d_0 and z_0 Resolution in Belle and in Belle II

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d_0 and z_0 Resolution

- Do to the lower boost in SuperKEKB, we need to increase our vertexing precision with respect to Belle.
- The improvement that we reach with basf2 on MC in vertexing, flavor tagging, high-level tools, etc. is driven mainly by the preciser track reconstruction.

B2TIP Physics and Algorithms chapter point to tracking section, but there is no plot so far that compares the track rec. in Belle II with the track rec. in Belle.

- I compared the d_0 and z_0 resolution of Belle II using single $\mu^{\pm}$ events with the results obtained by Belle using SVD2 cosmic data BN715.

Single Track Study

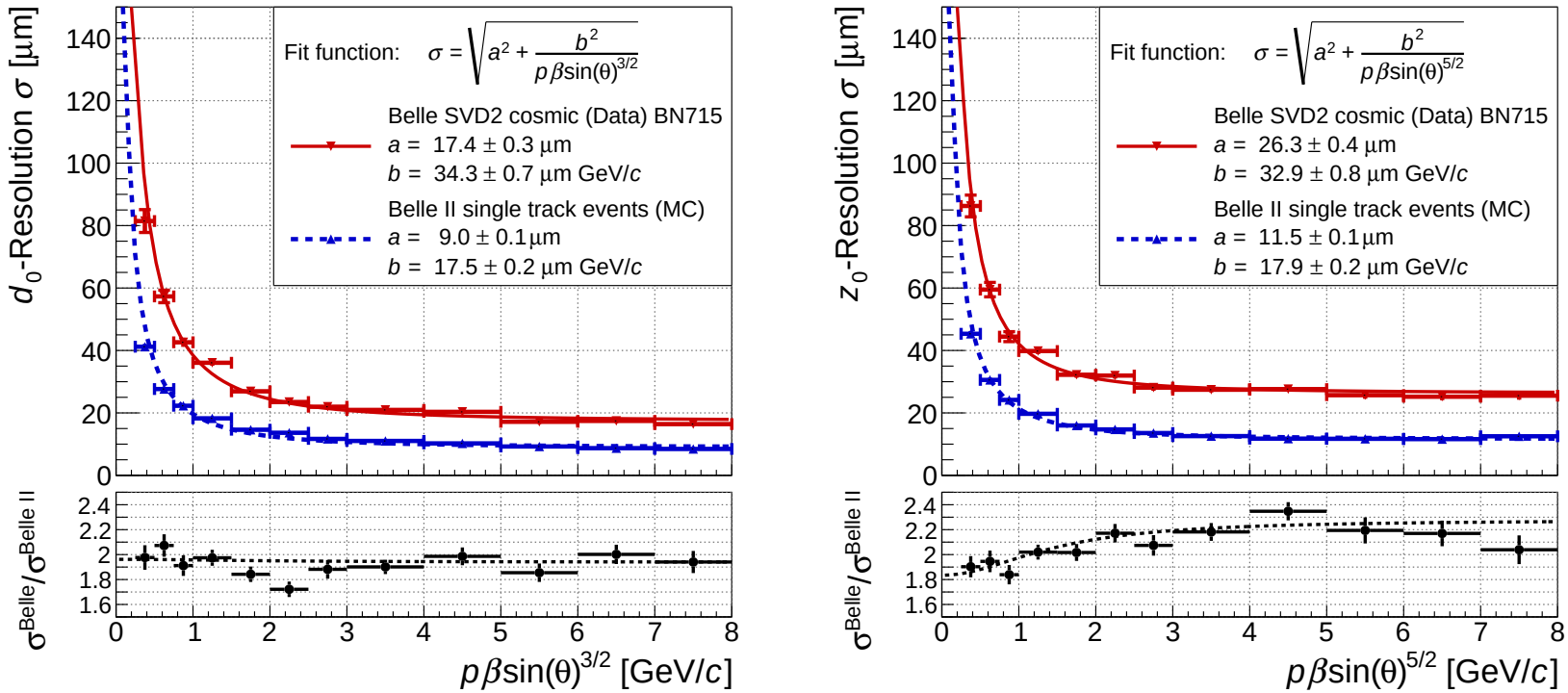
With `ParticleGun`:

- 1 $\mu^{\pm}$ particle per event
- Uniformly distributed $p_{\mathsf{T}} \in [0.1, 8.00]$ GeV
- Illuminate whole acceptance

$\Rightarrow$ Uniform distribution for ϕ and $\cos(\theta)$

- The study was performed without machine background.
- `basf2` track parameters: $[d_0,\ \phi_0,\ \Omega = 1/r,\ z_0,\ \tan\lambda]$
- information extracted directly from mDST.

