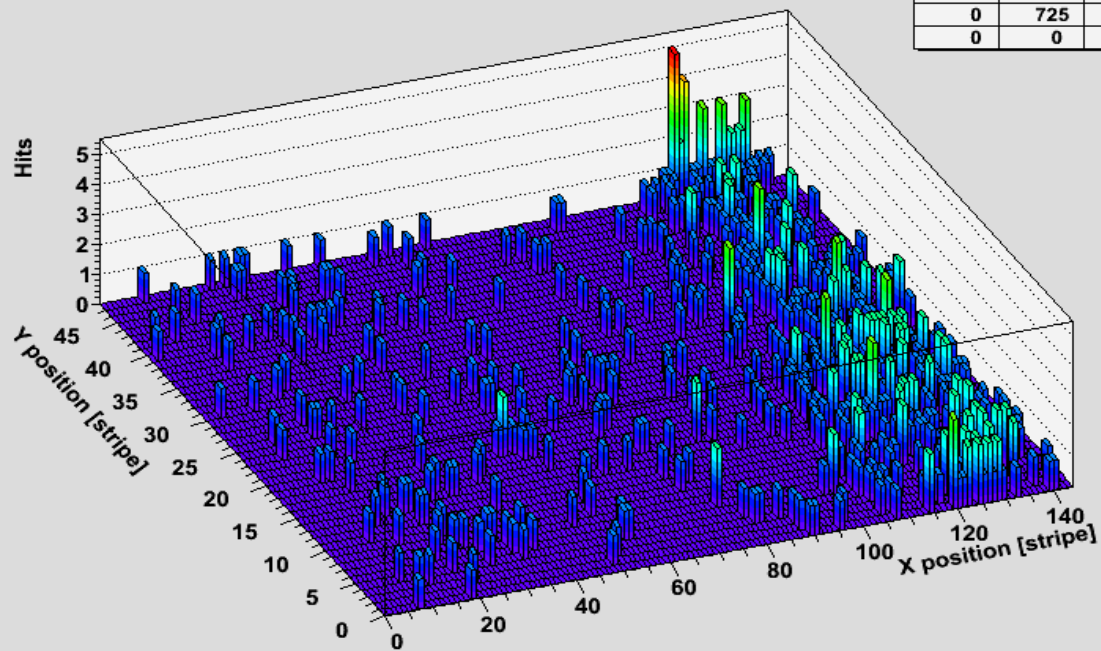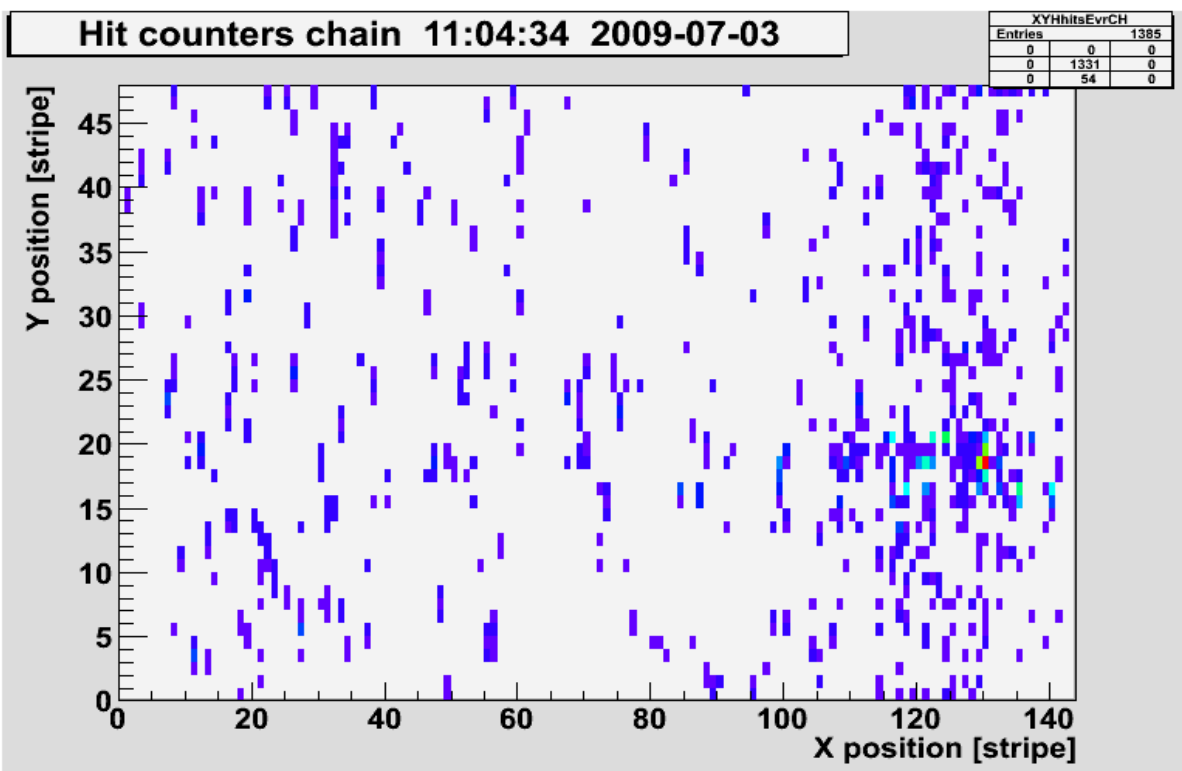