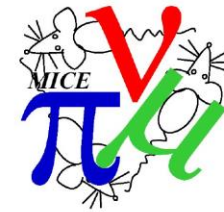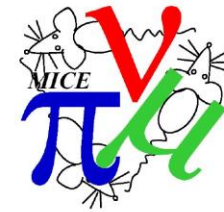# Tracker Software Update

A. Dobbs, CM39, 25th June 2014

Contents

- Updates since last CM

- Monte Carlo and Geometry Status

- Online display ideas

- Emittance MC study results

- Single particle amplitude results

- To Do

Updates

- New MAUS API now fully integrated with SciFi – performance improvements (no more passing JSON strings between MAUS modules!)

- Data structure cross links now fully implemented – useful for performing recon vs MC truth studies (see the Tracker Software: How To talk for more)

- Excellent MC truth emittance study results

- DAQ data now integrated fully into the Data structure (accessible in the output ROOT files)

- Tests expanded, integration tests now cover Kalman and Pattern Recognition seperately
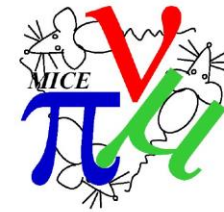
Online display ideas

- Number of spacepoints per tracker station integrated over run and presented as a bar chart

- Channel-by-channel high gain RMS plot

- Dead channels, in some easy to read form

- Saturated ADC channels flagged

- Number of digits per fibre plane and station

- Number of clusters per fibre plane and station

- Cluster maps with ADC threshold above a certain value

- Number of spacepoints, digits, clusters, and tracks per spill per tracker

- High gain vs low gain plots

- High gain ADC counts vs channel ID

- Some sort of simple event display on a per spill basis (simple event display already exists)
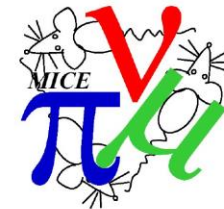
Monte Carlo and Geometry Status

- Little change since the last CM

- Some ongoing issues with geometry implementation (moving from simply rotating the tracker volume is GEANT4 to placing each plan specifically for each tracker, bug fixing, He window placement…)

- Changes at MAUS level to how we deal with the GDML files

- ADC smearing still switched off – provides a noise effect, without simulation may produce artificially good results. C. Heidt and D. Adey working on.
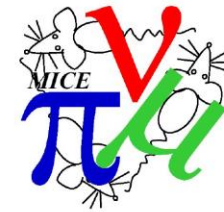
Emittance MC study (C. Hunt)

| Parameter	Virtual	Reconstructed	Deviation
Emittance Upstream	5.808 mm	5.805 mm	-0.05%
Emittance Downstream	5.641 mm	5.621 mm	-0.35%
Beta Upstream	356.1 mm	353.8 mm	-0.64%
Beta DownStream	393.9 mm	385.2 mm	-2.2%
Number Upstream	15590	15590	0.0%
Number Downstream	15590	15590	0.0%

- Input beam: Gaussian, 6π mm 4D emittance, 5 MeV p_z spread, origin just inside upstream solenoid

- Only tracks which are present in MC and reconstruction are used, derated focus coil, ignore decay events

