

## Documentation of Macros in offline/Macros 1 Dec 2015

All macros are to be run in ROOT unless otherwise stated. Macros not listed in this document are currently in development or not in use.

### 1) beamprofile\_NEW.sh

Displays the ADC High Gain TARGET beam counts for a given event. Same as beamprofile.sh except faster and with cleaner run output. **Run as a standalone job.**

Associated macros:

TARGET\_BeamProf.C – executes BeamProfile.C

TARGET\_BeamProfile.C – loads the TARGET beam profile

To execute: ./beamprofile\_NEW.sh run\_number

To execute TARGET\_BeamProfile.C in ROOT: TARGET\_BeamProfile(Run\_Number, flag)

- Note: Entering a non-zero flag restricts the number of entries in the run the macro executes over. By default, it is set to 0 and executes over all events. The above holds true for all other macros documented with a *flag* parameter.

See included manuals for more information on the following:

E36FindPeds.C

E36FindPeds.h

E36Monitor.C

E36Monitor.h

### 2) Efficiency\_Loss\_Histo.C

Calculates and produces histograms of the proportion of events within a given run that satisfy the given filters (good TARGET, good gap, good MWPC; bad TARGET, bad gap, bad MWPC).

Outputs of this macro for several runs can be found at the following link (search for the xls file listed beside “Run Statistics-v2 TRIUMF”):

<http://www-online.kek.jp/~e06/pukiwiki/index.php?Weekly%20TREK%20Meeting>

To execute: Efficiency\_Loss\_Histo(run\_number, enable\_cout, flag)

- Set enable\_cout to a non-zero value to print the events with good gap, good TARGET, and good MWPC

### 3) Event\_Display.C

Displays the ADC HG TARGET, ADC HG and TDC TARGET, ADC LG TARGET, ADC HG SFT, ADC and TDC TOF for a given event in a given run; cuts are made individually for each channel in a given detector (except MWPC). Also prints the corrected (after threshold cutting) values of each of the channels in the detectors listed above, as well as all MWPC channels.

The text files where the cuts are defines can be found in the Mapping directory (ADC\_TOF1\_Thresholds.txt, for example).

To execute: Event\_Display(run\_number, event\_number, enable\_cout)

Set enable\_cout to a non-zero value to print the ADC HG SFT and TDC LE SFT values from depth 0 to 3 for all channels

### 4) Histo\_Display.C

Shows the spectra of channels in the specified detector (ADC\_HG\_TARGET, ADC\_High\_SFT, TDC\_LE\_TARGET, TDC\_LE\_SFT, MWPC, ADC and TDC TOF). **Run Tree2Histo.C for the desired run before executing this macro**

To execute: `Histo_Display(run_number, board_number, iflag)`

See below for an explanation of the `board_number` and `iflag` parameters:

if `iflag=0` -> ADC\_High and TDC\_LE ONLY !!!

if `iflag=1` -> Both ADCs and TDCs !

`board number = 1` -> SFT (ch. 0 - 63)

`board number = 2` -> SFT (ch. 64 - 127)

`board number = 3` -> TARGET (ch. 0 - 63)

`board number = 4` -> TARGET (ch. 64 - 127)

`board number = 5` -> TARGET (ch. 128 - 191)

`board number = 6` -> TARGET (ch. 192 - 255)

`board number = 7` -> TOF1 (ch. 0 - 23)

`board number = 8` -> TOF1 (ch. 0 - 23) - Sorted

`board number = 9` -> TOF2 (ch. 0 - 47)

`board number = 10` -> TOF2 (ch. 0 - 47) – Sorted

`board number = 11` -> MWPC (ch. 0 - 512)

`board_number = 12` -> AC (0 - 23)

`board_number = 13` -> PGC (0 - 96)

`board_number = 14` -> TTC (0 - 11)

## 5) `Histo_DisplaySC.C`

A version of `Histo_Display.C` to show histograms from files created using the macro `Tree2HistoSC.C` (which creates a ROOT file containing histograms for all the channels in various detectors, using only events with **good gap** and at least **one hit each of the MWPC chambers**). **Be sure to run `Tree2HistoSC` beforehand.**

To execute: `Histo_DisplaySC(run_number, board_number, iflag)`

## 6) `Kaon_Centroid_Histo.C`

Shows the ADC Low Gain TARGET beam hit profile for a given run, including only the four largest ADC LG TARGET hits in each event, as well as X and Y side profiles.