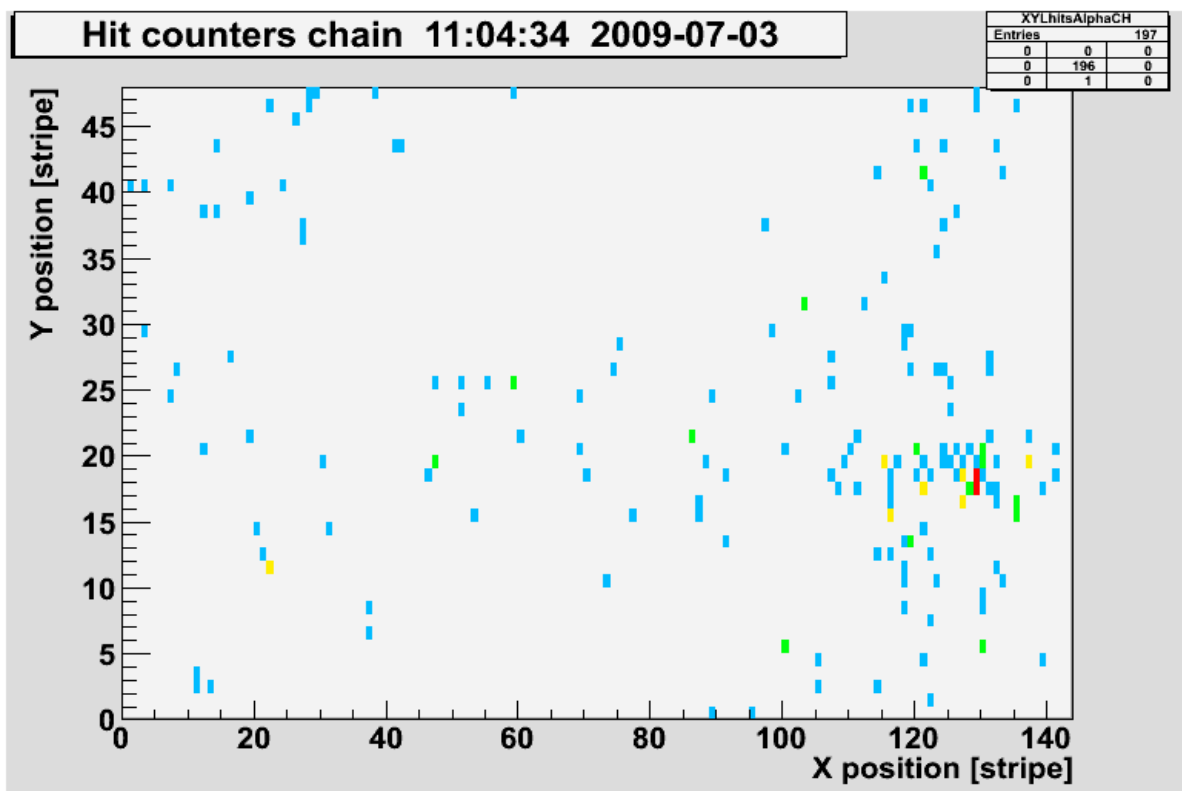**Hit counters before SF   11:04:34   2009-07-03**

