Ω_c^0 lifetime measurement

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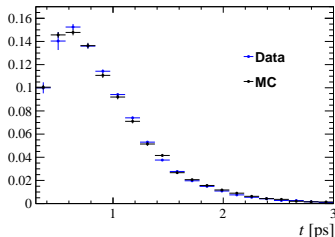Ω_c^0 *lifetime measurement meeting*
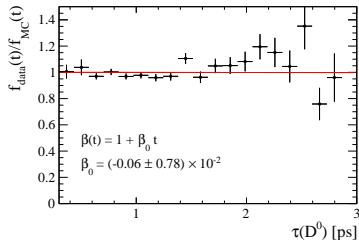
April 19, 2019

Outline

1. Measure $\tau(D^0)$ with $K^- K^+ \pi^- \pi^+$

2. Measure $\tau(\Xi_c^0)$ and $\tau(\Omega_c^0)$ with $pK^- K^- \pi^+$

Decay time distribution with MC corrections

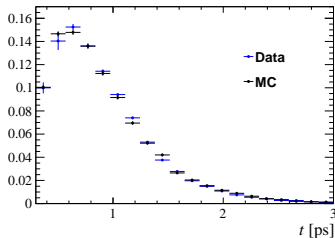■ Bug: PID weights applied upon PID cuts for L0-weighted sample
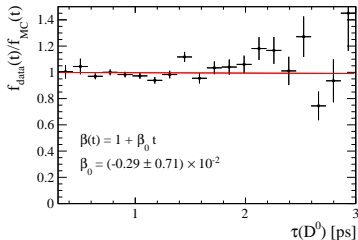

MC w/ L0, PID and Dalitz weights

The ratio of data to MC

Decay time distribution with MC corrections
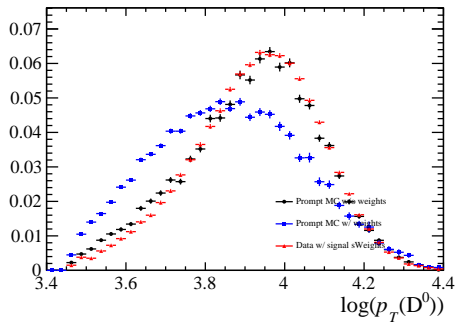
- $\chi^2/\text{NDOF} = 41/19$
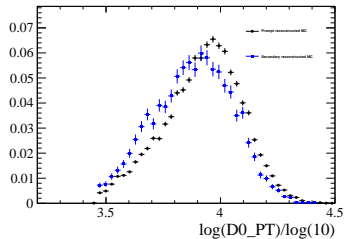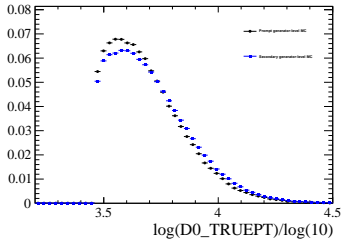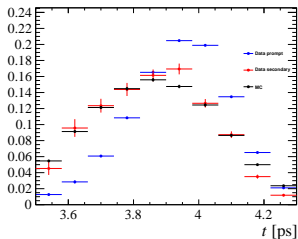

MC w/ L0, PID and Dalitz weights

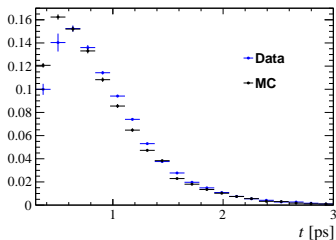The ratio of data to MC

p_T (D^0) of data and MC

- Wrong x title, should be "$\log(p_{\mathrm{T}}(D^0))$"

Does the p_T (D^0) matters?

- Yes
- Possible culprit: 2012 L0 Hadron table?
- Propose to check with $D^0 \to K^- \pi^+$
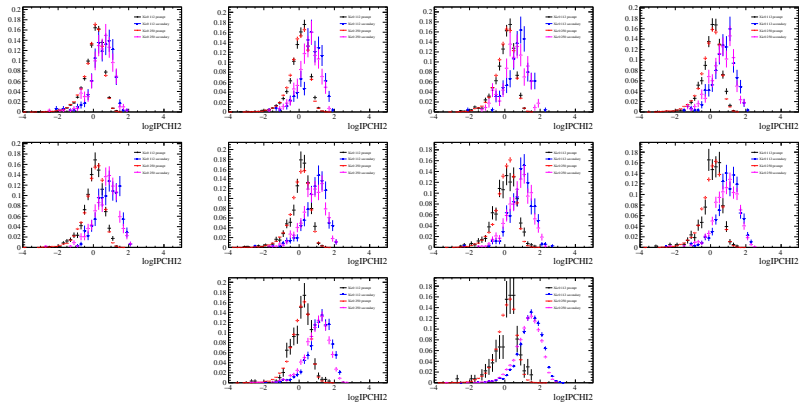
Measure $\tau(\Xi_c^0)$ with $\Xi_c^0 \to pK^-K^-\pi^+$

