- Λ_b^0 cross section vs. p_T at 7 TeV from CMS (BR correction is not applied)
- Fit with Tasllis function
- Scale with the ratio of B between 13 TeV and 7 TeV from FONLL
  ➔obtain Λ_b^0 cross section at 13 TeV
- Scale with $\frac{BR(b\to\Xi_b)BR(\Xi_b\to e\Xi\upsilon X)}{BR(b\to\Lambda_b)BR(\Lambda_b\to J/\psi\Lambda)} = \frac{3.9\times10^{-4}}{5.8\times10^{-5}}$
  ➔obtain Ξ_b cross section decaying to $e\Xi\upsilon X$
- Scale with efficiency, y, dp_T, luminosity
  ➔obtain the number of reconstructed $e\Xi$ pairs from Ξ_b for sampled MB events
- Refold to $e\Xi$ p_T with 2D response matrix

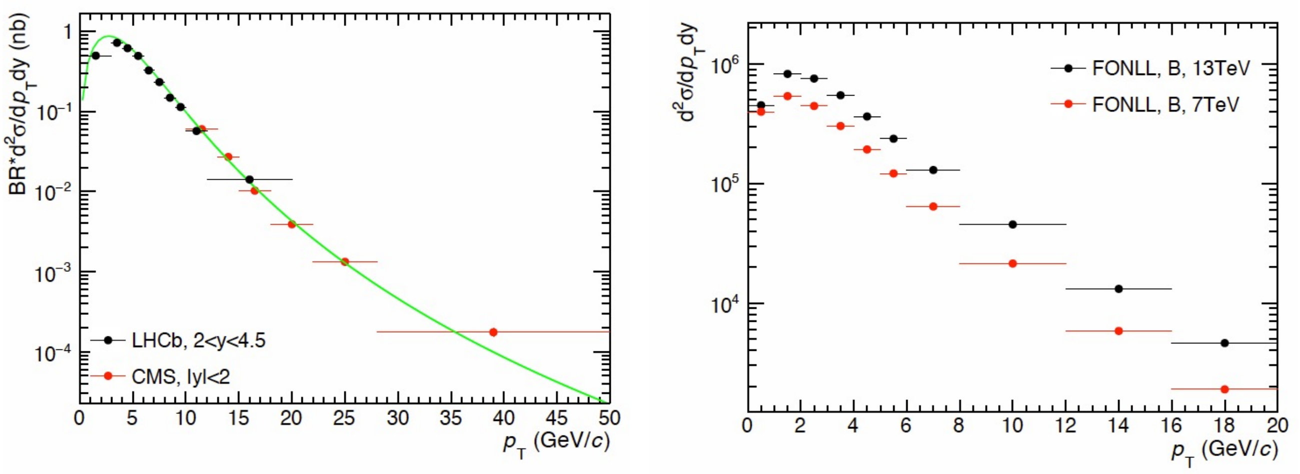


Fig. 14: (Left) Λ_b spectrum at 7TeV, (Right) B mesons spectrum generated by FONLL

- Λ_b^0 cross section vs. p_T at 7 TeV from CMS (BR correction is not applied)
- Fit with Tasllis function
- Scale with the ratio of B between 13 TeV and 7 TeV from FONLL
  ➔obtain Λ_b^0 cross section at 13 TeV
- Scale with $\frac{BR(b\to\Xi_b)BR(\Xi_b\to e\Xi\upsilon X)}{BR(b\to\Lambda_b)BR(\Lambda_b\to J/\psi\Lambda)} = \frac{3.9\times10^{-4}}{5.8\times10^{-5}}$
  ➔obtain Ξ_b cross section decaying to $e\Xi\upsilon X$
- Scale with efficiency, y, dp_T, luminosity
  ➔obtain the number of reconstructed $e\Xi$ pairs from Ξ_b for sampled MB events
- Refold to $e\Xi$ p_T with 2D response matrix

Λ_b^0 Decay Modes

The branching fractions B(b -baryon $\to \Lambda\ell^-\overline{\nu}_\ell$ anything) and B($\Lambda_b^0 \to \Lambda_c^+\ell^-\overline{\nu}_\ell$ anything) are not pure measurements because the underlying measured products of these with B($b \to b$ -baryon) were used to determine B($b \to b$ -baryon), as described in the note "Production and Decay of b-Flavored Hadrons."

For inclusive branching fractions, *e. g.*, $\Lambda_b \to \overline{\Lambda}_c$ anything, the values usually are multiplicities, not branching fractions. They can be greater than one.

