

1

## 2      **Strange particle in jets and underlying events with different models**

### 3      **1    Simulate with PYTHIA 8 sQCD with CR1 and rope**

#### 4      **Parameters**

5    Beams:idA = 2212  
6    Beams:idB = 2212  
7    Main:numberOfEvents = 1001  
8    Beams:eCM = 13000.  
9    SoftQCD:all = on

10

#### 11     **CR**

12    MultiPartonInteractions:pT0Ref = 2.15  
13    BeamRemnants:remnantMode = 1  
14    BeamRemnants:saturation = 5  
15    ColourReconnection:reconnect = on  
16    ColourReconnection:mode = 1  
17    ColourReconnection:allowDoubleJunRem = off  
18    ColourReconnection:m0 = 0.3  
19    ColourReconnection:allowJunctions = on  
20    ColourReconnection:junctionCorrection = 1.2  
21    ColourReconnection:timeDilationMode = 2  
22    ColourReconnection:timeDilationPar = 0.18

23

#### 24     **Rope**

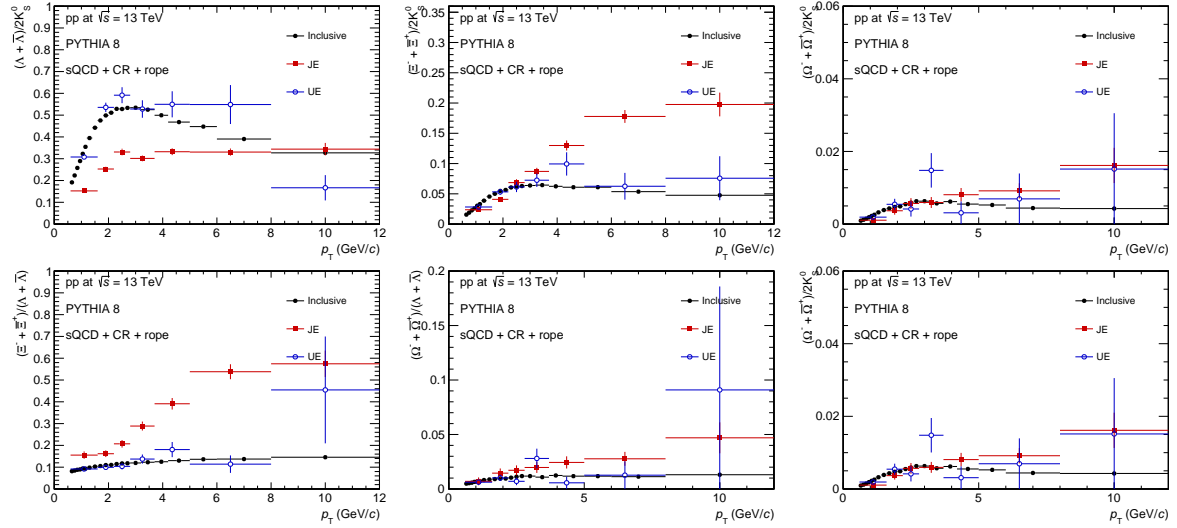
25    Ropewalk:RopeHadronization = on  
26    Ropewalk:doShoving = on  
27    Ropewalk:tInit = 1.5  
28    Ropewalk:deltat = 0.05  
29    Ropewalk:tShove = 0.1  
30    Ropewalk:gAmplitude = 0.

31

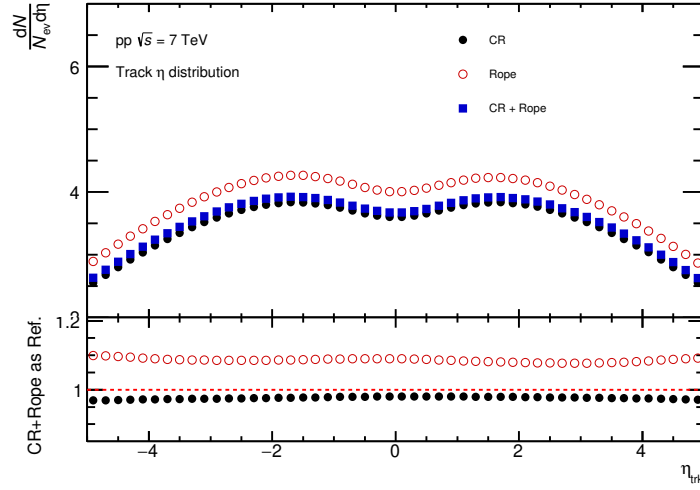
32    Ropewalk:doFlavour = on  
33    Ropewalk:r0 = 0.5  
34    Ropewalk:m0 = 0.2  
35    Ropewalk:beta = 0.1