XYLhitsAlphaDT		
Entries		338166
0	0	0
3168	241030	0
53562	40406	0

Hits

Y position [stripe]

X position [stripe]

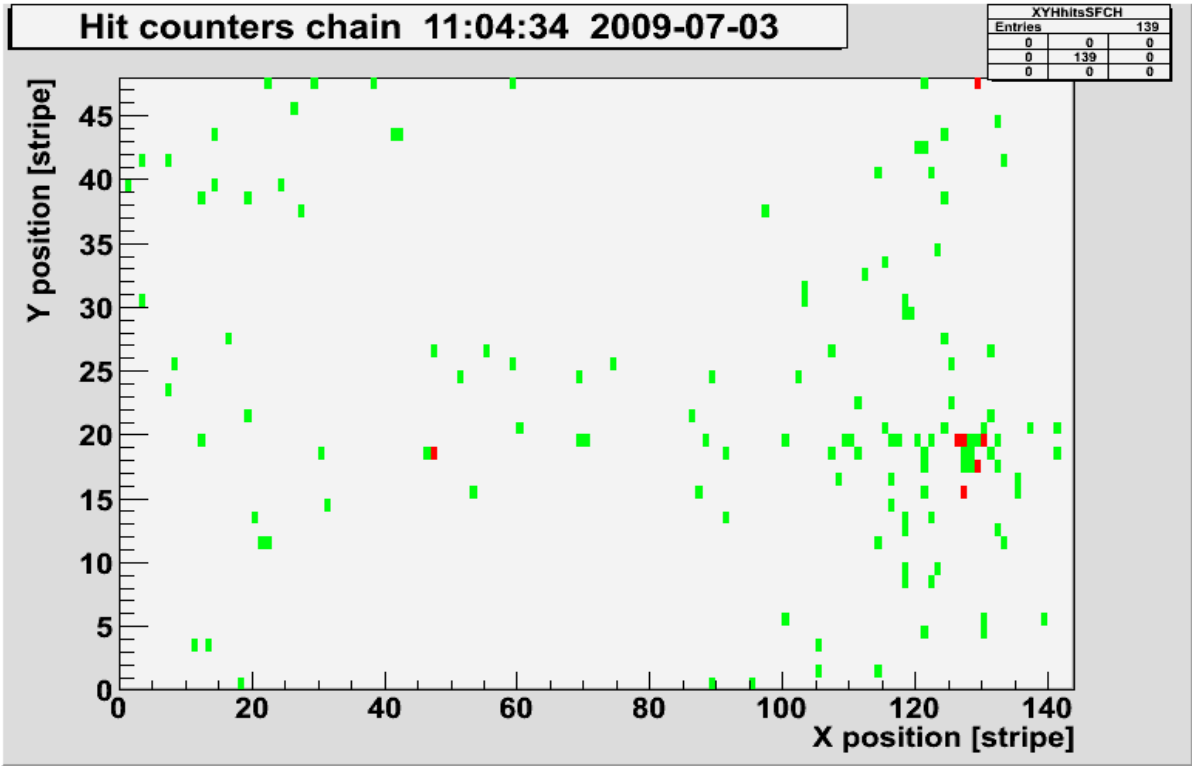**Hit counters before SF   11:04:34   2009-07-03**

