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 \rightarrow obtain Λ_b^0 cross section at 13 TeV
- Scale with $\frac{BR(b \to \Xi_b)BR(\Xi_b \to e\Xi vX)}{BR(b \to \Lambda_b)BR(\Lambda_b \to J/\psi\Lambda)} = \frac{3.9 \times 10^{-4}}{5.8 \times 10^{-5}}$ \Rightarrow obtain Ξ_b cross section decaying to $e\Xi vX$
- Scale with efficiency, y, dp_T , luminosity \rightarrow 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

Correction for over-subtraction

20		MODES
	Mode	Fraction (Γ_i/Γ)
Г1	$J/\psi \equiv^- \times B(b \to \equiv^b)$	$(1.02\substack{+0.26\\-0.21}) imes 10^{-5}$
Γ2	$J/\psi \Lambda K^- \times B(b \rightarrow \Xi_b^-)$	$(2.5 \pm 0.4) \times 10^{-6}$
Гз	$pK^{-}K^{-} \times B(b \rightarrow \Xi_{b}^{-})$	(3.7 ± 0.8) $\times 10^{-8}$
Γ4	pK ⁻ K ⁻	seen
Γ ₅	$p\pi^{-}\pi^{-}$	
Г ₆	p K ⁻ π ⁻	seen
Γ ₇	$\Lambda_b^0 \pi^- \times B(b \to \Xi_b^-)/B(b \to \Lambda_b^0)$	(5.7 ± 2.0) $ imes 10^{-4}$
Γ_	=0 _m -	coon

E DECAY MODES

• Λ_b^0 cross section vs. p_T at 7 TeV from CMS (B	BR correction is not applied)
--	-------------------------------

- Fit with Tasllis function ٠
- Scale with the ratio of *B* between 13 TeV and 7 TeV from FONLL ٠ \rightarrow obtain Λ_h^0 cross section at 13 TeV
- Scale with $\frac{BR(b \to \Xi_b)BR(\Xi_b \to e\Xi vX)}{BR(b \to \Lambda_b)BR(\Lambda_b \to J/\psi\Lambda)} = \frac{3.9 \times 10^{-4}}{5.8 \times 10^{-5}}$ • \rightarrow obtain Ξ_b cross section decaying to $e \Xi v X$
- Scale with efficiency, y, dp_T , luminosity ٠ \rightarrow obtain the number of reconstructed $e\Xi$ pairs from Ξ_b for sampled MB events 2021 PDG
- Refold to $e \Xi p_T$ with 2D response matrix ٠

Λ^0_k Decay Modes

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

For inclusive branching fractions, e.g., $A_b \to \overline{A}_c$ 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	$J/\psi(1S) A imes$ B($b o A_b^0$)	$(5.8\pm0.8) imes10$	$)^{-5}$	1740

20	19 PDG =, DECAY	MODES	
	Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence leve
Г1	$\Xi^- \ell^- \overline{\nu}_\ell X \times B(\overline{b} \to \overline{\Xi}_b)$	(3.9 ± 1.2) $ imes$ 10	.0 ⁻⁴ S=1.4
Г2	$J/\psi \overline{\Xi}^- imes B(b o \ \overline{\Xi}_b^-)$	$(1.02 \substack{+0.26 \\ -0.21}) imes 10$.0 ⁻⁵
Γ ₃	$J/\psi \Lambda K^- imes B(b \to \Xi_b^-)$	(2.5 \pm 0.4) $ imes$ 10	0-6
Г4	$p D^0 K^- \times B(\overline{b} \rightarrow \overline{\Xi}_b)$	(1.8 ± 0.6) $ imes$ 10	0-6
Г ₅	$p\overline{K}{}^{0}\pi^{-} imes B(\overline{b} ightarrow \overline{\Xi}_{b})/B(\overline{b} ightarrow B^{0})$	< 1.6 × 10	0 ⁻⁶ CL=90%

