

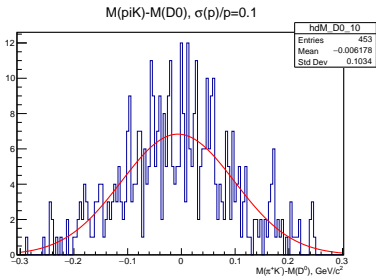
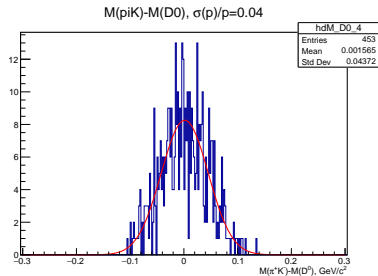
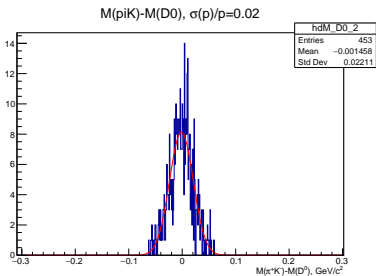
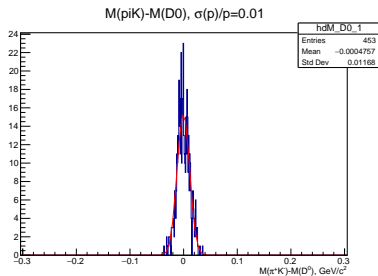
Rate of open-charm events in pp-collisions at 27 GeV

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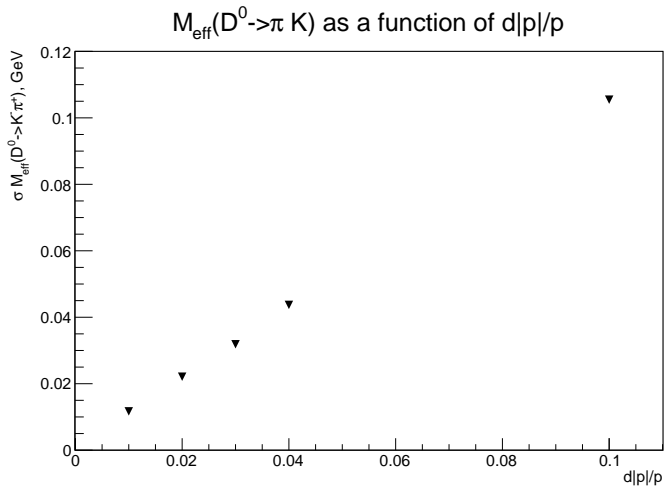
02.06.2021

- pythia8.303 ($p + p$, $\sqrt{s} = 27$ GeV, SoftQCD=on)
- Averaged multiplicities: $\langle n_{\text{ch}} \rangle = 9.5$, $\langle n_0 \rangle = 9.6$
- Fairly fast: < 1 msec/event
- Channels of interest:
 - $D^0 \rightarrow \pi^+ K^-$ (0.0395 ± 0.0003)
 - $D^+ \rightarrow K^- \pi^+ \pi^+$ (0.094 ± 0.002)
- Study is focused on a data-reduction inside the online-filter

$D^0 \rightarrow K^- \pi^+$: resolution



100M pp-interactions

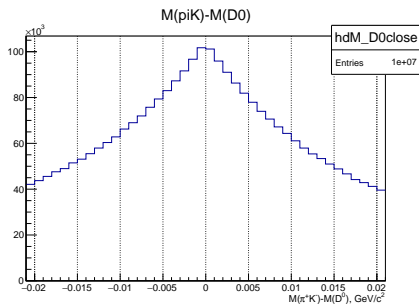
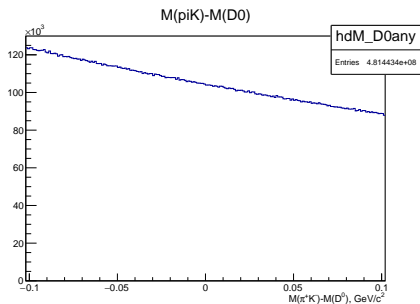


$D^0 \rightarrow K^- \pi^+$: background

Worst-case scenario: only pos/neg charges are distinguished:

Any $x^+ y^-$ are treated as $\pi^+ K^-$

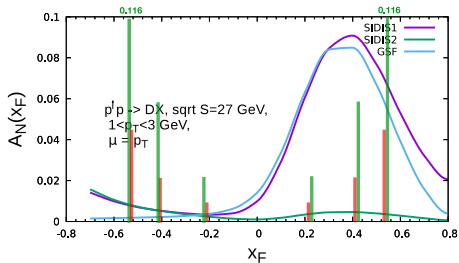
tracks selection: $p > 0.15 \text{ GeV}/c$, $p_T/p > 0.1$



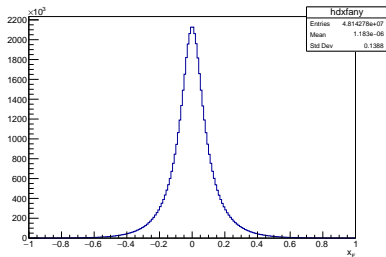
Probability of pos. trigger decision

$\Delta M_{\text{eff}}(D^0 \rightarrow \pi K)$, MeV	$P(\pi^+ K^-)$	$P(K^+ \pi^-)$	$P(K\pi)$
< 10	0.09	0.10	0.16
< 40	0.27	0.28	0.39
< 100	0.44	0.45	0.52

$D^0 \rightarrow K^- \pi^+$: x_F



Events of interest: $x_F = \frac{p_z}{p_{z,\max}} > 0.2$



$$D^0 \rightarrow K^- \pi^+ : x_F$$

Events of interest: $x_F = \frac{p_z}{p_{z,\max}} > 0.2$

means $|p_z| > 2.5 \text{ GeV}/c$

Probability of pos. trigger decision (ΔM_{eff} & $|x_F|$)

$\Delta M_{\text{eff}}(D^0 \rightarrow \pi K)$, MeV	$ x_F $	$P(\pi^+ K^-)$	$P(K^+ \pi^-)$	$P(K\pi)$
< 10	any	0.09	0.10	0.16
< 40	any	0.27	0.28	0.39
< 100	any	0.44	0.45	0.52
< 10	> 0.2	0.018	0.021	0.038
< 40	> 0.2	0.07	0.08	0.13
< 100	> 0.2	0.15	0.16	0.24

- Momentum reconstruction at online-filtering: resolution?
- Particle identification (π/K)?

TODO:

- Event-tagging: $pp \rightarrow D^0 + X(\bar{c}) + X$
- Triggering of charged-channel open-charm events (D^\pm, \dots)