XYHhitsSFDT		
Entries		725
0	0	0
0	725	0
0	0	0

Hits

Y position [stripe]

X position [stripe]

22

23

Hit counters chain 11:04:34 2009-07-03

Calibration

An automated generation of calibration coefficient files is done by macro
makecali.C(prefix, rootfile)
root -b -l "makecali(\"test\",\"test_AS\")"
where prefix is a string used as prefix for all file names generated, rootfile is the name of the ROOT file containing the
histograms (given without trailing .root). The macro should be adjusted. Several parameters can be set inside.

Histograms/Cali/StopXL:	prefix_StopXL[144]
Histograms/Cali/StopYL:	prefix_StopYL[96]
Histograms/Cali/StopXH:	prefix_StopXH[144]
Histograms/Cali/StopYH:	prefix_StopYH[96]
Histograms/Cali/BackH:	prefix_BackH[64]
Histograms/Cali/BackL:	prefix_BackL[64]
Histograms/Cali/VetoH:	prefix_VetoH[16]
Histograms/Cali/VetoL:	prefix_VetoL[16]
Histograms/Unpack/GammaE:	prefix_GammaE[8]
Histograms/Unpack/GammaT:	prefix_GammaT[8]

The format of the calibration files is:
name value
The format of the generated files is:
name index a0 a1 a2 : NOF ChiSquare

Class TascaCalibration is the parameter class holding the coefficients. This parameter is used in the TascaCaliProc
processor of the second step.
To enable/disable the calibration the macro
setcali.C
must be edited. If enabled, it reads the files produced by makecali. For these the prefix string must be set.

Class TascaCaliFitter is a parameter class with the purpose of doing the calibration interactively. This might be
necessary if the automatic calculations do not work for a histogram. This parameter is used in the TascaCaliProc
processor of the second step. Calculating calibration parameters is done in two steps. First we need a histogram with the
measured lines and a text file with the energies of these lines. These are present in arrays inside the parameter. First
fitter LineFitter is used to find out true channel numbers for corresponding lines in calibration spectrum. This fit should
be done interactively on the GUI side:
– Get parameter CaliFitter from analysis (Doubleclick)
– Display calibration spectrum.
– Double click on the LineFitter fitter in the parameter editor. Fit panel will open showing the current settings of the
  fitter. Press Use pad of the fit panel to assign this fitter to the view panel containing the calibration spectrum and
  Rebuild button.
– Use peak finder 3 to find the peaks. Enlarging the noise factor removes peaks as well as minimum noise.
– Do Fit. If the positions of the lines are fitted correctly, copy the fitter back to the calibration parameter: right mouse
  button click on LineFitter, select Get from FitPanel .
– Check if the name of the calibration file is correct.
– Set DoFit variable to 1 (will be set back to 0 after the fit).
– Now press left arrow button. This will perform fit of the calibration curve (polynomial of order 2) in the
  UpdateFrom() method of TascaCaliFitter on the analysis side.
– Pressing right arrow button will get the results of the calibration, present in the polynomial coefficients
  fdA[0]...fdA[2] and in the Calibrator fitter.
– The corresponding TGraph is UserObjects/CaliGraph and is displayed by double click. Then double click on the
  Calibrator fitter in the parameter editor to open in a fit panel, press Use Pad, Rebuild and Draw. This will draw
  the calibration polynomial over the points which indicate the energy/channel of the calibration lines.

Stop detector DSSSD

	Channels (H+L)	ADCs Multipl: 8
48 (96)	96 (192)	12 (24)
72 (144) 72 (144)	144 (288)	18 (36)

Veto detector SSSD

8
8

Indices 4LW
4x10x3bit = 40
one for H and L
Index ⇔ channel

3x CAEN 785
3x32 = 96
ADC ⇔ index

Back detector SSSD

8

	16 (32)	2 (4)
	64 (128)	8 (16)
	320 (640)	40 (80)

8

The detector layouts