	Mode	Fraction (Γ_i/Γ)	Confidence level
Г1	$p D^0 K^- \times B(b \rightarrow \Xi^0_b)$	$(1.7 \pm 0.6) imes 1$	0-6
Γ2	$p\overline{K}{}^{0}\pi^{-} \times B(b \rightarrow \overline{\Xi}{}^{0}_{b})/B(\overline{b} \rightarrow \overline{\Xi}{}^{0}_{b})$	< 1.6 × 1	0 ⁻⁶ 90%
-	B^0)		6
13	$pK^{\circ}K \times B(b \rightarrow =_{b}^{\circ})/B(b \rightarrow =_{b}^{\circ})$	< 1.1 × 1	.0-0 90%
Гл	$\Lambda \pi^+ \pi^- \times B(b \rightarrow \Xi_t^0)/B(b \rightarrow$	< 1.7 × 1	0-6 90%
4	Λ_b^0)		
Г ₅	$\Lambda K^{-} \pi^{+} imes B(b ightarrow \Xi^{0}_{b}) / B(b ightarrow$	< 8 × 1	0 ⁻⁷ 90%
_	Λ_b^0		7
Г ₆	$\Lambda K^+ K^- \times B(b \rightarrow \Xi_b^0) / B(b \rightarrow \Phi^0)$	< 3 × 1	.0-7 90%
г	Λ_{b}^{o})		
	$J/\psi \Lambda$ $I/y_2 = 0$	seen	
Γ ₉	$\Lambda_{+}^{\phi}K^{-} \times B(b \rightarrow \Xi_{b}^{0})$	$(6 \pm 4) \times 1$	0-7
Γ ₁₀	$p \overset{b}{K} \pi^+ \pi^- \times B(b \rightarrow \overline{\Xi}^0_b) / B(b \rightarrow $	(1.9 \pm 0.4) \times 1	0-6
	Λ_b^0)		
Γ_{11}	$pK^{-}K^{-}\pi^{+} \times B(b \rightarrow \Xi^{0}_{b})/B(b \rightarrow$	$(1.73\pm0.32) imes 1$	0-6
_	Λ_b^0		
Γ ₁₂	$pK^-K^+K^- \times B(b \rightarrow -0)$	(1.8 ± 1.0) $ imes 1$	0-1
	$= \tilde{b} / B(b \rightarrow \Lambda_b^{\circ})$		2

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 \rightarrow obtain Λ_b^0 cross section at 13 TeV
- Scale with $\frac{BR(b \to \Xi_b)BR(\Xi_b \to e\Xi vX)}{BR(b \to \Lambda_b)BR(\Lambda_b \to J/\psi\Lambda)} = \frac{3.9 \times 10^{-4}}{5.8 \times 10^{-5}}$ \Rightarrow obtain Ξ_b cross section decaying to $e\Xi vX$
- Scale with efficiency, y, dp_T , luminosity \rightarrow 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 $\frac{\# of \ events \ in \ 0-0.1\% \ from \ HMV0 \ trigger}{\# of \ events \ in \ 0-0.1\% \ from \ MB \ trigger}$



Prompt fraction

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 -> XicO + X BRs in PYTHIA8: → B0 -> Xic0 + X = 0.00267 (ignore) \rightarrow B+ \rightarrow XicO + 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) • BR $(\Xi_{\rm b}^{-} \to \Xi_{\rm c}^{0})/{\rm BR}(\Lambda_{\rm b} \to \Lambda_{\rm c}^{+}) = 50.5 \% / 82.0 \% = 0.616$

