Minutes of Face-to-Face Calorimeter Software Meeting
18-19 July 2002
NRL

Attendees:
Mark Strickman, NRL
Sasha Chekhtman, NRL
Eric Grove, NRL
Byron Leas, NRL
Richard Dubois, SLAC
Berrie Giebels, Ecol Polytechnique
Heather Kelly, GSFC

Note: Bold lines are action items

• Discussion of Cal Software Resources
  o SLAC
    ▪ Richard 0.25 FTE
    ▪ Eduardo 0.2 FTE
  o NRL
    ▪ Sasha 1.0 FTE
    ▪ Mark 0.5 FTE
  o Ecol Poly
    ▪ Berrie 0.5 FTE
    ▪ Zouliekha (Postdoc) 0.5 FTE
    ▪ Gabriel Musat (S/W) 0.8 FTE
  o Bordeaux (Thierry Reposeur + student)
    1.0 FTE (maybe)
  o Total ~3-5 FTE
  o Start conversation with Thierry [Berrie]
  o Send low energy backscatter info and validation requirements to Bordeaux (via Berrie?) [Mark]

• Geometry
  o Hardware geometry more or less frozen
  o Not all details supplied to Joanne by Sasha implemented
  o Modify sim geometry to have correct side plates and top plate edge [Sasha, Berrie]
  o Review geometry numbers sent to Joanne and send drawings when available [Sasha, Berrie]
  o Query project office [Richard] and subsystem office [Mark] about how geometry changes are tracked and how we can be notified
  o Write Cal geometry document (using tkr document as model) including “wordy” descriptions of components, links to “real” drawings [Sasha, Paul]
- Device change process for cal geom. doc that includes geometry verification as mentioned above. First verification with initial doc release [Sasha, Paul]
- Investigate/verify procedure for making all volumes active in G4 [?]
  - Realistic Digs
    - Use Cal digis as use case for relational tables to store relationship between primary particles, hits and digis [Richard]
    - Implement lookup tables for integral nonlinearity in digi and recon [Sasha, Richard]
      - 1 byte/point x 40 pt/channel x 1536 xtal x 2 ends x 4 channels/end => ~ 500 kbytes/table
  - Noise
    - For the moment, assume Gaussian noise
    - Only changes to current procedure are to use per channel parameters from new calibration classes
  - Light Taper Curve
    - Implement exponential + constant model for light taper for new xtal [Richard]
    - Investigate models other than exp+const might be more appropriate for light taper [Richard, Sasha, Eric, Mark]
    - Investigate use of log(Right/Left) rather than R-L/R+L [Sasah, Eric, Mark]
      - This is exactly correct if curve is exponential
      - It preserves slope of curve even if ends are not balanced
  - Proposed Validation Procedures
    - Validate digis vs data
      - Create real digi
      - Take difference of results from asym plots and simple linear positions
      - Compare distribution of differences to data
    - Validate “12 cell” digitization
      - Input vertical muons into existing model, look for discontinuities due to 12 cells
      - Put in “realistic” light taper and compare deduced to input position for vertical muons, look for discontinuities
      - Determine what discontinuities are “sensible”
  - Investigate how BABAR does digis [Richard]
    - Energy Recon
      - How do we deal with “quenching” and “saturation” effects?
      - Need to add error estimate for single log that will evolve from initial guess to 2nd iteration and will vary with type of particle. Position error from initial guess will also couple into energy error
      - Need to go through each step in calculation of single log energy and think about how to propagate error for that step
      - How do other logs contribute to error via width of shower?
Multiple recon paths for different particle types. Maybe try to interpret each event in multiple ways, then pick the best at the end considering info from all subsystems

- Recompute leakage correlation and profile fitting parameters for new geometry – Regis is available to do this [Regis, Berrie]
- Establish quasiperiodic reporting from Berrie. First report due by 8 Aug. [Berrie]
- Produce quick and dirty high E corrections (using sparse grid and interpolation) [Sasha]
- Produce quick and dirty low E correction (using tkr energy vs hits) [Mark]
- Add errors to output class of recon [Sasha]

- Position Recon
  - Investigate via simulation why some events produce coordinates outside of xtal [Sasha]
    - Suspect noise and direct deposit in diode – validate
    - Determine best default position for these events
    - Implement representative (as opposed to accurate) flattening of taper at ends for this investigation (we don’t know real flattening)
  - Investigate how to weight longitudinal position in fits [Sasha]
  - Investigate how to compute direction uncertainty given energy dependence of longitudinal position and other problems [Sasha]
  - Ask Steve Ritz what the “energy centroid problem” is for CalFitErrNrm [Richard]
    - Implemented as an offset from the cluster centroid with a pre-set energy dependent normalization

- Iterative Recon
  - Investigate whether TKR position info can be used to do consistency checks on Cal recon [Sasha]
  - Can Cal-only psf, eff. area tools be developed to allow cal-only analysis? [Sasha, Mark, Richard]

- Clustering
  - Investigate placing cut on distance from shower core for hits considered [Berrie]
  - Implement Gabriel’s ATLAS clustering code [Berrie]
  - Uses of clustering:
    - Separation of e+/e- tracks to improve psf
    - Outlier hit rejection (not clear this is good)
    - Background rejection

- Calibration
  - Develop and execute simulation process of inflight calibration with heavy ions [Sasha, Eric]
    - How long does a single calibration run need to be?
    - Simulate without nuclear interactions initially

- Cal Trigger
  - Implement software “portion” of Cal hi trigger after recon [Sasha]
- **Failure Modes**
  - Before CDR we must:
    - Implement code to deal with log-end failures [Sasha]
    - Study effects of failure of one tower [?]
- **Software Structure and Engineering**
  - Extract Minuit from Cal and put in facilities [Heather]
  - Study restructure of CAL recon with abstract classes (before Oct. release) [Toby? +?]
    - Sasha and Mark think this is not as important as adding functionality
  - Study TDS class design [Sasha, Heather]
- **Schedule**
  - Driver is October 2002 pre-inst. Performance effort release
  - Create list of anticipated improvements in Cal s/w before October release [Mark, Sasha, Berrie, Richard]
  - Create schedule for Cal s/w improvements before Oct. release [Mark]