Documentation of Macros in offline/Macros   13 Nov 2017

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.

001) Batch_Job.C

  calculates a large txt file of data for use by Osaka or Cooker analyses
To execute in ROOT: .L Batch_Job
Then type   Batch_6.0(Run#, min_Evt#, max_Evt#, flag, true or false) where flag = 0 writes to an output file, if set to **true**
  then you need to specify the name of the file in Line 2 of **Batch_Variables/h**

002) Many_Tracks_Fit_2.2.C

  calculates 2 tracks (a high energy lepton and a delta e-)
To execute in ROOT: .L Many_Tracks_Fit_2.2.C+
  Then type FindTwoTracks(Run#, Evt#)

003) Batch_Two_Tracks_Fit.C

  calculates a large txt file with data for 2 track fits
To execute in ROOT: .L Batch_Two_Tracks_Fit.C+   in alex/simulation
  Then type Batch_Two_Tracks_Fit(Run#, flag, min_Evt#, max_Evt#)
    flag = 0 analyze all events, no plots   flag = 1 analyze all events, plots to pdf

004) moniTarget3.cxx

  produces an output pdf file with pictures of the events
To execute in ROOT: .x moniTarget3.cxx   in alex/simulation
  FIRST – edit line 124 to input the root data file you wish to analyze

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1) beamprofile_NEW.sh
Displays the ADC High Gain TARGET beam counts for a given run. 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 in ROOT: .L TARGET_BeamProfile.C+
  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_3.2.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 defined can be found in the Mapping directory (**ADC_TOF1_Thresholds.txt**, for example).

To execute: Event_Display_3.2(Run_#, Evt_#, Flag-1, Flag-2, Flag-3)   Note—Event_Display_3.0 does not include Flag-1

Flag-1=0=correct time-walk, 1=orig times,   Flag-2=0=TDC-K_Avg, 1=TDC raw, 2=print all bars, 9=force Evt print-out, Flag-3=1=print slope, intercept, dy^2 for chisq calc

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)
boad_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_#, 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_#, Event_#)

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_#)_MWPC_Events_Cut_(MWPCthr).txt
To execute: MWPC_Hit_Counter(Run_#)

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_#, 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_#, 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_#, flag)

13) SFT_Layer_Distances.C

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

To execute: SFT_Layer_Distances(Run_#, 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_#, 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. 192-25

15) TARGET_EfficiencyC

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)

16) TARGET_Event_Counter.C
Counts the number of events in a run with at least 6 ADC HG TARGET hits

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

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 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.

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

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.

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.

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.

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 enable TDC TOF cuts, 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.

27) Tree2Histo.C
Creates a ROOT file containing histograms for all the channels in various detectors

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 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.

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