<particle< p=""></particle<>	id="5132" r	name="Xi_b-" antiNar	<pre>ne="Xi_bbar+" spinType="2"</pre>	chargeType="-3" colType="0"
	m0="5.79110	0" tau0="3.64000e-01	1">	
<channel< th=""><th>onMode="1"</th><th>bRatio="0.1080010"</th><th><pre>meMode="22" products="-12</pre></th><th>11 4 3101"/></th></channel<>	onMode="1"	bRatio="0.1080010"	<pre>meMode="22" products="-12</pre>	11 4 3101"/>
<channel< th=""><th>onMode="1"</th><th>bRatio="0.0020000"</th><th><pre>meMode="22" products="-12</pre></th><th>11 2 3101"/></th></channel<>	onMode="1"	bRatio="0.0020000"	<pre>meMode="22" products="-12</pre>	11 2 3101"/>
<channel< th=""><th>onMode="1"</th><th>bRatio="0.1080000"</th><th>meMode="22" products="-14</th><th>13 4 3101"/></th></channel<>	onMode="1"	bRatio="0.1080000"	meMode="22" products="-14	13 4 3101"/>
<channel< th=""><th>onMode="1"</th><th>bRatio="0.0020000"</th><th>meMode="22" products="-14</th><th>13 2 3101"/></th></channel<>	onMode="1"	bRatio="0.0020000"	meMode="22" products="-14	13 2 3101"/>
<channel< th=""><th>onMode="1"</th><th>bRatio="0.0250000"</th><th>meMode="22" products="-16</th><th>15 4 3101"/></th></channel<>	onMode="1"	bRatio="0.0250000"	meMode="22" products="-16	15 4 3101"/>
<channel< th=""><th>onMode="1"</th><th>bRatio="0.0010000"</th><th>meMode="22" products="-16</th><th>15 4 3101"/></th></channel<>	onMode="1"	bRatio="0.0010000"	meMode="22" products="-16	15 4 3101"/>
<channel< th=""><th>onMode="1"</th><th>bRatio="0.0010000"</th><th>products="443 3312"/></th><th></th></channel<>	onMode="1"	bRatio="0.0010000"	products="443 3312"/>	
<channel< th=""><th>onMode="1"</th><th>bRatio="0.0004370"</th><th>products="100443 3312"/></th><th></th></channel<>	onMode="1"	bRatio="0.0004370"	products="100443 3312"/>	
<channel< th=""><th>onMode="1"</th><th>bRatio="0.0004710"</th><th>products="20443 3312"/></th><th></th></channel<>	onMode="1"	bRatio="0.0004710"	products="20443 3312"/>	
<channel< th=""><th>onMode="1"</th><th>bRatio="0.0000900"</th><th>products="445 3312"/></th><th></th></channel<>	onMode="1"	bRatio="0.0000900"	products="445 3312"/>	
<channel< th=""><th>onMode="1"</th><th>bRatio="0.0004900"</th><th>products="441 3312"/></th><th></th></channel<>	onMode="1"	bRatio="0.0004900"	products="441 3312"/>	
<channel< th=""><th>onMode="1"</th><th>bRatio="0.0015000"</th><th>products="443 3314"/></th><th></th></channel<>	onMode="1"	bRatio="0.0015000"	products="443 3314"/>	
<channel< th=""><th>onMode="1"</th><th>bRatio="0.0006560"</th><th>products="100443 3314"/></th><th></th></channel<>	onMode="1"	bRatio="0.0006560"	products="100443 3314"/>	
<channel< th=""><th>onMode="1"</th><th>bRatio="0.0007060"</th><th>products="20443 3314"/></th><th></th></channel<>	onMode="1"	bRatio="0.0007060"	products="20443 3314"/>	
<channel< th=""><th>onMode="1"</th><th>bRatio="0.0001350"</th><th>products="445 3314"/></th><th></th></channel<>	onMode="1"	bRatio="0.0001350"	products="445 3314"/>	
<channel< th=""><th>onMode="1"</th><th>bRatio="0.0007350"</th><th>products="441 3314"/></th><th></th></channel<>	onMode="1"	bRatio="0.0007350"	products="441 3314"/>	