To execute: `Kaon_Centroid_Histo(Run_Number, flag)`

## 7) `MWPC_Empty_Counter.C`

Counts the number of events with 0 MWPC hits in a given run

To execute: `MWPC_Empty_Counter(run_number, flag)`

## 8) `MWPC_Event_Display.C`

Displays the hit multiplicities in each of the MWPC chambers (C2X, C2Y, C3X, C3Y, C4X, C4Y) for a given run. Can be executed over one event in a run if the parameter `Event_Number` is set to 0 or greater (by default, it executes over all events).

To execute: `MWPC_Event_Display(Run_Number, Event_Number)`

## 9) `MWPC_Hit_Counter.C`

Counts the number of events with at least one hit in each of the MWPC chambers (C2X, C2Y, C3X, C3Y, C4X, C4Y) and lists the events that satisfy this condition in a text file.

Name of the output file: Run\_Number\_(Run\_Number)\_MWPC\_Events\_Cut\_(MWPCthr).txt

To execute: MWPC\_Hit\_Counter(Run\_Number)

#### 10) PGC\_AC\_Histo.C

Displays histograms of the hit multiplicities of all ADC PGC and AC channels, as well as gap multiplicities of hits in the PGC and AC. Events in the latter two histograms are first filtered by good gap (TOF2[j] & TOF1[j,j+1, or j-1]).

To execute: PGC\_AC\_Histo(Run\_Number, time\_window, flag)

- Set time\_window to a non-zero value to enable good gap filtering with TDC cutting enabled (by default, it is set to 1)

#### 11) SFT\_Efficiency.C

Calculates the ADC HG SFT efficiency (percentage of hits above threshold) for events in a given run with at least 5 ADC HG TARGET hits. Efficiency calculated for each individual layer (L1, L2, L3, L4) and each helicity (L1 & L2, L3 & L4)

To execute: SFT\_Efficiency(Run\_Number, NHit\_TARGET\_good\_event, Nb\_events)

- To change the threshold number of ADC HG TARGET hits, change the parameter NHit\_TARGET\_good\_event
- Nb\_events serves the same purpose as flag

#### 12) SFT\_Fiber\_Efficiency.C

Calculates the efficiency of all fibers in each of the ADC HG SFT layers

To execute: SFT\_Fiber\_Efficiency(Run\_Number, flag)

#### 13) SFT\_Layer\_Distances.C

Produces histograms of all the L1-L2 and L3-L4 ADC HG SFT multiplicities for a given run

To execute: SFT\_Layer\_Distances(Run\_Number, flag)

#### 14) TARGET\_Board\_Hit\_Counter.C

Counts the number of events with exactly two ADC HG TARGET hits (with good gap and MWPC), and determines how many of those events have hits in one TARGET board or two TARGET boards (three and four boards for hit\_thr > 2)

To execute: TARGET\_Board\_Hit\_Counter(Run\_Number, hit\_thr, flag)

TARGET Board 1: Ch. 0-63

TARGET Board 2: Ch. 64-127

TARGET Board 3: Ch. 128-191

TARGET Board 4: Ch. 192-255

#### 15) TARGET\_Efficiency.C

Calculates the efficiency of each channel in the TARGET with kaon tracking using only events that satisfy the given filters (ADC LG and HG TARGET hits, coincident TDC\_LE\_TARGET hits, good gap)

To execute: TARGET\_Efficiency(Run\_Number, flag)

#### 16) TARGET\_Event\_Counter.C

Counts the number of events in a run with at least 6 ADC HG TARGET hits

To execute: TARGET\_Event\_Counter(Run\_Number, flag, threshold)

- To change the required number of ADC HG TARGET hits, change the threshold parameter

### 17) TARGET\_Hit\_Multiplicity.C

Calculates the number of events in a run with 0, 1, 2, 3, 4, and 5 ADC HG TARGET hits (and have good gap and MWPC), and shows the ADC LG TARGET hit multiplicities for events with 0 to 5 ADC HG TARGET hits

To execute: TARGET\_Hit\_Multiplicity(Run\_Number, flag)

### 18) TARGET\_SFT\_Efficiency.C

Same as TARGET\_Efficiency, except the SFT Efficiency of the filtered events is also calculated and displayed in a histogram

To execute: TARGET\_SFT\_Efficiency(Run\_Number, Enable\_TARGET\_Eff, nevents)

- To enable the TARGET Efficiency Calculation, set Enable\_TARGET\_Eff to a non-zero value. By default, only the SFT efficiency calculation is performed.