36

37    ///  
38    PartonVertex:setVertex = on  
39    PartonVertex:protonRadius = 0.7  
40    PartonVertex:emissionWidth = 0.1



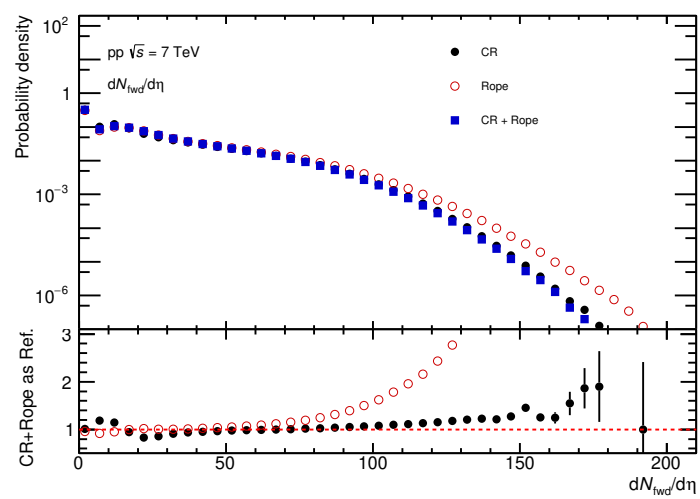
**Figure 1:** Baryon-to-meson(top) and baryon-to-baryon ratio with PYTHIA sQCD + CR1 + rope.



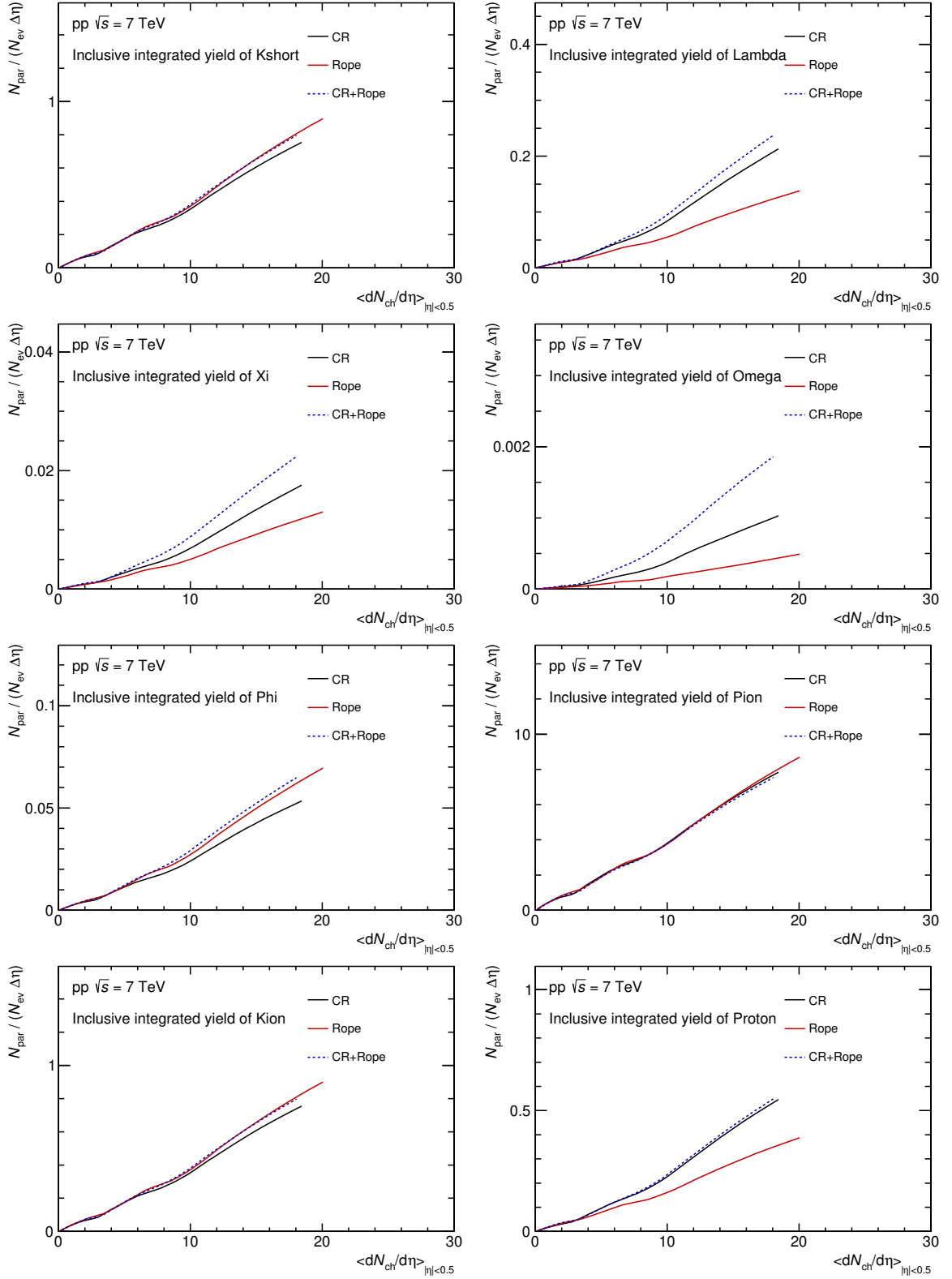
**Figure 2:** Track  $\eta$  distribution.