<channel< th=""><th>onMode="1"</th><th>bRatio="0.0012000"</th><th>products="443 -321 3122"/></th><th>></th></channel<>	onMode="1"	bRatio="0.0012000"	products="443 -321 3122"/>	>
<channel< th=""><th>onMode="1"</th><th>bRatio="0.0005240"</th><th>products="100443 -321 3122</th><th>2"/></th></channel<>	onMode="1"	bRatio="0.0005240"	products="100443 -321 3122	2"/>
<channel< th=""><th>onMode="1"</th><th>bRatio="0.0005650"</th><th>products="20443 -321 3122"</th><th>'/></th></channel<>	onMode="1"	bRatio="0.0005650"	products="20443 -321 3122"	'/>
<channel< th=""><th>onMode="1"</th><th>bRatio="0.0001080"</th><th>products="445 -321 3122"/></th><th>></th></channel<>	onMode="1"	bRatio="0.0001080"	products="445 -321 3122"/>	>
<channel< th=""><th>onMode="1"</th><th>bRatio="0.0005880"</th><th>products="441 -321 3122"/></th><th>></th></channel<>	onMode="1"	bRatio="0.0005880"	products="441 -321 3122"/>	>
<channel< th=""><th>onMode="1"</th><th>bRatio="0.0006000"</th><th>products="443 -311 3112"/></th><th>></th></channel<>	onMode="1"	bRatio="0.0006000"	products="443 -311 3112"/>	>
<channel< th=""><th>onMode="1"</th><th>bRatio="0.0002620"</th><th>products="100443 -311 3112</th><th>2"/></th></channel<>	onMode="1"	bRatio="0.0002620"	products="100443 -311 3112	2"/>
<channel< th=""><th>onMode="1"</th><th>bRatio="0.0002830"</th><th>products="20443 -311 3112"</th><th>'/></th></channel<>	onMode="1"	bRatio="0.0002830"	products="20443 -311 3112"	'/>
<channel< th=""><th>onMode="1"</th><th>bRatio="0.0000540"</th><th>products="445 -311 3112"/></th><th>></th></channel<>	onMode="1"	bRatio="0.0000540"	products="445 -311 3112"/>	>
<channel< th=""><th>onMode="1"</th><th>bRatio="0.0002940"</th><th>products="441 -311 3112"/></th><th>></th></channel<>	onMode="1"	bRatio="0.0002940"	products="441 -311 3112"/>	>
<channel< th=""><th>onMode="1"</th><th>bRatio="0.0038200"</th><th>meMode="43" products="443</th><th>3 3101"/></th></channel<>	onMode="1"	bRatio="0.0038200"	meMode="43" products="443	3 3101"/>
<channel< th=""><th>onMode="1"</th><th>bRatio="0.0016690"</th><th>meMode="43" products="1004</th><th>443 3 3101"/></th></channel<>	onMode="1"	bRatio="0.0016690"	meMode="43" products="1004	443 3 3101"/>
<channel< th=""><th>onMode="1"</th><th>bRatio="0.0017990"</th><th>meMode="43" products="2044</th><th>43 3 3101"/></th></channel<>	onMode="1"	bRatio="0.0017990"	meMode="43" products="2044	43 3 3101"/>
<channel< th=""><th>onMode="1"</th><th>bRatio="0.0003440"</th><th>meMode="43" products="445</th><th>3 3101"/></th></channel<>	onMode="1"	bRatio="0.0003440"	meMode="43" products="445	3 3101"/>
<channel< th=""><th>onMode="1"</th><th>bRatio="0.0018720"</th><th>meMode="43" products="441</th><th>3 3101"/></th></channel<>	onMode="1"	bRatio="0.0018720"	meMode="43" products="441	3 3101"/>
<cnannet< th=""><th>onmode="1"</th><th>DRat10="0.1096//0"</th><th>memode="22" products="-2</th><th>1 4 3101"/></th></cnannet<>	onmode="1"	DRat10="0.1096//0"	memode="22" products="-2	1 4 3101"/>
<cnannet< th=""><th>onmode="1"</th><th>DRat10="0.2632250"</th><th>memode="22" products="-2 4</th><th>4 1 3101"/></th></cnannet<>	onmode="1"	DRat10="0.2632250"	memode="22" products="-2 4	4 1 3101"/>
