Abstract

These plots show the first outcoming results on tracking efficiencies, before application of alignment corrections, as obtained from the 1st data challenges tests. In this challenge, several tracking detectors (the VELO, SciFi and Muon) have been misaligned and the effects on the tracking efficiencies are studied. Efficiency plots of long tracks are shown as a function of $p$, $p_T$, $\eta$ and nPV. The misalignment conditions are a first rough guess, based on the experience from Run 2.
Tracking efficiencies

Tracking efficiencies for long track as function of $p$ (Fig. 1), $p_T$ (Fig. 2), $\eta$ (Fig. 3) and nPV (Fig. 4) as presented below are obtained from the test using the first estimates of misalignment values for VELO, SciFi and combination of both conditions. Presented efficiencies are after the full reconstruction procedure (using Brunel v60r5) but without applying any software alignment corrections. These results are then compared with the default conditions without any artificially introduced misalignment. This study is done using simulated sample of 1000 $B_s^0 \rightarrow \phi \phi$ decays.

Long tracks are defined as tracks reconstructed in the VELO and the SciFi and may also have hits in the UT [1].

Following conditions were used:

- Nominal: sim-20180530-vc-md100
- SciFi: only modules are misaligned, translations (T) and rotations (R) in x, y and z direction, using a gaussian distributions with sigma = 200 $\mu$m, extra random rotation in Rx, using a gaussian distribution with sigma = 0.15 mrad
- VELO: only modules are misaligned, translations (T) and rotations (R) in x, y and z direction, using a gaussian distributions with following mean and sigma: $4 \pm 9$ Tx ($\mu$m), $4 \pm 24$ Ty ($\mu$m), $170 \pm 250$ Tz ($\mu$m), $0.70 \pm 1.0$ Rx (mrad), $0.87 \pm 2.60$ Ry (mrad), $0.075 \pm 0.200$ Rz (mrad)

Corresponding tags:
- SciFi only: upgrade/DC19-1a
- VELO only: upgrade/DC19-1-VPModulesmisaligned

References

Figure 1: Reconstruction efficiencies of long tracks as a function of $p$ with nominal conditions, misaligned VELO and misaligned SciFi.

Figure 2: Reconstruction efficiencies of long tracks as a function of $p_T$ with nominal conditions, misaligned VELO and misaligned SciFi.
Figure 3: Reconstruction efficiencies of long tracks as a function of $\eta$ with nominal conditions, misaligned VELO and misaligned SciFi.

Figure 4: Reconstruction efficiencies of long tracks as a function of number of Primary Vertices (nPV) with nominal conditions, misaligned VELO and misaligned SciFi.