

## Description of muTr Calibration DAQ and Analysis Procedures – MJL – 6/16//06

### DAQ

- on phnxrc@phoncsc:mutr/calib/
- the shift-person initiates this whole thing (by using docalib.pl) at least once a day when the beam or HV are off and normal data taking not taking place.
- docalib.pl – Perl/Tk GUI to control calibration of either arm
  - calib1.pl – Perl script called by above for initialization, for each of 13 DAC values and for finishing up. For each 13 runs:
    1. Set calibration system pulse amplitude & load user words for packets using calib.c program
    2. Then use RC to take >100 event run
  - prdf file names are recorded in the file filelist\_xx\_yy\_zz.txt
  - After a successful sequence it puts “tag” name into newcalibS.txt or newcalibN.txt (which is the signaling file used to communicate with the automatic analysis, see below)
  - And last it calls getTemp.csh to readout and check the FEM/Glink temperatures, voltages, currents and put results in the mySQL database

### Automatic Analysis

- On phnxmutr@va011 in ~/calib
- CVS repository is at /phenix/PHENIX\_CVS/online/calib/mutr
- (Full calibration procedures with pedestal only files in parenthesis)
- cauto (cautoped) – cron jobs (one for south, one for north) run every 5 minutes and look for newcalibX.txt files in the DAQ directory (above). When one of these files is found the cauto script initiates an analysis by calling docalib.
- docalib (doped) – csh script to analyze a set of calibration runs for a muon arm (south or north)
  - sets LD\_LIBRARY\_PATH to get working libraries
  - makes a sub-directory for this analysis using the “tag” name
  - get filelist\_xx\_yy\_zz.txt from DAQ directory
  - calib.C (quick.C) – root macro to analyze all data for calibration & produce threshold files
  - plot.C – root macro to plot calibration results
  - mon/... - comparison macros/programs to compare these results with results from previous calibrations & make some plots
    - docalmon arm (with arm=0 for south arm or =1 for north arm)
      - getf - csh script to get list of calibrations to scan and compare
      - calmon(arm) - using libcalmon.so library scan the listed calibrations and make the calmon ntuple
      - make some plots with drawp.C drawg.C and drawr.C
      - make history plots with pedhist.C rmshist.C and gainhist.C
      - make plots for each packet with dopedpkth arm
      - uses X virtual frame buffer (Xvfb) for display
  - check.pl - sanity checks before recording anything in db

- copy new threshold files to \$DCM\_THRESHOLDS/mutr.s or mutr.n
- update database
  - with dodb.pl
  - makes dodb script which uses dbputAll.C to put results in db, then verifies with dbgetAll.C as follows:
    - dbPutAll.C
      - txtGetAll(“merge.txt”)
      - txtPutAll(“cal-intermediate.txt”)
      - dbPutAll(start,stop,descript)
    - dbGetAll.C
      - dbGetAll
      - txtPutAll(“cal-check.txt”)
  - records in dbhistory.txt
  - then the following checks are made by dodb.pl
    - that the following files are time ordered:
      - dodb, dbhistory.txt, cal-intermediate.txt, cal-check.txt
    - and that the contents of cal-check.txt and cal-intermediadte.txt are identical (which verifies what was put into db comes back out again)
- use domove to update results & histograms on Web via Samba mount of /phenix/WWW & at /data2/phnxmutr/www/calib\_results
- email results to leitch (& others)
- optional: call dobits.csh which analyzes calibration prdf files for stuck bits
  - in directory ~/dobits/ using dobits.csh, check\_mutr.C and check\_stuck\_bit
- new web areas on logbook.phenix.bnl.gov that can be reached via tunneling to port 80 on logbook (7299 tunnel port number here)
  - [http://127.0.0.1:7299/mutr/calib\\_results/calib\\_results.html](http://127.0.0.1:7299/mutr/calib_results/calib_results.html)
  - <http://127.0.0.1:7299/mutr/www/>
  - <http://127.0.0.1:7299/dallas/>

### Analysis Code Overview

- code in CVS at /online/calibration/onlcal/subsystems/mutr/
- calib.C – macro called by docalib (or calibX.C where X is S or N)
  - load libraries: libonlreco.so & libMutCalib.so
  - create MutCalib object
  - initMappingObj or txtGetFullMap – get channel mapping
  - getPreviousCalibration – get most recent previous calibration results
  - txtputMap
  - process\_tag
    - loop over 13 prdf files
    - process\_run
      - process\_event – stores adc values internally
    - calcCalibVal
      - calc avg

- calc rms
- calc for DAC=0
  - $\text{thresh} = (\text{avg-nrms} * \text{rms} - 0.5) \wedge 0\text{xffff}$
- writeThreshFiles – write out thresholds into files formatted for DCM's
- rootPutInfo
- fit – fit for pedestal, linear and non-linear gain vrs input pulse size (DAC) description
- txtPutCalib – put resulting description for each of ~22k channels/arm in text file
- writeROOTFile – write ntuple that's useful for debugging or looking at more detail
- building libMutCalib library in phnxmutr@va032:/data2/phnxmutr/mjl/online/
  - presently using new
  - cd /data2/phnxmutr/tmp2/
  - mkdir build source install
  - cd source
  - cvs co -d ./source online/calibration/onlcal/subsystems/mutr
  - cd build
  - ../source/autogen.sh --prefix=/data2/phnxmutr/tmp2/install
  - make install
  - then use setenv LD\_LIBRARY\_PATH  
"/data2/phnxmutr/tmp2/install/lib:\$OFFLINE\_MAIN/lib:\$LD\_LIBRARY\_PATH"

### Setup of calibration analysis machine (VA011)

- \* use tar to transfer /tmp2, /calib and /dobits directories
- \* change cauto to accept the new machine for running on
- \* get email working (install mutt?)  
test with,  
mail -s "testing" leitch@rcf.rhic.bnl.gov < temp.txt  
mail -s "testing" caliblist
- \* set up samba mount  
for /mnt/win/phenix/WWW/publish/calib\_results/  
with mount made from phnxmutr account with phnxrc password
- \* have framebuffer running for internal x-display  
called Xvfb  
test with,  
setenv DISPLAY :1  
xclock
- \* cron working with  
1,6,11,16,21,26,31,36,41,46,51,56 \* \* \* \* /home/phnxmutr/calib/cauto South  
3,8,13,18,23,28,33,38,43,48,53,58 \* \* \* \* /home/phnxmutr/calib/cauto North  
#1,6,11,16,21,26,31,36,41,46,51,56 \* \* \* \* /home/phnxmutr/calib/cautoped South  
#3,8,13,18,23,28,33,38,43,48,53,58 \* \* \* \* /home/phnxmutr/calib/cautoped North  
0 \* \* \* \* /home/phnxmutr/calib/checkpcf