	Mode	Fraction (Γ_i/Γ)	Scale Factor/ Conf. Level	P(MeV/c)
Γ_1	$J/\psi(1S)\Lambda\times$ B($b\to\Lambda_b^0$)	$(5.8\pm0.8)\times10^{-5}$		1740

2019 PDG Ξ_b **DECAY MODES**

	Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level
Γ_1	$\Xi^-\ell^-\overline{\nu}_\ell X\times$ B($\overline{b}\to\Xi_b$)	$(3.9\pm1.2)\times10^{-4}$	S=1.4
Γ_2	$J/\psi\Xi^-\times$ B($b\to\Xi_b^-$)	$(1.02^{+0.26}_{-0.21})\times10^{-5}$	
Γ_3	$J/\psi\Lambda K^-\times$ B($b\to\Xi_b^-$)	$(2.5\pm0.4)\times10^{-6}$	
Γ_4	$pD^0K^-\times$ B($\overline{b}\to\Xi_b$)	$(1.8\pm0.6)\times10^{-6}$	
Γ_5	$p\overline{K}^0\pi^-\times$ B($\overline{b}\to\Xi_b$)/B($\overline{b}\to B^0$)	$<1.6\times10^{-6}$	CL=90%

2021 PDG Ξ_b^- **DECAY MODES**

	Mode	Fraction (Γ_i/Γ)
Γ_1	$J/\psi\Xi^-\times$ B($b\to\Xi_b^-$)	$(1.02^{+0.26}_{-0.21})\times10^{-5}$
Γ_2	$J/\psi\Lambda K^-\times$ B($b\to\Xi_b^-$)	$(2.5\pm0.4)\times10^{-6}$
Γ_3	$pK^-K^-\times$ B($b\to\Xi_b^-$)	$(3.7\pm0.8)\times10^{-8}$
Γ_4	pK^-K^-	seen
Γ_5	$p\pi^-\pi^-$	
Γ_6	$pK^-\pi^-$	seen
Γ_7	$\Lambda_b^0\pi^-\times$ B($b\to\Xi_b^-$)/B($b\to\Lambda_b^0$)	$(5.7\pm2.0)\times10^{-4}$
Γ_8	$\Xi^0\pi^-$	seen

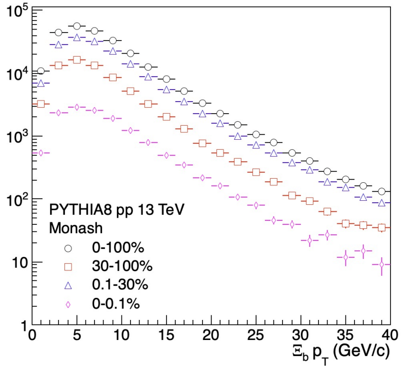
2021 PDG Ξ_b^0 **DECAY MODES**

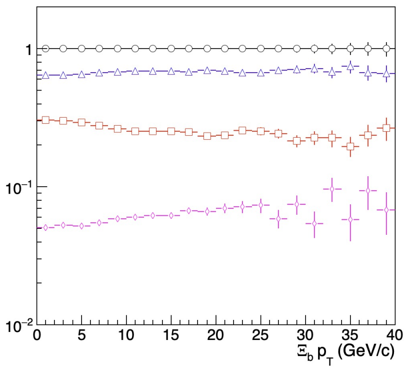
	Mode	Fraction (Γ_i/Γ)	Confidence level
Γ_1	$pD^0K^-\times$ B($b\to\Xi_b^0$)	$(1.7\pm0.6)\times10^{-6}$	
Γ_2	$p\overline{K}^0\pi^-\times$ B($b\to\Xi_b^0$)/B($\overline{b}\to B^0$)	$<1.6\times10^{-6}$	90%
Γ_3	$pK^0K^-\times$ B($b\to\Xi_b^0$)/B($\overline{b}\to B^0$)	$<1.1\times10^{-6}$	90%
Γ_4	$\Lambda\pi^+\pi^-\times$ B($b\to\Xi_b^0$)/B($b\to\Lambda_b^0$)	$<1.7\times10^{-6}$	90%
Γ_5	$\Lambda K^-\pi^+\times$ B($b\to\Xi_b^0$)/B($b\to\Lambda_b^0$)	$<8\times10^{-7}$	90%
Γ_6	$\Lambda K^+K^-\times$ B($b\to\Xi_b^0$)/B($b\to\Lambda_b^0$)	$<3\times10^{-7}$	90%
Γ_7	$J/\psi\Lambda$	seen	
Γ_8	$J/\psi\Xi^0$	seen	
Γ_9	$\Lambda_c^+K^-\times$ B($b\to\Xi_b^0$)	$(6\pm4)\times10^{-7}$	
Γ_{10}	$pK^-\pi^+\pi^-\times$ B($b\to\Xi_b^0$)/B($b\to\Lambda_b^0$)	$(1.9\pm0.4)\times10^{-6}$	
Γ_{11}	$pK^-K^-\pi^+\times$ B($b\to\Xi_b^0$)/B($b\to\Lambda_b^0$)	$(1.73\pm0.32)\times10^{-6}$	
Γ_{12}	$pK^-K^+K^-\times$ B($b\to\Xi_b^0$)/B($b\to\Lambda_b^0$)	$(1.8\pm1.0)\times10^{-7}$	