New plot in B2TIP

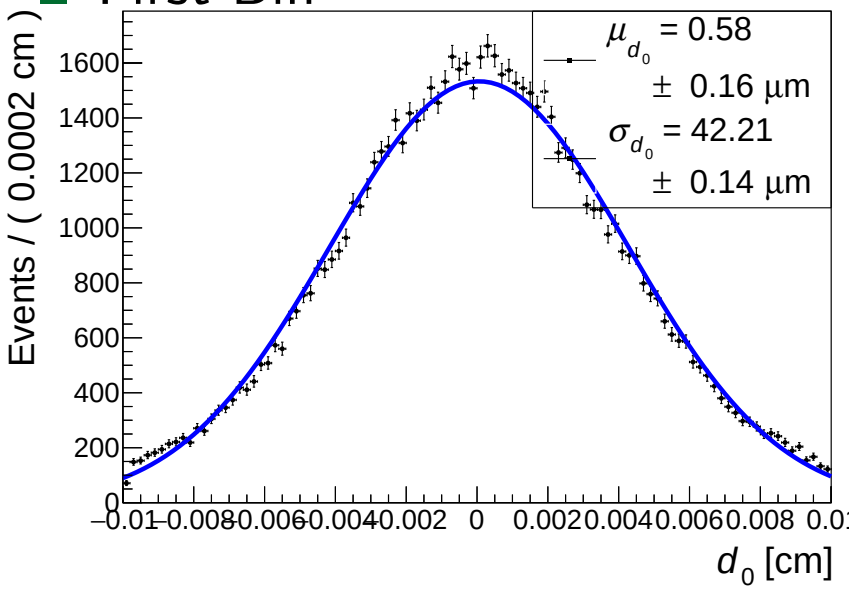


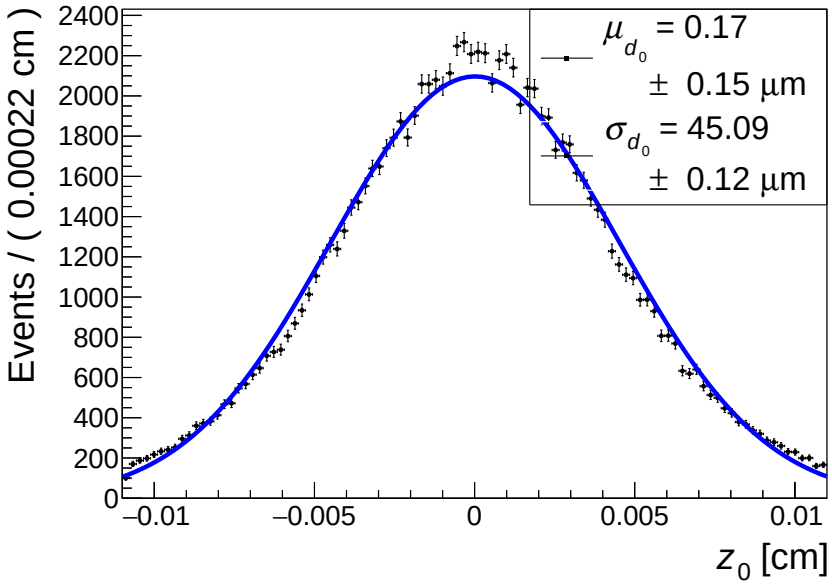
: Resolution of the transverse d_0 (left) and longitudinal z_0 (right) impact parameters. The results for MC events with a single muon track using the Belle II tracking algorithm are compared with the results for Belle cosmic events. The resolution in each bin is estimated using the σ value of a single Gaussian function fitted in a region containing 90% of the data around the mean value of the distributions.

Ansatz: $\sigma^2 = \sigma^2_{\text{int}} + \sigma^2_{\text{ms}}$

Fit of the Resolution

First Bin





Last Bin