Alignment Validation

Framework for Alignment Validation
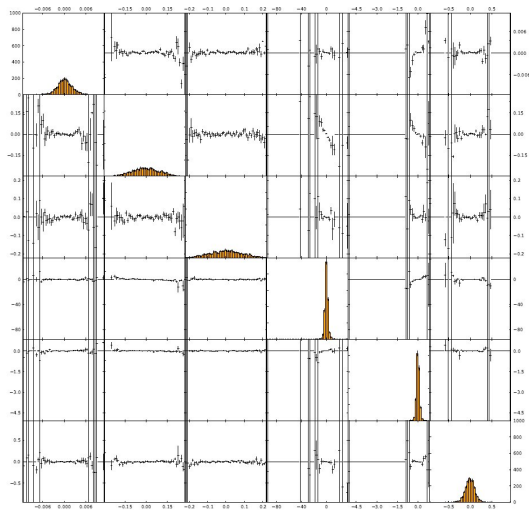
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Introduction

(Planned) Features

- ▶ Easy tool for crosschecks after alignment is performed
- ▶ Check for Vertex resolution with cosmics and J/Ψ events
- ▶ Check for Helix parameter correlations with cosmics events
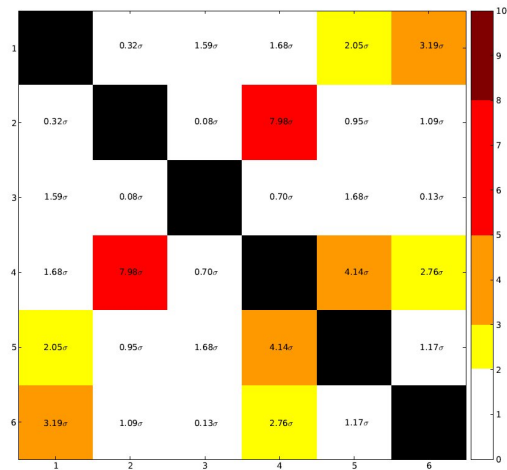- ▶ Monitoring tracking and alignment errors in D-decays

Helix parameter correlation

- Fit one Cosmic track as two track from IP region
- Look at differences in Helix parameter (e.g. $\Delta\lambda$)
- Look at correlation between Helix parameters (should be uncorrelated)
- Correlation evaluated with CAT

Helix parameter correlation

Helix parameter correlation - significance

Vertex resolution

- Planned for cosmics in IP region and $J/\Psi \rightarrow l^+l^-$
- Determine the vertex resolution in dz and dR
- Fit with $\sigma = a \oplus b/\tilde{p}$

Vertexing Control Samples

Ideas from the BABAR Vertexing and Composition Tools Group for monitoring vertexing algorithms and the quality of the data in terms of tracking errors and alignment.

- $\tau \to 3 - \mathrm{prongs}$
- $D^0 \to K3\pi$

$D^0 \to K3\pi$

- D^0 is reconstructed with 4 charged tracks
- Two vertex fits are done: (K^+, π^-) and (π^+, π^-)
- The differences in the fit is taken as resolution
- D^0 mass and width can also be monitored

$D^0 \rightarrow K3\pi$ reconstruction

The decay is reconstructed in the decay chain:

$$e^+ e^- \rightarrow c\bar{c} \rightarrow X D^{*+},$$
$$D^{*+} \rightarrow pi^+_{\text{slow}} D^0,$$
$$D^0 \rightarrow K3\pi$$

Track quality requirements:

- \# hits in SVD
- \# firing wires in the CDC
- Transverse momentum $P_t > 70 \mathrm{MeV}/c$
- IP cuts

$D^0 \rightarrow K3\pi$ reconstruction in basf2

D^0 reconstruction framework is setup:

- ▶ Evtgen for signal MC
- ▶ ParticleSelector/Combiner of the analysis framework are used for testing
- ▶ Signal selection is working
- ▶ Due to basf2 status the last days there are unfortunately no plots available

Future/Ideas

- Choosing track selection criteria
- Solving the handling of the TrackCands for cosmics in the MCTrackFinder