41 **2 Simulate with PYTHIA 8 sQCD with CR1 and rope**

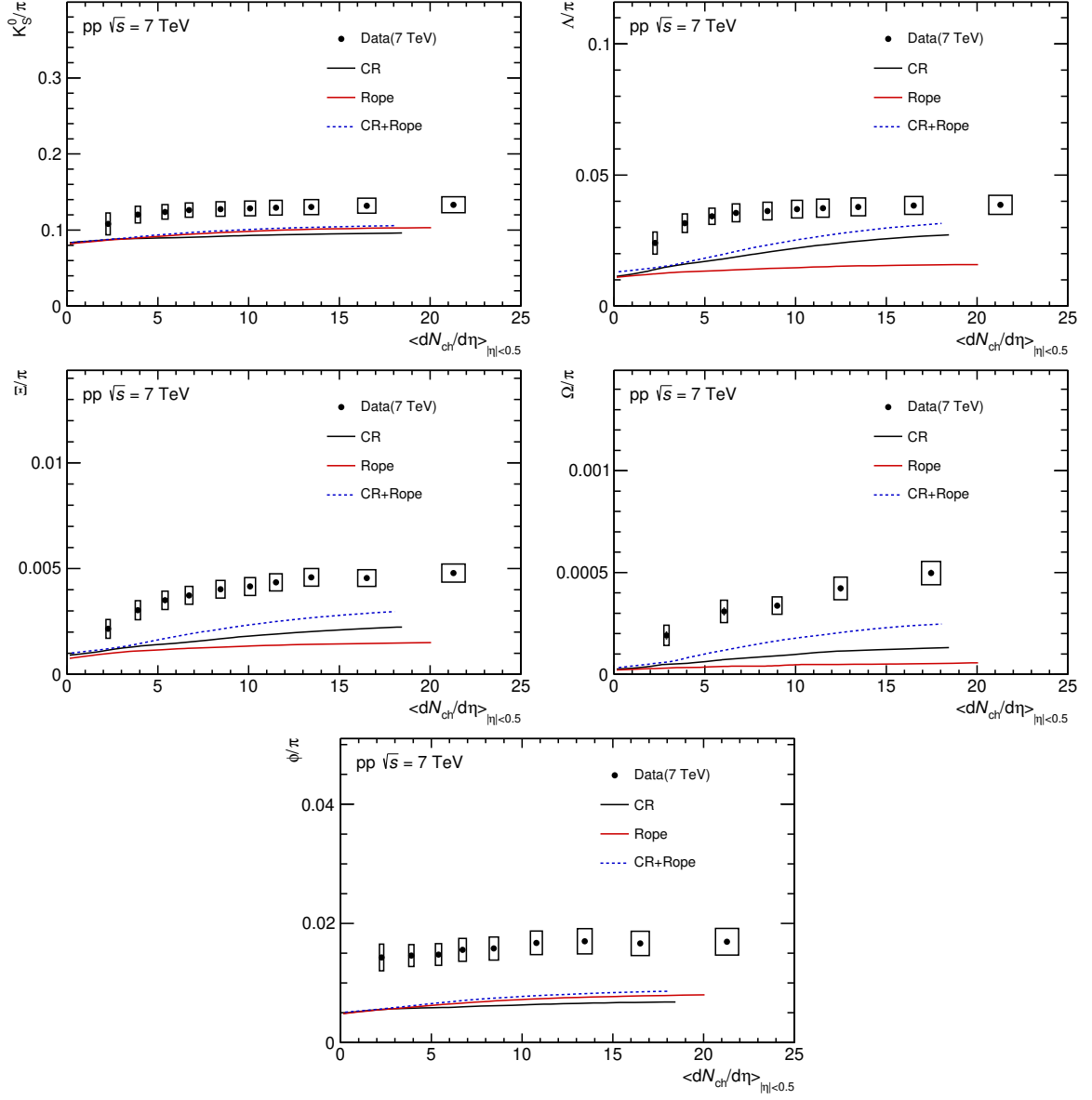
42 **References**



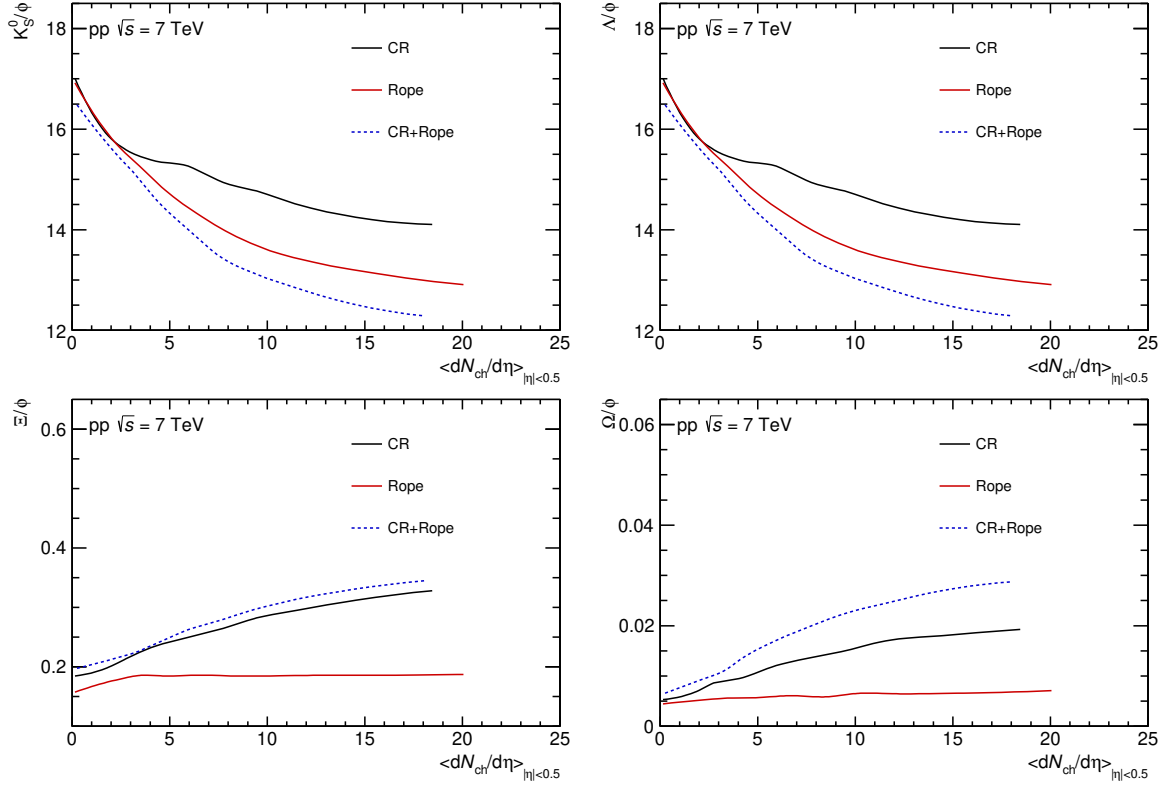
