Minutes of CAL s/w telecon
J. Eric Grove
16 August 2000
(revised 18 August to include switch in tbrecon for tbsim data)

CAL results in beam test paper **Grove**

I'm presuming that we'll have two recon goals for the CAL: first, profile fitting at 20 GeV (with perhaps some discussion or comparison with lower energies), and second, low-energy resolution. Profile fitting will emphasize weighting schemes to improve the resolution. Low-energy resolution will be included only if we can clean up the response, or at least understand what we have.

I've made some progress understanding the high-energy response (in particular, the HEX8 range), which is discussed below. We can follow similar procedures in the LEX4 range, and I hope that'll improve the resolution.

Although I didn't say this at the meeting, one of our fundamental goals for this calibration was to demonstrate a CsI readout with at least 5 decades of dynamic range. This should go into the paper, along with an updated version of the on-line figure we created with our CalGSE software showing the CAL self-triggering on muons and multi-e+ showers at 20 GeV simultaneously.

Actions:

1. *(Grove) Write first version of CAL section of beam test paper.*

Further work on integral linearity **Grove**

I've completed an initial analysis of the detailed charge-injection calibration we performed at GSI. As I reported last week, there are some distinct differences between SLAC and GSI calibrations, but it's clear that different functional forms could give better models of some ranges. However, my check of the model in range 2 (HEX8) shows that the quadratic-quadratic shape works quite well, for both data sets. In particular, for SLAC it's good to better than 2% or so for all channels.

Conclusions:

1. SLAC and GSI calibrations have some differences, as I reported last week.
2. The model in range 2 (HEX8) works quite well for SLAC. There is no reason to improve it.

Optimizing correction factors for Run 138 **Grove**

I inspected the CAL data from the grid of 16 runs with 20 GeV e+, looking the best run to use for profile fitting, i.e. the run with the smallest residual non-linearities. Run 138 seems to show fairly good agreement between log ends, and reasonably small deviations from the intlin and gain factors already in tbrecon. I argued that we should do the best

possible corrections for the appropriate logs and gain ranges to do profile fitting for the paper.

See the calsoftlist email archive for a message from me on 15 Aug for a more complete discussion.

Arache had the following response via email:

> I recall however that given the current coefficients, we already obtain about 4.6% resolution @ 20 GeV (after profile fitting, see http://cdfinfo.in2p3.fr/Experiences/GLAST/Studies/TBRecon0806.html), _for one run_, which is in fact the one you propose, run 138.
>
> This resolution gets even better when using another correction method (which is a correlation method I presented briefly at our july meeting) approching 3,5 %. Regis is working on a third method which will probably reach 3% @ 20 GeV.

I replied that I considered that we should develop profiling algorithms on data sets with the smallest possible systematics, so we don't bias the choice of algorithms.

I have completed relative gain corrections and first-pass non-linearity corrections for the 8 logs directly under the beam in Run 138. I will continue to study the neighboring logs, and derive absolute calibrations by comparing the observed distributions of energy deposition with simulated distributions. I already have simulated distributions from glastsim for 20 GeV e+.

Actions:

1. *(Giebels and Linder) Simulate run 138 with tbsim.*
2. *(Grove) Continue improvement of gain scales in HEX8 for run 138, incorporating expected signal from simulation.*

Disagreement between tbsim and tbrecon **Dubois**

Richard reported that the factor-of-two disagreement between energy scales in tbsim and tbrecon still exists.

Energy calibration in simulations **Giebels**

Berrie reported that glastsim and GEANT4 disagree about the most-probably energy loss for a MIP through 2.3 cm of CsI: our sims give 10 MeV, while GEANT4 gives 13 MeV. Berrie looked at the code and concluded that glastsim uses essentially the same code as GEANT, so the source of the problem is not obvious. [Actually, now I'm not sure: was the GEANT 3 or 4?]

Actions:

1. *(Giebels) Resolve discrepancy in simulations.*

Raw sum or reconstructed energy? **do Couto e Silva**

Eduardo asked whether he should use the calorimeter sum or reconstructed energy in making his cuts for tracker studies. He reported that, e.g., for a 20 GeV e+ run the reconstructed energy is greater than 20 GeV.

Arache remarked that this was *not* the case for run 138, in particular. I remarked that when I first distributed the intlin functions and gain factors that my tests of a sample of 20 GeV runs gave something like 22 GeV for the peak, using my IDL-based profile fitting, which sounds to be roughly consistent with Eduardo's findings with tbrecon. I remarked that I thought that Regis has inserted some extra scale factors to individual layers in his reconstruction because it was clear to him that some layers were incorrectly normalized by my coefficients, and I questioned whether this could be why run 138 reconstructed to 20 GeV. Arache responded that in fact there were no extra correction factors for Regis's recon.

Actions:

1. *(dCeS) Distribute list of runs and plots of total energy to calsoftlist so we can all play this game of Name That Total Energy.*

Switch in tbrecon for tbsim data **do Couto e Silva**

As we discussed last week, tbrecon merrily applies the gains and intlin corrections appropriate for beamtest data as it tries to reconstruct tbsim data. This is of course incorrect, since tbsim does not include any nonlinearities. To remedy this, we propose a switch in tbrecon to select the gain and intlin corrections that are appropriate for the input data set; for tbsim data, those should be null corrections, i.e. unit multiplicative factors.

Actions:

1. *(Chekhtman) Implement switch in tbrecon.*

Previous Action Items

1. *(Grove) Review CAL beam test paper goals.* ***Done.***
2. *(Giebels and Lindner) Proceed with the two-step gain calibration.*
3. *(Giebels) Verify our understanding of trigger logic and timing for muon runs in clean room after ESA with Gary Godfrey.* ***In progress.***
4. *(Grove) Fit GSI intlin data.* ***Done.***
5. *(Grove) Improve fits to SLAC intlin data.* ***Range 2 (HEX8) is fine; others are under review.***
6. *(Grove) Get more info on upstream material, beam aperture from GSI.*
7. *(Grove) Generate simple saturation curve from muon, C, and Ni points in a few bars.* ***First pass done, will repeat.***

8. *(Sandora) Complete electronic and source calibrations of Test Box crystals.* ***Done, results under review.***
9. *(Tylka) Improve interface to dE/dx and partial cross-section routines from CREME96.*