Summary of the
LP Testbeam Analysis Workshop
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Main Goals:

- Review status of the reconstruction chain
- Identify issues and missing items
- Find commonalities between technologies
- Agree on conventions and methods for analysis
- Make a list of plots needed (in view of the PRC review)

Scope: Pad-based technologies: GEM and Micromegas.

1. Reconstruction:
   - Current status:
     - PulseFinder
     - HitFinder
     - Tracking
   - Differences between technologies
   - Identify open issues
2. Corrections and Calibration
   - Distortions
   - Alignment
3. Analysis
   - Discussion of performance and quality plots
   - Agreement on methods and procedures
   - Conventions and rules
   - List of processors needed

Reconstruction: Issues

Main focus:

Ensure a consistent reconstruction for GEMs. But also identify items that are common for GEMs and Micromegas.

Only difference in reconstruction between Asian and Desy group: PulseFinder
$\rightarrow$ converge to the same processor

Missing items:

- Charge: needs a correction for over-range especially if the maximum value is used for the charge estimate.
- Time: time walk effects have been observed (charge dependent time) but also a dependence on the position within the hit.

Both items need information on hit level like a PRF, so these corrections can only be done after the HitFinder.

Overview of reconstruction that is either common or depends on either the technology or the electronics.

| | General | Special for | |
		GEM/MM	Altro/After
time shift	X		
gain calibration	X		
pulse reco			X
reintegration		MM only	
hit reco		X	
RCU sync			Altro only
time walk correction		X	X
determine PRF (class!!!)		X	
PRF application	X		
over-range, dead channel correction	X		
errors for tracking	X		
distortion correction	X		
tracking	X		

Analysis: Plots

Performance Plots:

- Resolution (x,z): B=0,1T, theta=0,alpha,-alpha
  2 curves: best row, evaluate for all rows separately and combine
  Definition: $\sigma = \sqrt{\sigma_{inclusive}\sigma_{exclusive}}$
- Distortions ($r\phi$,z): B=0,1T, theta=0,alpha,-alpha
- Diffusion plot: sigmaPRF vs drift and one example of a PRF
- Hit Efficiency for one row vs drift
- Hit Efficiency vs row
- Momentum Resolution

Quality Plots: (a selection)

- Charge vs drift. hit charge spectrum with mean90
- Over-range and dead channel hits vs drift
- Distortion correction
- Resolution Gaussian fits
- Fraction of events left after cuts vs drift

Analysis: Conventions

Cuts

- Single track events
- Number of hits on track $> 80\%$ of active rows
- Event cut: e.g. gain drop
- Track parameters (omega, angle): to be evaluated

Methods

- Resolution and distortions are to be evaluated along the row meaning in rϕ not xy projection (label accordingly $\sigma_{r\phi}$ or $\Delta_{r\phi}$
- Gaussian fit in rϕ, refit within 3 σ
- If distributions are non Gaussian (e.g. in z) use RMS90 with factor to get back to σ, to be compare with fit method

Rules

- Use common style file for plots
- Use radius (at $\phi = 0$) instead of row number for plots vs row
- Define units, e.g. mm
- Always label with "drift distance" or z_{drift}, not just z

Summary & Outlook

In my opinion very successful workshop!
Reached agreements/proposals on:

- Missing features in reconstruction
- Analysis plots
- Rules and conventions for the plots
- Implementation plan and work distribution

On the way to our goal: same code for all pad-based analysis plots (Marlin processor + small root script)

Next step: Feedback from the LCTPC collaboration

More details will be given in the summary document of the workshop which will become available on the agenda:
http://ilcagenda.linearcollider.org/conferenceDisplay.py?confId=6197

Discussion of the content during the next analysis meeting.