- Selection
  - Turbo + L0 Hadron TOS + BDT (non-PID) + BDT (PID)
- Extract the prompt yield (split the sample by L0 trigger)
  - Fit mass
  - Fit χ_{IP}^2 in MC
  - Fit χ_{IP}^2 in Data
- Correct the efficiency (split the sample by L0 trigger)
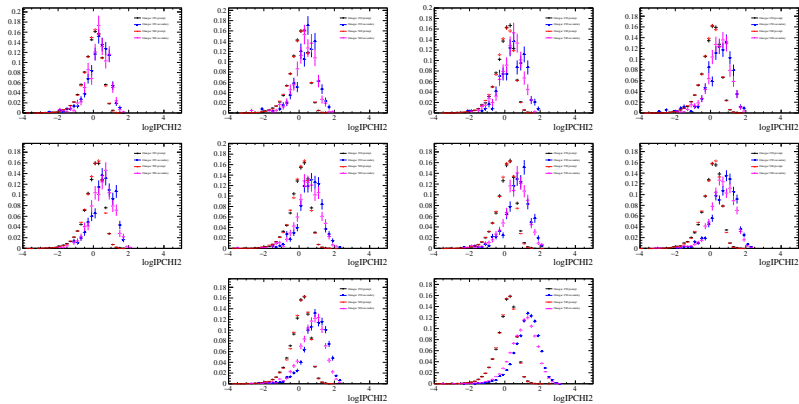 - L0 Hadron TOS
  - PID
  - Phase-space
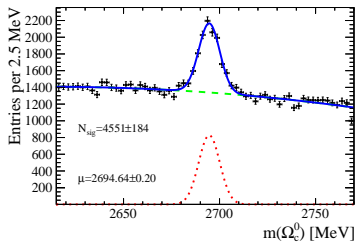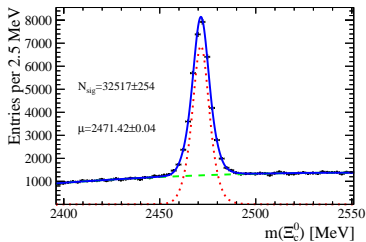
- Fit with simple signal models

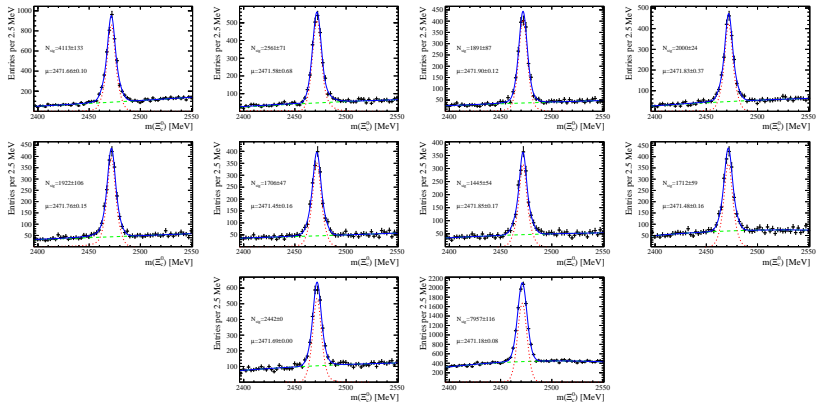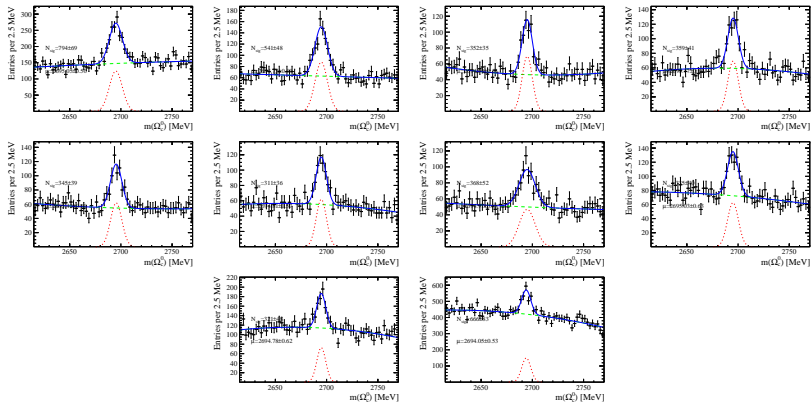- Should keep in mind this difference

