

It's important to take notes

M.-H, Vitalii, Yasmine

April 19, 2016

1 General and random considerations

What do we know about the $\Lambda_b \rightarrow pKl^+l^-$ beasts ?

- $\Lambda_b \rightarrow J/\psi(\rightarrow \mu^+\mu^+)pK$ observed. Used to measure the lifetime of Λ_b this mode is also used for pentaquark studies.
- $\Lambda_b \rightarrow \psi(2S)(\rightarrow \mu^+\mu^+)pK$ observed, check B&Q paper.
- $\Lambda_b \rightarrow \mu^+\mu^-pK$ never observed (work ongoing P.Griffith and co).
- $\Lambda_b \rightarrow J/\psi/\psi(2S)(\rightarrow e^+e^-)pK$ never observed.
- $\Lambda_b \rightarrow e^+e^-pK$ never observed.
- $\Lambda_b \rightarrow \gamma(\rightarrow e^+e^-)pK$ never observed.
- q^2 range goes from $2m_l^2$ to $16.96 \text{ GeV}/c^2$

What do we want to do :

- Measure the lepton universality in $\Lambda_b \rightarrow pKl^+l^-$, let's call it R_{Λ^*}
- Measure Branching ratio of $\Lambda_b \rightarrow pK\gamma$ with conversions.

Back of the envelope Calculation of the expected yields :

What do we know about the pK spectrum?

Questions ?

- For the LeptonU measurement, how many q^2 bins can we afford ?
- What range of pK should we use ?
- If we want to do an angular analysis, how do we define the angles we care about ? Can we adapt whatever comes out from P2VV tuple tool ? What was used in the pentaquark paper ?

Channel	Yields	Reference
$B^0 \rightarrow J/\psi(\rightarrow \mu^+\mu^-)K^*$		
$B^0 \rightarrow J/\psi(\rightarrow e^+e^-)K^*$		
$B^0 \rightarrow K^*\mu^+\mu^-$		
$B^0 \rightarrow K^*e^+e^-$		
$B^0 \rightarrow \gamma(\rightarrow e^+e^-)K^*$		
$\Lambda_b \rightarrow J/\psi(\rightarrow \mu^+\mu^-)pK$	26k/29k	arXiv:1507.03414v2/1603.06961v1
$\Lambda_b \rightarrow \psi(2S)(\rightarrow \mu^+\mu^-)pK$	665	arXiv:1603.06961v1
$\Lambda_b \rightarrow J/\psi(\rightarrow e^+e^-)pK$		
$\Lambda_b pK \rightarrow \mu^+\mu^-$		
$\Lambda_b pK \rightarrow e^+e^-$		
$\Lambda_b \rightarrow \gamma(\rightarrow e^+e^-)pK$		

Table 1: Measured and estimated yields.

2 Samples

Sample	Event Type	Information	Processed
$\Lambda_b \rightarrow \Lambda(1520)e^+e^-$	15124001	Sim08 ?	476 221
$\Lambda_b \rightarrow pK e^+e^-$	15124011	Sim08 ?	497 919
$\Lambda_b \rightarrow J/\psi(e^+e^-)pK$	15154001	Sim08 ?	1 214 792
$\Lambda_b \rightarrow \Lambda(1520)\gamma$	15102201	Sim08 ?	383 997
$B_s \rightarrow \phi\gamma$	13102201	Sim08 ?	3 039 979
$B^0 \rightarrow K^*\gamma$	11102201	Sim08 ?	3 027 980
$B^0 \rightarrow K^*(e^+e^-)$	11124001	Sim08 ?	1 272 496

Table 2: Monte Carlo samples - 2012

3 Stripping selection

For the preliminary studies, data processed with **Stripping 21**, **Reco 14** were used. In **Stripping 21** the Bu2LLK stripping line selects the following final states : K, K^*, ϕ . So we added in **S21r0,1p1** $\Lambda, \Lambda^*(\rightarrow pK), K_S$ etc.

Variables	Importance
-----------	------------

Table 3: Variables used in the BDT.

4 Offline Selection

4.1 BDT Selection

4.2 PID Selection

5 Papers and Useful references

- The pentaquark paper : <http://arxiv.org/abs/1507.03414>

¹incremental stripping of Run I data