

poster (Indico) mattermost

A study for hit-time reconstruction of Belle II SVD

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VERTEX 2020



- e^+e^- collisions @SuperKEKB • design luminosity: ~ $6 \times 10^{35} cm^{-2} s^{-1}$
- time-dependent analysis possible
 - asymmetric energy
 - decay vertex measurement

- vertex detector
 - cylindrical
 - pixel 2 layers + strip 4 layers (SVD)
- SVD: double-sided strip detector (DSSD) tracking w/ 4 layers of 2D hits

Future update for stable SVD operation

- We will go to <u>higher luminosity</u>
 More background hits and higher trigger rate
- ◆ Data rate will reach its limit
 ■6-sample DAQ → 3-sample DAQ
 ■3/6-sample mixed-mode under test
- BG hits will deteriorate the tracking performance
 Offline hit rejection using hit-time



Hit-time reconstruction study

AIM:

check that SVD hit-time is OK even with 3-sample

- Developed novel hit-time estimation methods for 3-sample DAQ
- 2. Applied them to current 6-sample DAQ data and check hit-time distributions
- 3. Also analyzed simulated data to see the performance of hit-time cut



Result: Hit-time resolution in data

 \bullet Analyze a set of data with BB-like events



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Result: Hit-time cut and tracking efficiency in MC

- Study Monte-Carlo simulation
 various amount of BG
- Try applying cut on hit-time
 [-35,+35] (width 70 ns) cut
 signal hit efficiency > 99%
 background hit rejection ~ 81%
- tracking efficiency improved
 promising result for future reconstruction under higher BG