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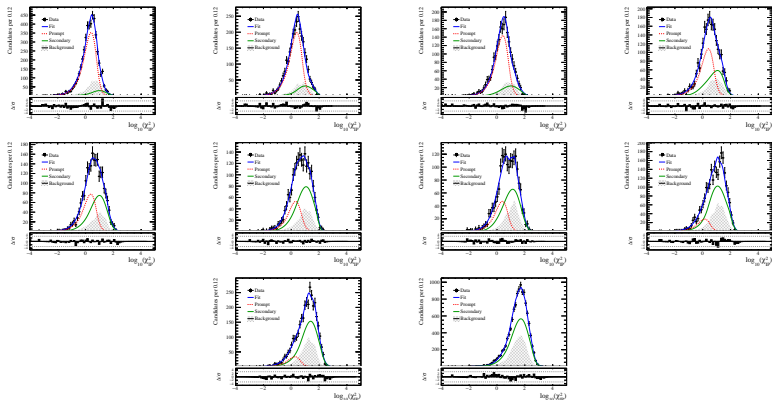# MC samples with different selections
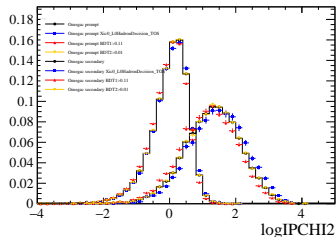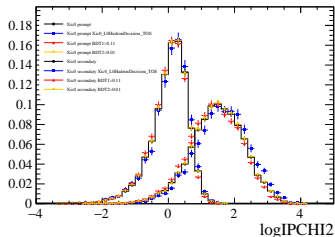
- Apply no offline selection when fitting the MC
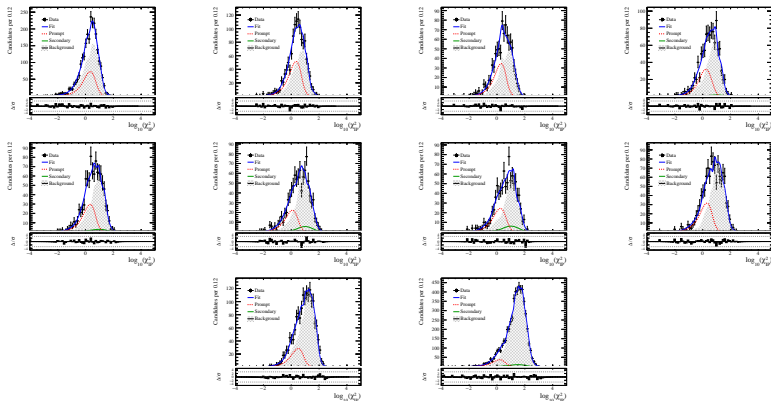- Should keep in mind this difference

Ξ_c^0 mass fits

- Use simple model for now
- Will switch to Dong's fit model

Ω_c^0 mass fits

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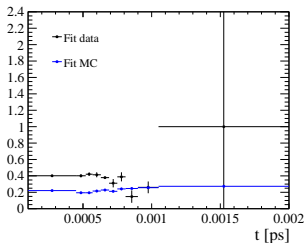- Will switch to Dong's fit model

- $\pm 2.5\sigma$ signal window, μ_{prompt} and $\mu_{\mathrm{secondary}}$ free
- The last bin: N_{prompt} at limit

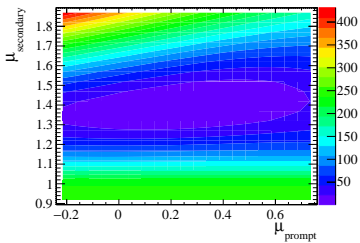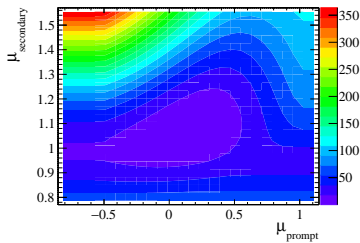# Ω_c^0 IPCHI2 fits

- $\pm 2.5\sigma$ signal window, μ_{prompt} and $\mu_{\mathrm{secondary}}$ free
- Error matrix not-pos-def for some bins

