

Minutes of Tracker Software Review: Meeting 2

Present: KL, AD, MU, DC, PK, CH, Abr, DR, CR

1. Introduction - K. Long
 - No particular introduction.
2. Actions from previous meeting
 1. Compare data/MC efficiencies for 8681: action was unassigned. We discussed and (re)assigned it to AD. **Stands.**
 2. In adding unused spacepoint, show the distribution of distance of unused s.p & its correlation with #pe. **Done.** See AD presentation.
 3. Low pt: Consider doing a straight track fit first and pass to Kalman if it passes chi²/other requirements. **Done.** First attempt at implementation described in AD's presentation.
 4. Generate list of uncertainties and show what has been done so far (alignment, scattering, energy loss, field uniformity, etc). Unassigned. Assigned to **CR. Stands.**
 5. Check dead channel & noise handling in MC. Unassigned. PK had intended to look at noise. He agreed to look at dead-channel handling too. **Stands.**
3. Pattern recognition update: A. Dobbs [tracker-recon-status.pdf](#), [p-value, 8681](#), [CR p-value.pdf](#)
 - No attempt at minutes; actions generated are listed below. Note that the p-value distribution obtained from 2.8.5 is attached. It shows a distribution peaked towards 1 in contrast to that seen in 2.9.0.
4. Kalman & track fitting overview: C. Hunt [Track fit overview.pdf](#)
 - As above, no minutes. Actions listed below.
5. Next Steps for review
 - Work towards completion of actions; then arrange a new meeting. KL and AD to review s-z algorithm in preparation.
 - **Not for the present review:** very important to get to the bottom of the magnetic-field discrepancy between Hall probe measurement and magnetic field simulation
6. AoB

Summary of actions:

- **AD:** Compare data/MC efficiencies for 8681
- **CR:** Generate list of uncertainties and show what has been done so far (alignment, scattering, energy loss, field uniformity, etc).
- **PK:** Check dead channel & noise handling in MC.
- **AD: pattern recognition/efficiency:**
 - Study "10%" of missing 5-point tracks; where in the p.r. does the missing point get rejected?
 - Conjecture is that the linearised parameterisation poorly describes a set of tracks, causing 5-point tracks to be rejected. In addition, the s-z fit may cause good 5-point tracks to be rejected. Non-linear circle parameterisation appears to

be better behaved, but, chi2 cut needs to be optimised and possible feature in s-z fit needs to be studied.

- *Scan events in which 5-point tracks are rejected*
- *Remove requirement for one hit per station in data and study performance. Also, study multi-track MC*
- *Plot Chi2 distributions etc. on log scale (to emphasise tails)*
- *Optimise Chi2 cut for "MINUIT" variant*
- *Recover reasons for shape of hits-per-station histogram*
- *Plot NPE, pull etc. by station (done, but not presented)*
- *Investigate reason for hits recovered on track being peaked up at "zero" distance from the track in both variants of the r-phi fit. Investigate reason for double peak in MINUIT variant*
- *Reproduce VB mechanical angular momentum plot and demonstrate the issue observed (loss of tracks with zero canonical angular momentum) using MAUS 2.7*
- *Demonstrate using VB selection etc. that the effect is absent in the MINUIT variant of MAUS 2.9*
- *With KL, review s-z algorithm*
- **CH: track fit:**
 - *With CR/DR, establish reasons for differences between p-value in versions 2.8.5 and 2.9.0*
 - *Check Highland and Bethe against what is implemented in GEANT*
 - *Study p-value: split up contributions to p-value shape using MC and study shape in data, e.g. is there an error in the resolution per plane, handling of MCS, handling of energy loss, magnetic field, ...*
 - *Repeat study that was done to investigate whether field integration (e.g. using Runge Kutta) is required to compensate for magnetic field non-uniformity*
 - *Make study of magnetic-field alignment with a view to establishing whether the present algorithm is sufficiently insensitive to reasonable assumptions of maximum field-misalignment*