$\Lambda_c^+ \to phh'$ BFs - outline

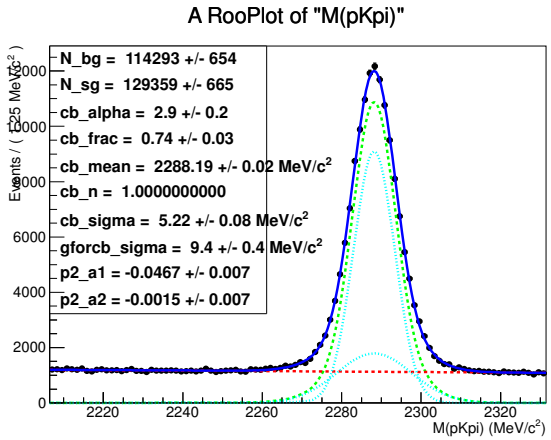
- Glasgow analysis in WG review -
  - Measuring the following quantities:

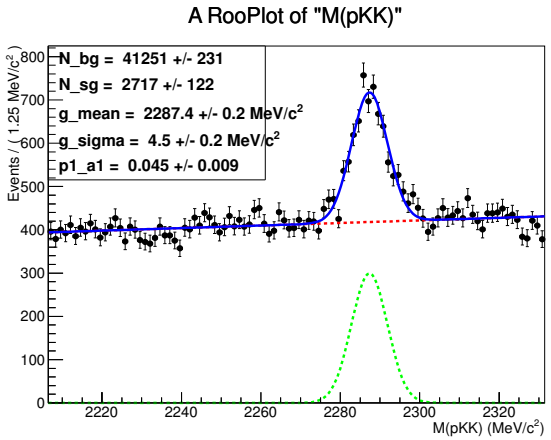
$$\frac{\mathcal{B}(\Lambda_c^+ \to pK^-K^+)}{\mathcal{B}(\Lambda_c^+ \to pK^-\pi^+)}, \frac{\mathcal{B}(\Lambda_c^+ \to p\pi^-\pi^+)}{\mathcal{B}(\Lambda_c^+ \to pK^-\pi^+)}, \frac{\mathcal{B}(\Lambda_c^+ \to p\pi^-K^+)}{\mathcal{B}(\Lambda_c^+ \to pK^-\pi^+)}$$

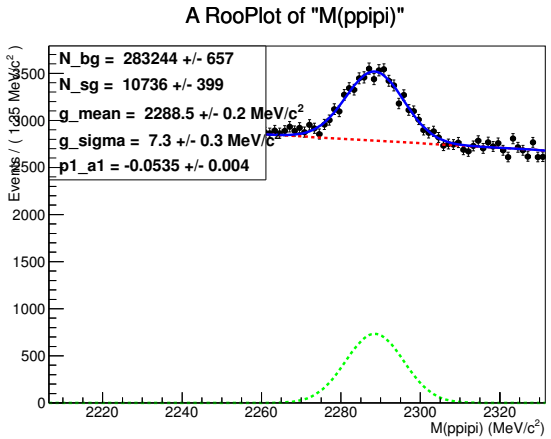
  - Independent measurements with two sources of Λ_c:
    - promptly produced
    - from semileptonic $\Lambda_b^0 \to \Lambda_c^+ \mu^- \overline{\nu}_\mu$
  - Unobserved $\Lambda_c^+ \to p\pi^-K^+$ mode blind in prompt and SL
  - Using full 2011 dataset at $\sqrt{s} = 7$ TeV
  - Stripping17b, Reco14
- v1 draft of ANA available at `https://twiki.cern.ch/twiki/bin/view/LHCbPhysics/Lc2pKpiDCS`.

$\Lambda_c^+ \to phh'$ BFs - selections and yields

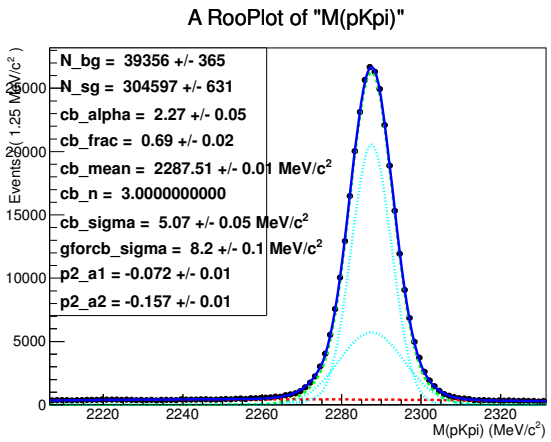
- Tight PID and kinematic cuts used to reject combinatoric and charm reflections
- MVA selection for DCS mode in prompt