Compare μ_{prompt} and $\mu_{\mathrm{secondary}}$ of MC and data fits
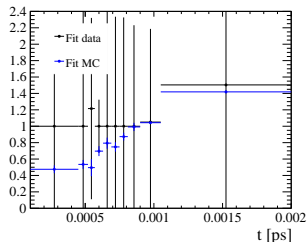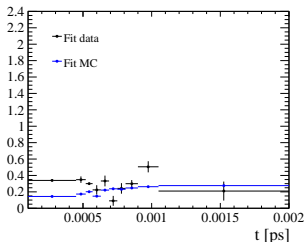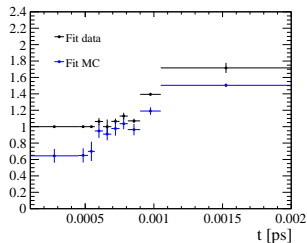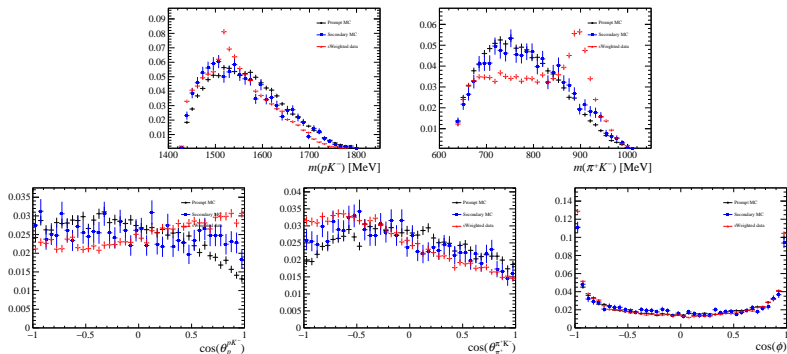

- (Top) Ξ_c^0 and (bottom) Ω_c^0

- No other local minimal is observed

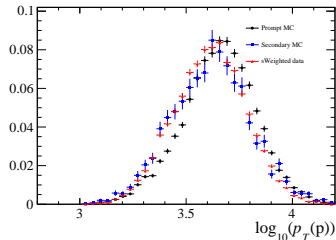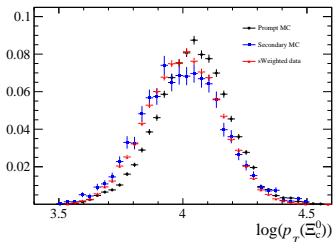# Decay time distributions of MC and data
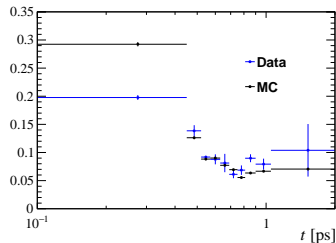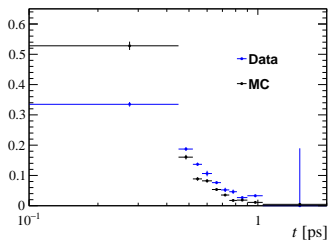
- MC $\tau(\Xi_c^0) = 112\,\mathrm{fs}$, $\tau(\Omega_c^0) = 250\,\mathrm{fs}$
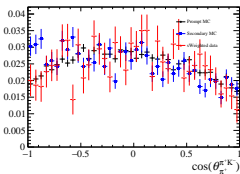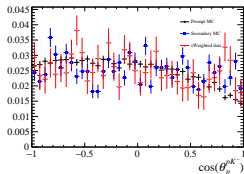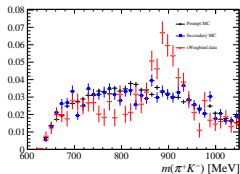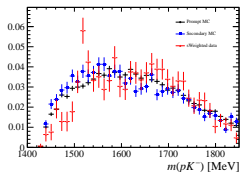- No corrections to MC are applied

- $\Lambda(1520)$ and K^* resonances

Ξ_c^0 MC and data comparison: kinematic variables
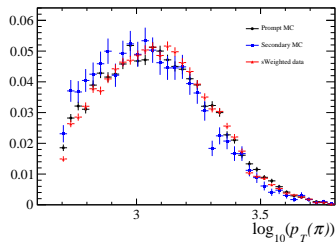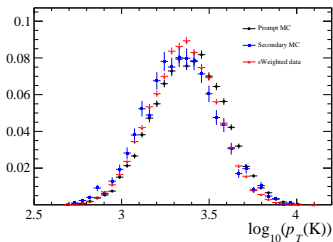
Ω_c^0 MC and data comparison: phase-space varibles

Ω_c^0 MC and data comparison: kinematic varibles