



University of Zurich

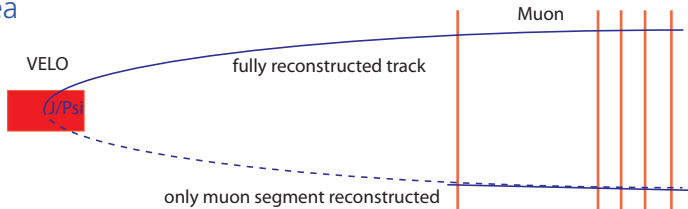


TRACKING EFFICIENCY WITH J/Ψ s

TRACKING & ALIGNMENT WORKSHOP CERN, 4.6.2010

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Basic Idea



Tag-and-probe method

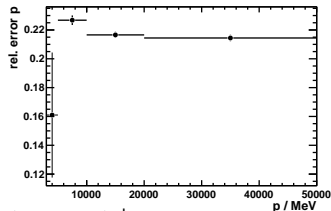
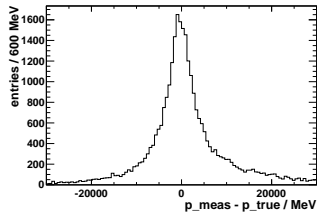
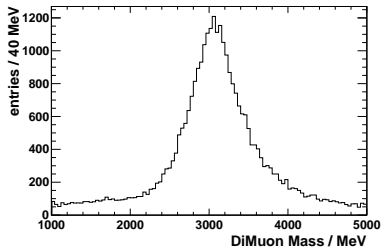
- Take a fully reconstructed long track.
- Take a track reconstructed standalone in the muon system (μ -stub).
- Calculate the 4-momentum of the μ -stub at the PV, combine the momenta of both tracks.
- Make a selection for J/Ψ s.
- Check if there is a long track corresponding to the μ -stub.
- Need to have an unbiased sample (\rightarrow Need stripping selection).

Muon track reconstruction

Using tool **MuonCombRec** to reconstruct standalone muon track.

- Start seeding in M5.
- Extrapolate back to M4, ..., M1, take the hit in every station which is closest to the extrapolation.
- Kill clones if they share hits in M2 & M3.
- Fit a straight line to the hits $\rightarrow \mu$ -stub
- Assume track came from the PV: Use pt-kick-tool to reconstruct momentum components at the PV.
- Combine a long-track and a μ -stub with opposite charge. Add the 4-momenta to get the mother. No vertex fit is done.

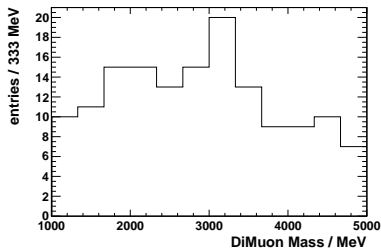
Mass & Momentum resolution



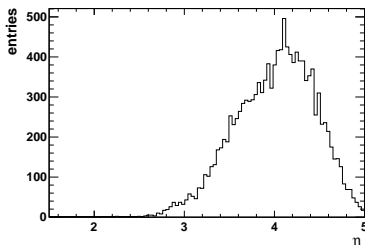
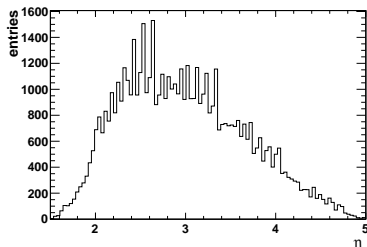
Used 2010 MC $J/\Psi \rightarrow \text{DiMuon}$ sample.

- Cuts on p_T of muons and J/Ψ , PID-cut on long-track-muon, track-quality cuts on μ -stub.
- $\sigma \sim 400 \text{ MeV}$
- Problem: pt-kick-method combined with poor spatial resolution of the Muon system gives a poor momentum resolution.
- MC assoc: > 70 % of hits on stub belong to single MCParticle

Will we ever see a peak on real data?



- Ran over $\sim 3/4$ of MagUp and MagDown DiMuonStripping Reco 03.
- I'm looking forward to having more statistics :)

Acceptance: η 

- Full acceptance coverage includes Muon regions with different spatial resolution.
- To be able to select J/Ψ s on data, one may need to cut on the error of the track: Implicit selection of phase space.
- η region where method may be applied will get reduced.
- Left: No cuts on error. Right: Cuts on error as in selection in real data.

Summary

- Measuring the tracking efficiency without using a tracking station / Velo may be attractive for itself or as a crosscheck.
- Still not sure if method works out / is applicable.
- Work in progress: Suggestions welcome!