To: E852 Collaboration
From: Notre Dame 852 Group
Subject: CsI calibration results for E852 1994 run

1 Introduction

This note summarizes the results of the two CsI calibrations done during the E852 1994 run. The first was done with about 1.5 hours of beam on May 22, 1994 (run 7217). The second was done on July 16, 1994 with about 2 hours of beam (run 8190). The quality of the halo data taken during run 7217 was exceptional, while it was merely adequate for run 8190. Fits to the minimum ionizing peaks were obtained for both sets which were well within our tolerance of finding the peak position to within 10%. The fits and variation in calibration constants are discussed below.

2 Calibration Run 1994a (Run 7217)

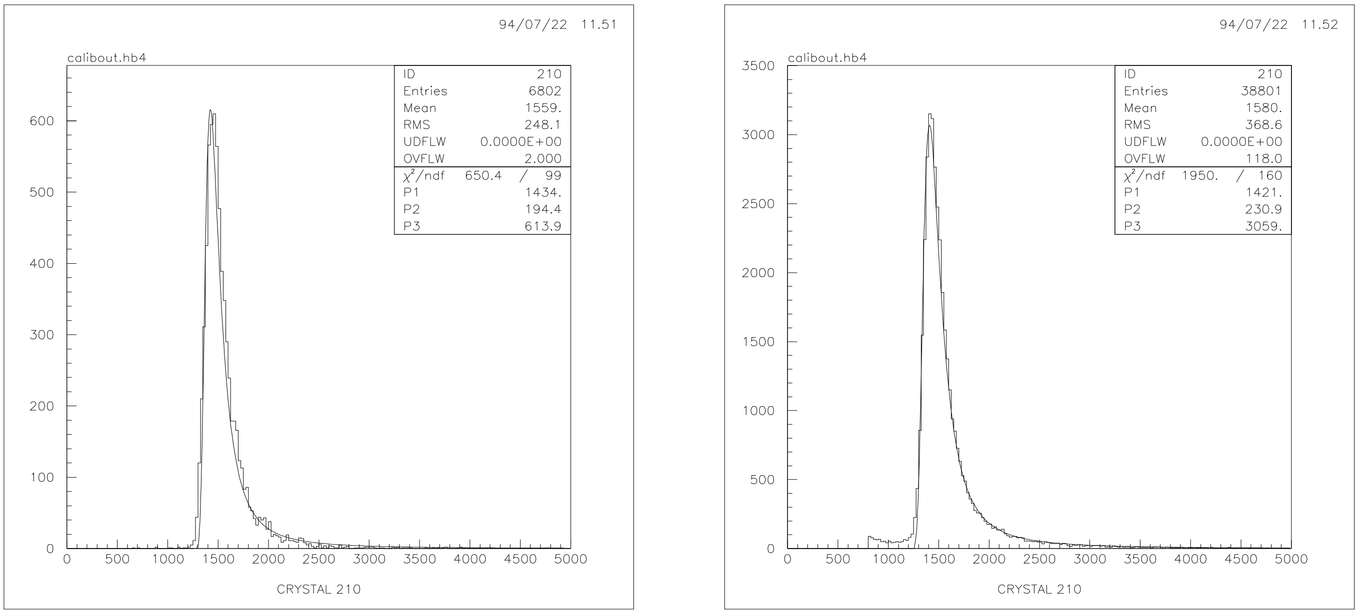
The data taken for run 7217 was of exceptional quality. A very short time of running produced some very clean straight-through halo particles at a good rate. The data was then subjected to an extremely tight cut of requiring only 11 blocks to fire and that they all be in a single row. This produced a clean minimum ionizing peak with almost no background in all channels. See Fig. 1a for a sample. The histograms were then fit with a Landau distribution. More information on these fits can be found in the previous memo on analysis of the CsI from the 1993 run.

3 Calibration Run 1994b (Run 8190)

The data taken for run 8190 was of poorer quality than the first calibration run. We had a much higher rate of events with 30+ crystals hit in them. This is often attributable to interactions upstream or in the barrel itself. The reason for this decrease in quality may be due to different beam conditions or a change in the halo counters or trigger. Since the data was sufficient, this problem was not fully investigated. The data was histogrammed with cuts requiring less than 16 blocks per event hit, throwing out hits of less than 800 ADC counts, and finally requiring that one row have at least 9 hits in it. This was clean enough for the fitter to do all crystals except for 5 of them.. These 5 crystals were then calibrated by hand. All peak positions were found to with 10%. A sample crystal spectrum and fit is given in Figure 1b.