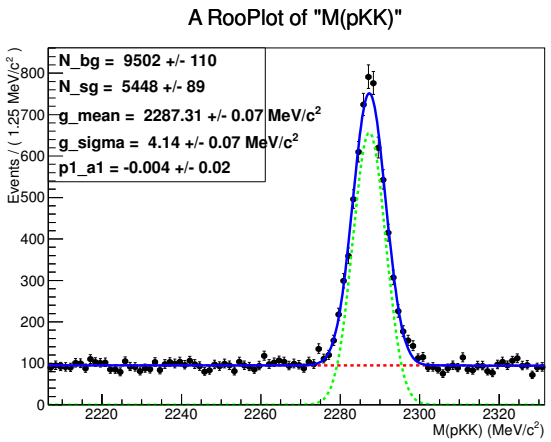


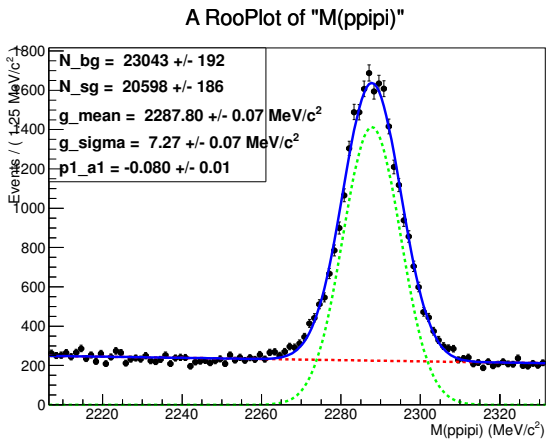




prompt



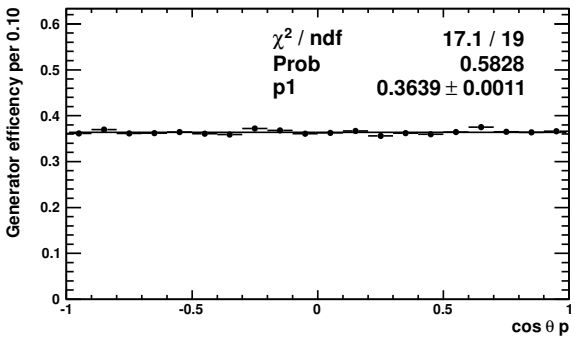




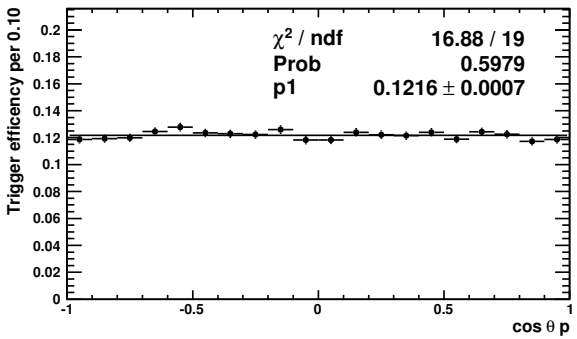
SL

$\Lambda_c^+ \to phh'$ BFs - efficiency corrections

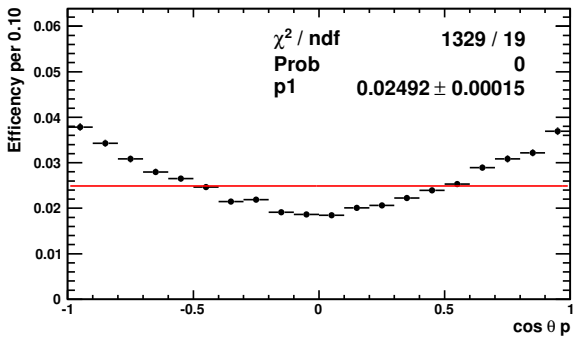
- Analysis uses entirely data-driven `PIDCalib` technique -
  - have parameterised and corrected for new biases when using data reference samples.
- Stripping selection biased heavily with regard to resonant variables which are badly modelled (5D structure)
  - Example - selection efficiency in bins of $\cos\theta_p$ for SL $\Lambda_c^+ \to pK^-K^+$:



Generator



Trigger



Stripping

- Requires challenging re-weighting of selection efficiencies -
  - developed new performance metrics for multidimensional binned efficiency descriptions

$\Lambda_c^+ \to phh'$ BFs - results

Measurement	Prompt [%]	Semileptonic [%]
$\frac{\mathcal{B}(\Lambda_c^+ \to pK^-K^+)}{\mathcal{B}(\Lambda_c^+ \to pK^-\pi^+)}$	$2.03 \pm 0.07 \pm 0.10$	$1.68 \pm 0.03 \pm 0.07$
$\frac{\mathcal{B}(\Lambda_c^+ \to p\pi^-\pi^+)}{\mathcal{B}(\Lambda_c^+ \to pK^-\pi^+)}$	$7.04 \pm 0.19 \pm 0.34$	$7.45 \pm 0.06 \pm 0.24$
$\frac{\mathcal{B}(\Lambda_c^+ \to p\pi^-K^+)}{\mathcal{B}(\Lambda_c^+ \to pK^-\pi^+)}$	$x.xx \pm y.yy \pm z.zz$	$x.xx \pm y.yy \pm z.zz$
$\frac{\mathcal{B}(\Lambda_c^+ \to pK^-K^+)}{\mathcal{B}(\Lambda_c^+ \to p\pi^-\pi^+)}$	$28.81 \pm 1.29 \pm 1.73$	$22.59 \pm 0.40 \pm 0.90$

- Results:
  - $\mathcal{B}(\Lambda_c^+ \to p\pi^-\pi^+)/\mathcal{B}(\Lambda_c^+ \to pK^-\pi^+)$ - good agreement
  - $\mathcal{B}(\Lambda_c^+ \to pK^-K^+)/\mathcal{B}(\Lambda_c^+ \to pK^-\pi^+)$ - 2.6 σ discrepancy
- SL $\mathcal{B}(\Lambda_c^+ \to pK^-K^+)/\mathcal{B}(\Lambda_c^+ \to pK^-\pi^+)$ much closer to previous measurements
  - too much prompt $\Lambda_c^+ \to pK^-K^+$?
  - systematics too low?
- Would welcome comments on possible source of this effect