Correction for over−subtraction

- Λ_b^0 cross section vs. p_T at 7 TeV from CMS (BR correction is not applied)
- Fit with Tasllis function
- Scale with the ratio of B between 13 TeV and 7 TeV from FONLL
  ➔obtain Λ_b^0 cross section at 13 TeV
- Scale with $\frac{BR(b\to\Xi_b)BR(\Xi_b\to e\Xi\upsilon X)}{BR(b\to\Lambda_b)BR(\Lambda_b\to J/\psi\Lambda)} = \frac{3.9\times10^{-4}}{5.8\times10^{-5}}$
  ➔obtain Ξ_b cross section decaying to $e\Xi\upsilon X$
- Scale with efficiency, y, dp_T, luminosity
  ➔obtain the number of reconstructed $e\Xi$ pairs from Ξ_b for sampled MB events
- Refold to $e\Xi$ p_T with 2D response matrix

- Scale with the fraction of Ξ_b in different multiplicity bins
- For the 0−0.1% bin from the HMV0 trigger, additional scale with $\frac{\#\ of\ events\ in\ 0{-}0.1\%\ from\ HMV0\ trigger}{\#\ of\ events\ in\ 0{-}0.1\%\ from\ MB\ trigger}$





Some checks are done for the contribution from other b hadrons, which tell us that their contribution can be negligible. Especially the decay BR ($B_s \to \Xi_c^0$) is 0.0126. So for the feed-down contribution, we only consider the dominant one from Ξ_b^-. The following shows the BR checks for BR ($B_s \to \Xi_c^0$) and BR ($B_s \to \Lambda_c^+$) in Fig. 25:

BRs check for $B \to \Xi_c^0$ and $B \to \Lambda_c^+$

- Hb —> Lc + X BRs in PYTHIA8:
  - ➡ B0 —> Lc+- + X = 0.0184059 (ignore)
  - ➡ B+ —> Lc+- + X = 0.0169298 (ignore)
  - ➡ Bs —> Lc+- + X = 0.0195037 (ignore)
  - ➡ Lb —> Lc+- + X = 0.819539 (dominate)
- Hb —> Xic0 + X BRs in PYTHIA8:
  - ➡ B0 —> Xic0 + X = 0.00267 (ignore)
  - ➡ B+ —> Xic0 + X = 0.002089 (ignore)
  - ➡ Bs —> Xic0 + X = 0.0126 (ignore)
  - ➡ Lb —> Xic0 + X = 0.00094 (ignore)
  - ➡ Xib0 —> Xic0 + X = 0.00104 (ignore)
  - ➡ Xib- —> Xic0 + X = 0.505056 (dominate)
- $\mathrm{BR}(\Xi_b^- \to \Xi_c^0)/\mathrm{BR}(\Lambda_b \to \Lambda_c^+) = 50.5\,\%/82.0\,\% = 0.616$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- b-quark cross section vs. p_T from FONLL
- Scale with $BR(b \to \Lambda_b^0)BR(\Lambda_b^0 \to \Lambda_c^+)$ and apply the 2D respnose matrix for p_T smearing of $\Lambda_b^0 \to \Lambda_c^+$ (Q. b p_T → Λ_b^0 p_T)
  ➔obtain non-prompt Λ_c^+ cross section vs. p_T

- Cross section of $\Lambda_c^+ \to pK\pi$ from B
- Scale with $BR(\Lambda_c^+ \to pK\pi)$ (Q. scale factor is 1e-6/(0.068*20), what '20' is for ? => bin width)
  ➔obtain non-prompt Λ_c^+ cross section vs. p_T
- Scale with the yield ratio $\frac{inclusive\ \Xi_c^0}{prompt\ \Lambda_c^+} \approx \frac{inclusive\ \Xi_c^0}{inclusive\ \Lambda_c^+}$ (Q. additional correction for $\frac{non-prompt\ \Xi_c^0}{non-prompt\ \Lambda_c^+}$?)
  ➔obtain non-prompt Ξ_c^0 cross section vs. p_T
- Scale with the efficiency for inclusive and non-prompt Ξ_c^0 (gen level ➔ reco level)
  ➔obtain the spectra of reconstructed inclusive and non-prompt Ξ_c^0