### 19) TDC\_Depth.C

Displays histograms for all TDC\_LE\_SFT and TDC\_LE\_TARGET channels from depth 0 to 3. Hits are filtered by thresholds.

To execute: TDC\_Depth(Run\_Number, flag)

### 20) TDC\_TOF\_Hit\_Distribution.C

Shows histograms for each TDC channel in TOF1 and TOF2, containing *only* hits where the corresponding ADC TOF1 or TOF2 is above the threshold specified in the mapping files (eg. **ADC\_TOF1\_Thresholds.txt**). Each histogram has four bars:

**Red:** Number of hits where the TDC is -1

**Green:** Number of hits within the TDC window

**Blue:** Number of TDC hits outside the peak but between 0 and 4000

**Black:** Number of TDC hits greater than 4000

To execute: TDC\_TOF\_Hit\_Distribution(Run\_Number, flag)

### 21) TDC\_TOF\_Test.C

Displays ADC and TDC histograms for TOF1 and TOF2. ADC hits are only plotted if the corresponding TDC fits within the time window defined in **Thresholds.h**. On each TDC histogram, the number of hits in the TDC peak for each channel, as well as the number of hits at or above 0, is displayed.

To execute: TDC\_TOF\_Test(Run\_Number, normalize, flag)

Set the parameter “normalize” to a non-zero value to set the height of each TDC histogram (TOF1 and TOF2) to a uniform value dependent on the maximum height of all the TOF1 and TOF2 histograms.

### 22) Thresholds.h

Defines the thresholds for all the detectors listed in the file (including TARGET, SFT, TOF, and MWPC)

### 23) TOF\_E\_2D.C

Produces 2D histograms (scatter plots) of the ADC vs. TDC for each channel in TOF1 and TOF2.

To execute: TOF\_E\_2D(Run\_Number, flag)

### 24) TOF\_E\_Cut\_2D.C

Produces 2D histograms (scatter plots) of the ADC vs. TDC for each channel in TOF1 and TOF2 using only events with good gap and good MWPC.

To execute: TOF\_E\_Cut\_2D(Run\_Number, flag)

### 25) TOF\_Gap\_Multiplicity.C

Produces a histogram of the number of times each TOF gap satisfies the “good gap” condition in a particular run.

To execute: `TOF_Gap_Multiplicity(Run_Number, time_window, flag)`

- To enable TDC TOF cutting, set `time_window` to a non-zero value.

### 26) TOF\_TOF\_2D.C

Produces scatter plots of the TDC Up vs. TDC Down for TOF1, and TDC Out vs. TDC in for TOF2.

To execute: `TOF_TOF_2D(Run_Number, flag)`

### 27) Tree2Histo.C

Creates a ROOT file containing histograms for all the channels in various detectors

To execute: `Tree2Histo(Run_Number, flag)`

### 28) Tree2HistoSC.C

Creates a ROOT file containing histograms for all the channels in various detectors, using only events with good gap and at least one hit in each of the MWPC chambers (C2X, C2Y, C3X, C3Y, C4X, C4Y)

To execute: `Tree2HistoSC(run_number, n_MWPC_hits, flag)`

- To change the number of required hits in each MWPC chamber, modify the `n_MWPC_hits` parameter (the default value is 1)

### 29) Tree2HistoMWPC.C

Loads the ADC TOF1 and TOF2 spectra using only the channels in the output file of `MWPC_Hit_Counter.C`. Ensure the MWPC threshold in `Thresholds.h` matches that of the output file from `MWPC_Hit_Counter.C` you want to analyze.

To execute: `Tree2HistoMWPC(Run_Number, flag)`

### 30) unpack.sh

Use to unzip and unpack a data file. Run in command line outside ROOT.

To execute: `./unpack.sh Run_Number`