Big Bite Shower and Preshower Cosmic Calibration and High Voltage Adjustment Scripts

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Version 2

The following describes the ROOT scripts developed to fit Big Bite shower and preshower cosmic data and generate new high voltage settings for the slow controls system. The general goal behind these scripts is to determine high voltage adjustment factors, which will move the cosmic ray peak toward a common channel in the shower and preshower ADC spectrum. These scripts are semi-automated so as such the user may have to make minor changes to the file name and assumed directories at the beginning of each script. Familiarity with ROOT is assumed.

File Location:

The most current version of the scripts are on the DAQ computer for Big Bite. A backup is maintained by Will Tireman. The active location on the BB DAQ is

/home/daq/Analysis/BBcal/replay/tireman

A copy can be made to your directory on the DAQ simply by using the following steps.

1) First, log into the DAQ and change directory to directory you wish to work in.

2) Then use this command, >> cp /home/daq/Analysis/BBcal/replay/tireman/BB*.C .

to copy the files to that directory.

The Scripts:

There are two scripts. BBcosmicCalibration.C will load and fit the shower and preshower ADC spectra and generate the high voltage corrections. It will also display the fits on the screen. More on that in a bit. The BBshower_HV_Adjust.C script will load up the results from the previous fit, load up the high voltage settings file, compute the new high voltage settings, and write a new high voltage settings file. It will also generate some diagnostic graphs, which the user can use to assess performance.

The use of the BBcosmicCalibration.C script:

Login into daq for the BB detector and do the following steps

```
>> cd Analysis/BBcal
>> source setup.csh
>> cd replay/*user*
>> root -l
root> .x BBcosmicCalibration.C("###")
root> .q  *** do this only after you have looked over all the histograms ***
```

This will execute the BB cosmic calibration script on run ###. Change the ### to any run number you need to analyze. This will generate 7 pages of histograms for the shower counters and 2 pages for the preshower counters. Inspect the histograms for proper fitting. The script outputs a root file with the histograms. It also outputs two ascii files with the necessary fit parameters and high voltage correction. One file, bbshower_###_FitResults.txt, for the shower counters and another file, bbpreshower_###_FitResults.txt, for the preshower counters.

The use of the BBshower_HV_Adjust.C script:

>> root -l
root> .x BBshower_HV_Adjust.C("###")
root> .q *** do this only after you have looked over all the plots ***

This will execute the BB High voltage adjustment script on run ###. Change the ### to any run number you need to adjust. This script will read in the high voltage setting file (hv_###.set) for the run number along with the Fit Results files outputted by BBcosmicCalibration.C script. This will generate 6 plots. One for shower and preshower of Peak Channel vs. Block Number, High Voltage vs. Block Number, and Peak Width vs. Block Number. The user should look over these diagnostic plots. Two files are generated. A ROOT file stores the plots. A new high voltage setting file called hv_###_Corrected.set is created. This file has the adjusted high voltage values that were adjusted according to the HV correction factors from the BB cosmic calibration.

CAUTION: Never apply changes to the high voltage system on any detector without first going through all the steps and thoroughly looking at each histogram and the resulting computed changes to the high voltage settings. These scripts are not fully constructed or tested to catch every contingency.