4 Comparison of Calibration Constants

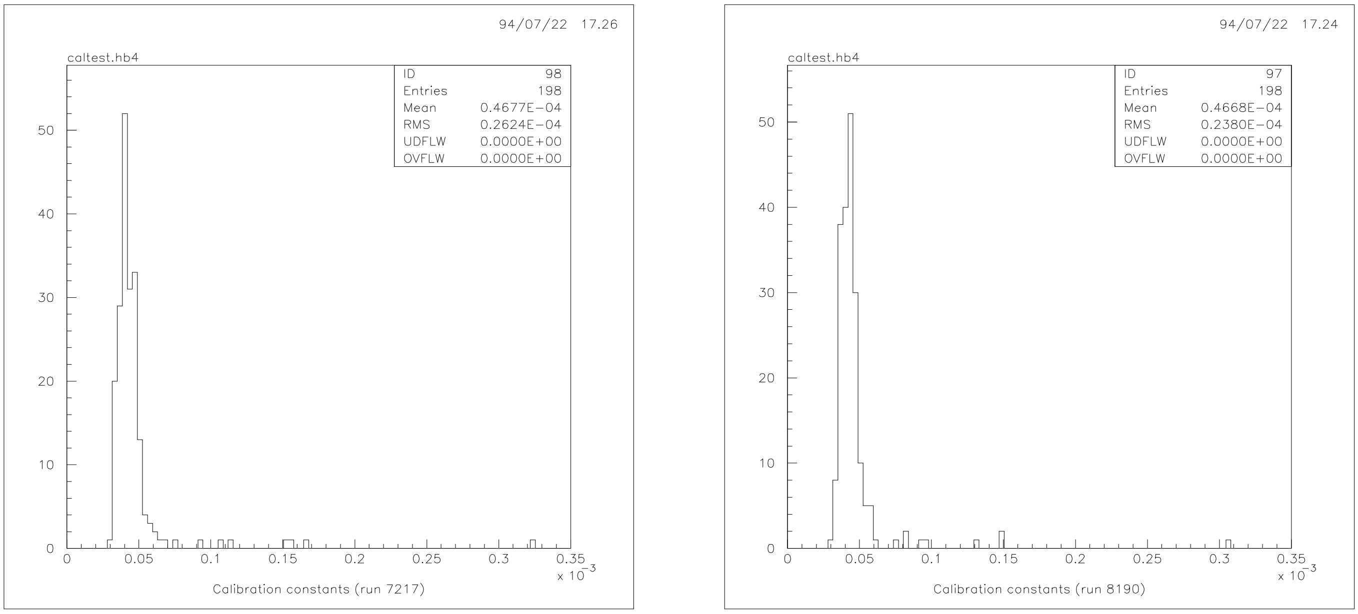
The resulting calibration constants can be compared. Major changes in the CsI may occur if there was significant radiation damage. Also, changes might occur in the electronics. The main reason for the second calibration run was to check for such changes. The distributions for each run's calibration



(a) (b)

Figure 1: Sample distributions of halo from run 7217(a) and run 8190(b). They include the fits.

constants are shown in Figure 2. The difference between the calibrations is plotted by index number in Figure 3. Finally, the percent diffenence [(run 8190 - run 7217)/(run 7217)] is plotted in Figure 4. The change in calibration constants is almost completely less than 10%. Those few which are higher than that are mostly CIA crystals and five of them are the ones which were fitted by hand. These distributions show fairly well that there was no major change in the CsI gains during the two months of heavy use between these calibrations.



(a) (b)

Figure 2: Distribution of calibration constants for run 7217(a) and run 8190(b).

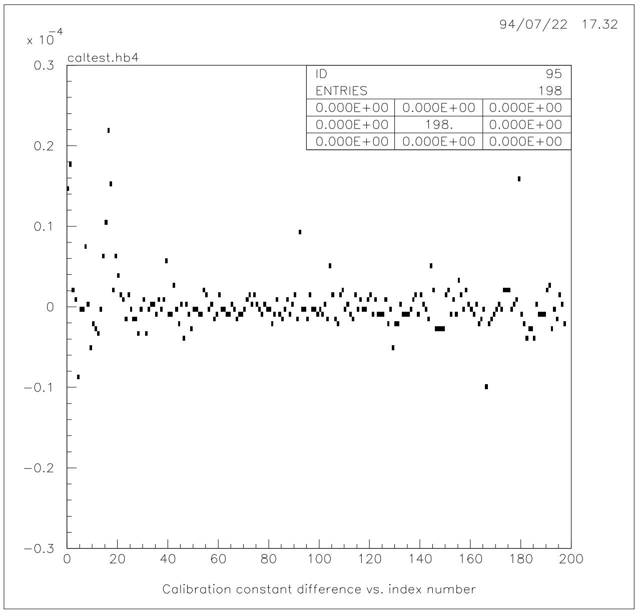


Figure 3: Difference in calibration constants by block index.

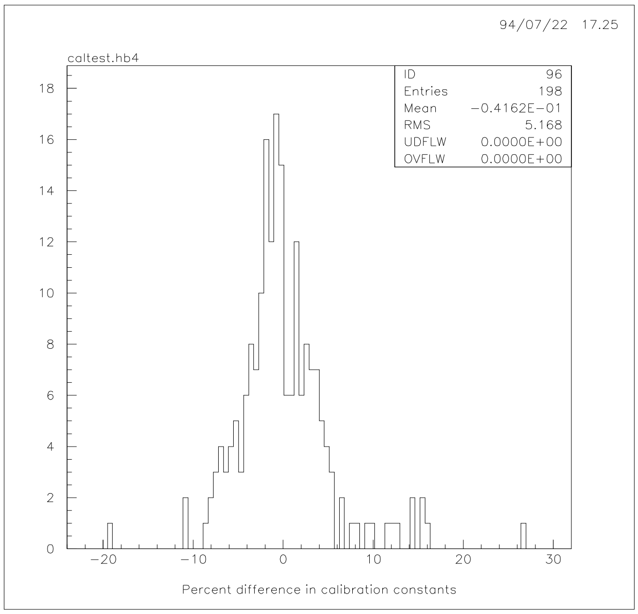


Figure 4: Distribution of percent difference in calibration constants.