<channel< th=""><th>onMode="1"</th><th>DRat10="0.0658060"</th><th>meMode="42" products="-2</th><th>1 4 3101"/></th></channel<>	onMode="1"	DRat10="0.0658060"	meMode="42" products="-2	1 4 3101"/>
<cnannet< th=""><th>onMode="1"</th><th>DRat10="0.0000000"</th><th>memode="42" products="-2 4</th><th>4 1 3101"/></th></cnannet<>	onMode="1"	DRat10="0.0000000"	memode="42" products="-2 4	4 1 3101"/>
<channel< th=""><th>onmode="1"</th><th>DRat10="0.005//20"</th><th>memode="22" products="-2 .</th><th>3 4 3101"/></th></channel<>	onmode="1"	DRat10="0.005//20"	memode="22" products="-2 .	3 4 3101"/>
<channel< th=""><th>onMode="1"</th><th>DRat10="0.0138540"</th><th>memode="22" products="-2"</th><th>4 3 3101"/></th></channel<>	onMode="1"	DRat10="0.0138540"	memode="22" products="-2"	4 3 3101"/>
<channet< th=""><th>onMode="1"</th><th>DRat10="0.0034630"</th><th>memode="42" products="-2 .</th><th>5 4 5101"/></th></channet<>	onMode="1"	DRat10="0.0034630"	memode="42" products="-2 .	5 4 5101"/>
<channet< th=""><th>onMode="1"</th><th>bRat10= 0.0000000</th><th>memode= 42 products= -2 4</th><th>+ 3 3101"/></th></channet<>	onMode="1"	bRat10= 0.0000000	memode= 42 products= -2 4	+ 3 3101"/>
< channel	onMode= 1	bRatio= 0.0090000	memode= 22 products= -2.	
< channel	onMode= 1	bRatio="0.0000000"	meMode="22 products="2"	2 I JIUI />
< channet	onMode= 1	bRatio= 0.0230000	meMode= 03 products= -43.	
<channet< th=""><th>onMode= 1</th><th>bRatio= 0.0230000</th><th>memode= 03 products= -43.</th><th>5 4 5101 /></th></channet<>	onMode= 1	bRatio= 0.0230000	memode= 03 products= -43.	5 4 5101 />
< channel	onMode= 1	bRatio="0.0130000"	products= -431 4132 />	
< channel	onMode= 1	bRatio="0.0090000"	products= -431 4314 />	
schannel	onMode= 1	bRatio="0.0090000"	products= -433 4132 />	
channel	onMode="1"	bRatio="0.0230000	meMode="22" products="-42"	1 -321 / 3101"/>
schannel	onMode="1"	bRatio="0.0000000"	meMode="22" products= -42.	1 _311 / 3101 /3
channel	onMode="1"	bRatio="0.0000000	meMode="22" products= -41.	3 _321 4 3101 /2
channel	onMode="1"	bRatio="0.0320000"	meMode="22" products= -42.	3 _311 / 3101"/>
schannel	onMode="1"	bRatio="0.0320000"	meMode="42" products= -41	2 -2202 2101"/2
<th>onnoue- 1</th> <th>DIGCTO- 0.0770000</th> <th>menoue= 42 produces= 412.</th> <th>2203 3101 /2</th>	onnoue- 1	DIGCTO- 0.0770000	menoue= 42 produces= 412.	2203 3101 /2
~/ par cicco				

Prompt fraction

- 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 $p_T \to \Lambda_b^0 p_T$) \Rightarrow obtain non-prompt Λ_c^+ cross section vs. p_T
- Cross section of $\Lambda_c^+ \to pK\pi$ from B

• Scale with $BR(\Lambda_c^+ \rightarrow pK\pi)$ (Q. scale factor is 1e-6/(0.068*20), what '20' is for ? =) bin width) \rightarrow 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 $\frac{non-prompt \Xi_c^0}{non-prompt \Lambda_c^+}$?) \Rightarrow 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 \rightarrow reco level) \rightarrow obtain the spectra of reconstructed inclusive and non-prompt Ξ_c^0



