

Secondary Vertex Resolutions for D Mesons for Different Beampipes and Different Inner Trackers

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July 06, 2022

D Meson Decay Channels of Interest

① $D^0 \rightarrow \pi^+ + K^-$

Secondary Vertex Resolution

- There are proposals of different configurations of beam pipe in different stages of SPD
- Stage 1 : central pipe Aluminium, lateral Al pipe thickness 15 mm
- Stage 2 : central pipe Beryllium, lateral Al pipe thickness 30 mm
- We tested D0 decay vertex resolution for different configurations for three different vertex detectors
 - 1 5 layers of DSSD
 - 2 3 layers of DSSD
 - 3 4 layers of MAPS
- Thank you Arteom Ivanov for help with SpdRoot part where beampipe is configured

Secondary Vertex Resolutions : X-dir

D^0 decay length $\sim 120\mu$, D^+ decay length $\sim 310\mu$

$D^0 \rightarrow \pi^+ + K^-$: Al beampipe, 15 mm thick, X dir.

$D^0 \rightarrow \pi^+ + K^-$: Be beampipe, 30 mm thick, X dir.

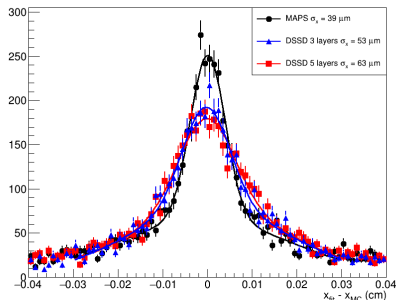
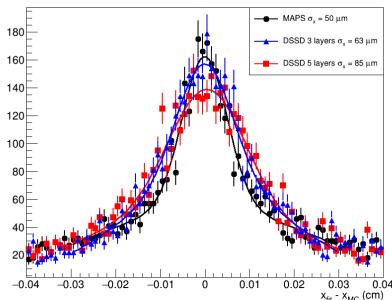


Figure 1: Central pipe : Aluminium,
Lateral (Al) pipe thickness 15 mm

Figure 2: Central pipe : Beryllium,
Lateral (Al) pipe thickness 30 mm

Secondary Vertex Resolutions : Z-dir

D^0 decay length $\sim 120\mu$, D^+ decay length $\sim 310\mu$

$D^0 \rightarrow \pi^+ + K^-$: Al beampipe, 15 mm thick, Z dir.

$D^0 \rightarrow \pi^+ + K^-$: Be beampipe, 30 mm thick, Z dir.

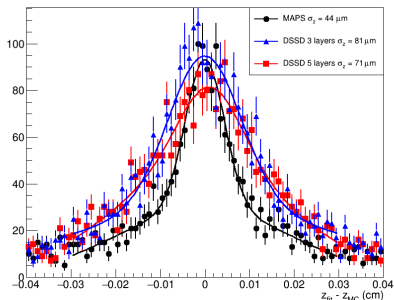


Figure 3: Central pipe : Aluminium,
Lateral (Al) pipe thickness 15 mm

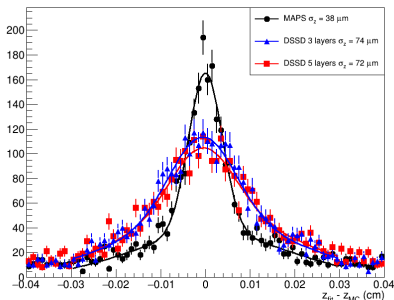


Figure 4: Central pipe : Beryllium,
Lateral (Al) pipe thickness 30 mm

Summary and Outlook

- Increasing lateral pipe thickness does not seem to adversely affect secondary vertex resolution
- Benefit from Beryllium central part outweighs any such effect : 10-15% overall improvement for config 2

Thank You