- Code used is in trunk, and should be part of next MAUS release
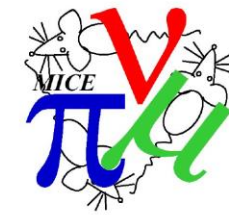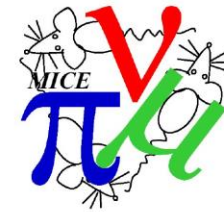
Single Particle Amplitude
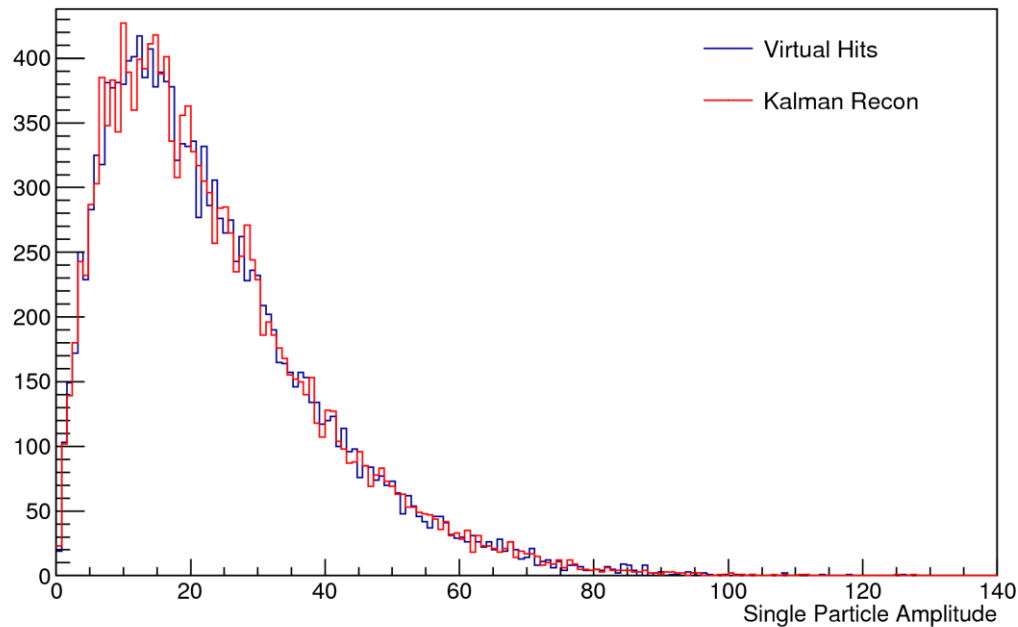
Upstream tracker
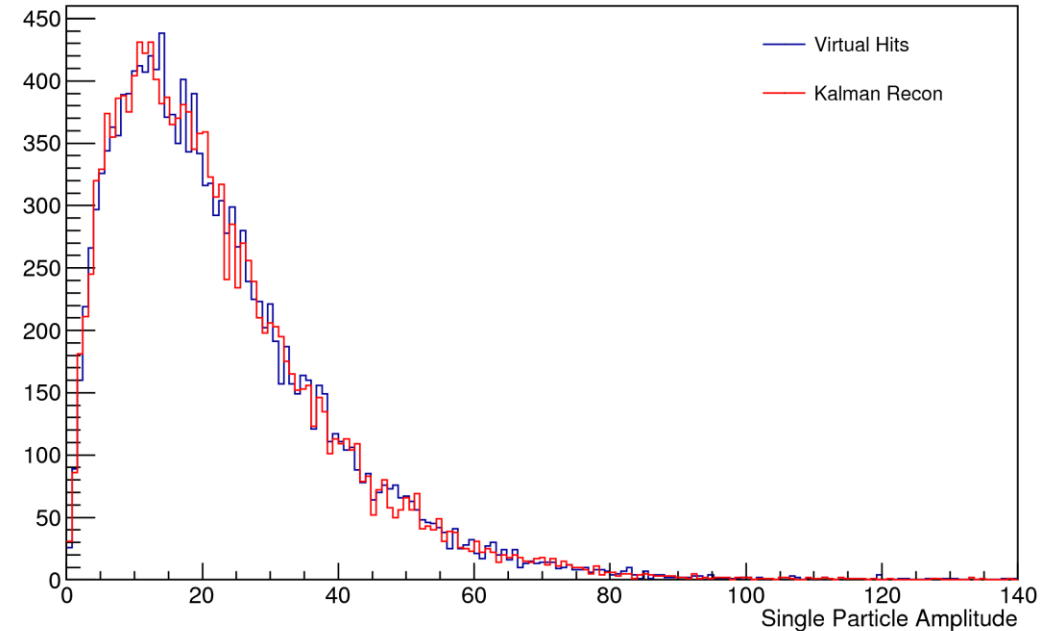
Downstream tracker

Excellent results. Thanks to C. Hunt for the analysis. See his presentation to analysis group for details e.g. cuts: http://micewww.pp.rl.ac.uk/attachments/2189/step4_emittanceRecon.pdf

To Do

- Fix ADC smearing in the MC (Heidt, Adey)

- Sort out CDB geometry issues (Heidt, Bayes)

- Sort CDB calibration issues (Adey)

- Fix Kalman Fit for negative particles (Santos)

- Complete documentation (Dobbs, Santos)

- Create online monitoring plots (Uchida)

- Still waiting on Trigger MC – badly needed for Pattern Recognition testing (Bayes)

- Finish spacepoint truth matching study (Hunt, Dobbs)

- Provide a goodness measure in the reconstruction tracks based on likelihood they are from low p_t particle tracks (Dobbs)

- Redo emittance MC study with ADC smearing and noise on, using all tracks (Hunt)

- Write up as paper (Dobbs)

Questions