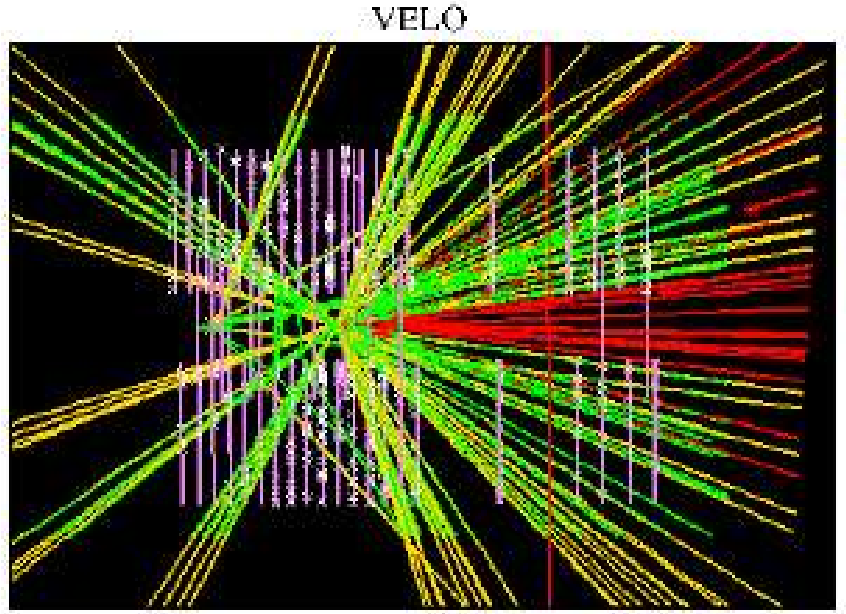
'Physics' Book and Documentation

M. Needham
CERN



Introduction

- Physics book will contain a chapter on track reconstruction
- Idea:
  - Describe how tracking is done (State of Play with DC '06 Brunel)
  - How efficiencies and resolutions are extracted with real data
  - Maybe we miss some tools to measure efficiencies ?
  - Resource for students of the future to understand the tracking
- In addition, two page summary of tracking performance in Detector paper
- These should be backed up by a set of public LHCb notes
- Not covered here: Alignment
  - Assume notes produced in context of Alignment challenge

Suggested Notes

'Overall Long Tracking Performance' M. Needham

'Performance of the Forward Tracking Algorithm' O. Callot/Heidelberg

'Updated Performance of the Track Matching' M. Needham, J. van Tilburg

'Downstream Tracking' O. Callot

'Upstream Tracking' M. Witek

'Velo Tracking Performance' D. Hutchcroft

'Open Velo Tracking' T. Lastoswicka

'Stand-alone track seeding in the T stations' R.Forty, M. Needham

'The Tsa reconstruction framework' M. Needham

'Strategies for measuring the tracking system performance with data' T.Ruf (ed)

'The LHCb Track Fit' E. Rodrigues (ed)

'The Trajectory Model for Track Fitting and Alignment' E. Bos

Anything missed ?

Suggested Notes

Sub-detector performance

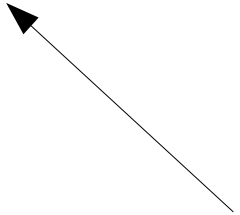
'Material Scans'

'ST Occupancies and Clustering'

'OT Occupancies'

'Velo Simulation for DC'06'

'Tuning detector thresholds with Data'



Note for each of the tracking sub-detectors ?

Anything missed ? Suggestions welcome

Guidelines

- tex or doc as your conscience dictates (though tex is prefered)
- All histograms should be made with root
- At the end of the process I want a web tarball for each note containing
  - All original files (tex, figures) plus a pdf copy
  - root file containing all histograms used in making the note
  - .C macros or pyRoot scripts to make each histogram and TGraph
- Living archive:
  - Easy plot harvesting for physics book, detector paper
  - Easy format conversion (eps, jpg, gif)

Guidelines

- All notes must be sent to the tracking coordinator before release for review and editing
- Standards of the notes should be high
  - I am quite prepared to go through 10 rounds of editing
- Try to ensure:
  - Good English, pay attention to parataxis
  - Clear plots
  - Avoid or explain jargon
- Notes should contain:
  - Explanation of important cuts or parameters used in the code
  - Consideration of how to determine these numbers with data
- All results with DC 06 standard version of Brunel: no private hacks
  - But further improvements can be noted/included if clearly stated

Content

- Efficiencies
  - All tracks
  - Tracks with p > 5 GeV
  - Muons from J/Psi, Electrons from J/Psi, Ks decay products
  - Efficiency vs eta (if appropriate) and momentum
  - Consideration of sources of inefficiency
- Ghost rates --> event weighted only (I do not consider this a matter of conscience)
- Performance at high luminosity
- Any robustness tests, ...
- For fit: pulls resolutions, bias and sigma as function of p at vertex, first measurement, bin in p and eta, RICH1, RICH2, effect of outlier, wrong L/R choice for each track type

Content

- Numbers to be made with significant samples --> more than 2000 events
  - For fit binning in eta and p means more events ---> 25 k or so
- I have provided sets of standard of jobOptions and xml file catalogues
- Standard definitions of efficiency to be used

For other track types change as appropriate

MCParticle is in the LongTrack acceptance if:

- Has 3 r and 3 phi clusters in Velo
- 1 x and u measurement in T1 – T3
- No hadronic interaction
- Not an electron

} eff = n found/n expected

Ghost rates etc

Ghost rate = # tracks not linked to MC/ # reconstructed tracks
Spillover rate = # tracks 'linked' to previous spill/#reconstructed tracks
Parent ghost rate = # number of ghosts due to parent ghost/#reconstructed tracks

Timescales

- Nothing prevents people starting to write now
- Brunel frozen ~ end of November --> final version to run over make final numbers with
- Content for detector paper needs defining this month
  - Not so much needed --> two pages like a status in conference proc
  - Few plots need to be ready early
- First drafts of supporting notes 14th February
- Editing during February / March
- Content for physics books defined mid-May
- Internal tracking group draft: 12th April
- Final drafts of notes by 27th April

Questions ?

Summary

- I will set up a webpage
  - Agreed note titles and authors
  - Timescales
  - Useful information for authors