

Prompt $\Lambda_c^+ \rightarrow p^+ h^+ h^-$ BF Update: Offline yields



Stephen Ogilvy



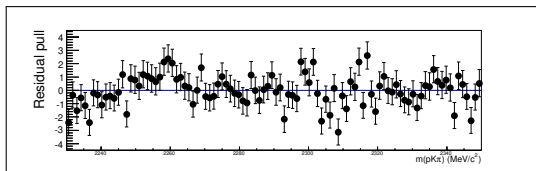
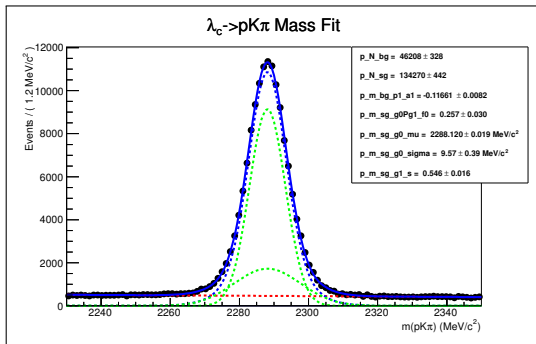
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- Selection incorporating BDT has been finalised.
- Have offline mass distributions for CF and SCS using DCS training (i.e. training on CF data using 0.003 global signal weight multiplier).
- Cuts in order of $(\epsilon_{sig} \times (1 - \epsilon_{bkg}))$:
 - $(\text{proton_PIDp} - \text{proton_PIDK}) > 12$
 - $\text{BDT_response} > -0.025$
 - $\text{proton_PIDp} > 20$
 - $\text{K_PIDK} > 7$
 - $(\text{K_PIDK} - \text{K_PIDp}) > -10$
 - $\text{K_PIDe} < 4$
 - $\pi_PIDK < 0$
 - $\pi_PIDe < 4$
- More info on the training of the BDT [here](#).

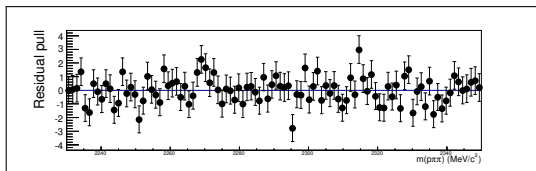
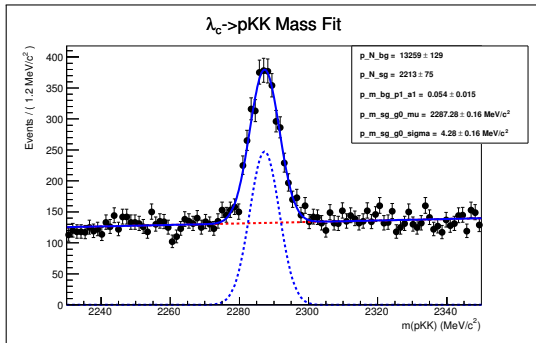
$$\Lambda_c^+ \rightarrow p^+ K^- \pi^+$$

Signal: double gaussian, shared mean. Bkg: 1st order Chebychev.



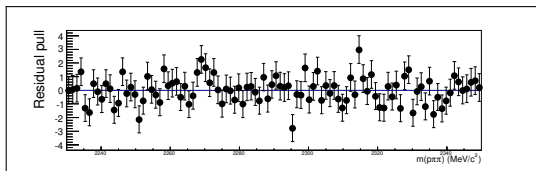
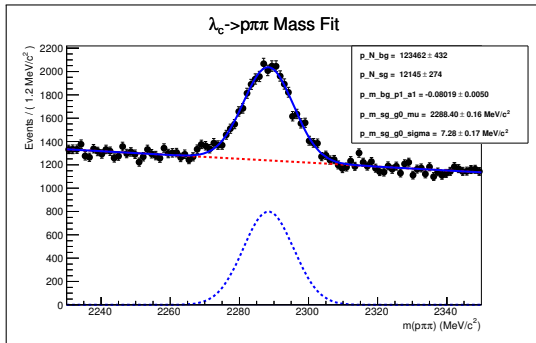
$$\Lambda_c^+ \rightarrow p^+ K^- K^+$$

Signal: single gaussian. Bkg: 1st order Chebychev.



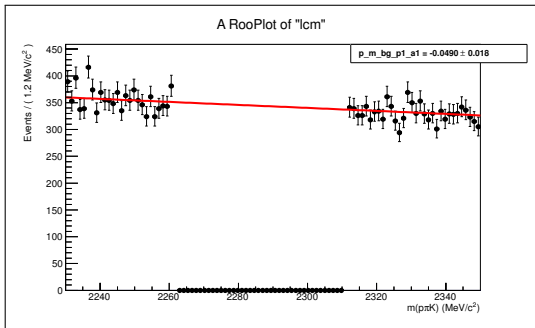
$$\Lambda_c^+ \rightarrow p^+ \pi^- \pi^+$$

Signal: single gaussian. Bkg: 1st order Chebychev.



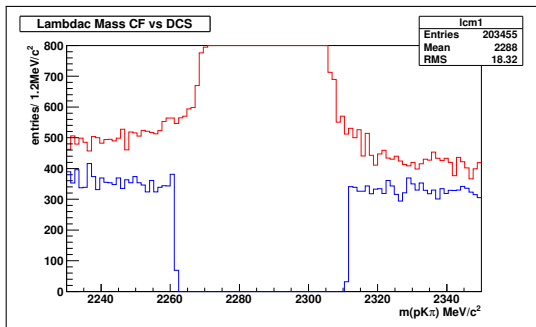
$\Lambda_c^+ \rightarrow p^+ \pi^- K^+$ (DCS Sidebands)

Bkg: First order Chebychev.



CF vs DCS Sidebands

As seen with D^0 RS/WS analysis, higher combinatoric bkg for the CF mode (red) than the DCS (blue) mode.



Some kind of associated production effect?

Raw Yields

- All Λ_c^+ decay modes measured relative to $p\pi\pi$, which has a large (26%) error on its BF measurement.
- Yields before PID and selection efficiency corrections, measured errors all statistical:

Mode	Yield	Measured fraction of CF	PDG fraction of CF
$pK\pi$	134270 ± 442	-	-
$p\pi\pi$	12145 ± 274	$(9.045 \pm 0.206) \times 10^{-2}$	$(7.0 \pm 4.3) \times 10^{-2}$
pKK	2213 ± 75	$(1.648 \pm 0.056) \times 10^{-2}$	$(1.5 \pm 0.8) \times 10^{-2}$

- At this stage good agreement, but errors on PDG values are large.

- As previously discussed a 5D phase space characterises the resonance structure of the decay, this must be taken into account due to the rich number of resonances in the phh decay modes and the potential for large variations in signal efficiency across resonance regions.
- Now have a large sample of MC11 for prompt (2.5m per mode), work underway to evaluate the treatment of this efficiency and the binning in the phase space.
- Now we have MC for all phh modes PID efficiency corrections will follow.