**Figure 3:** Forward track  $dN_{\text{fwd}}/d\eta$  distribution.



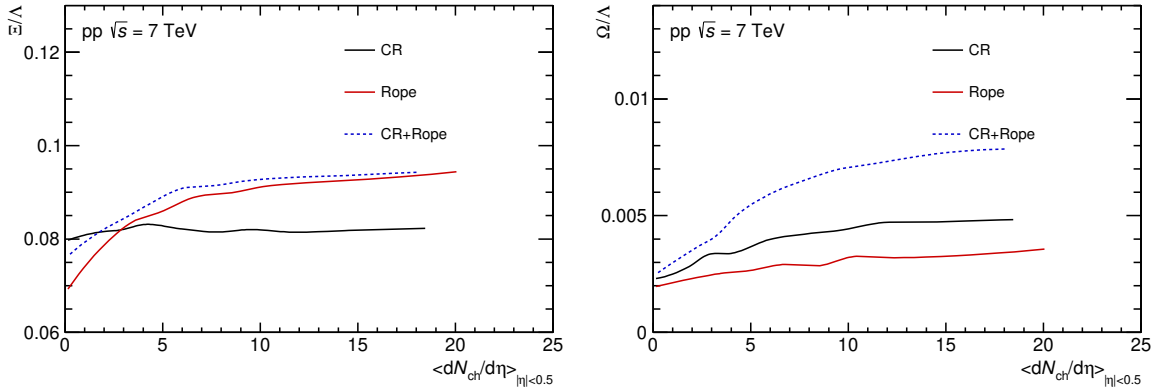
**Figure 4:** Inclusive integrated yields of particles with  $\langle dN_{ch}/d\eta \rangle$ .



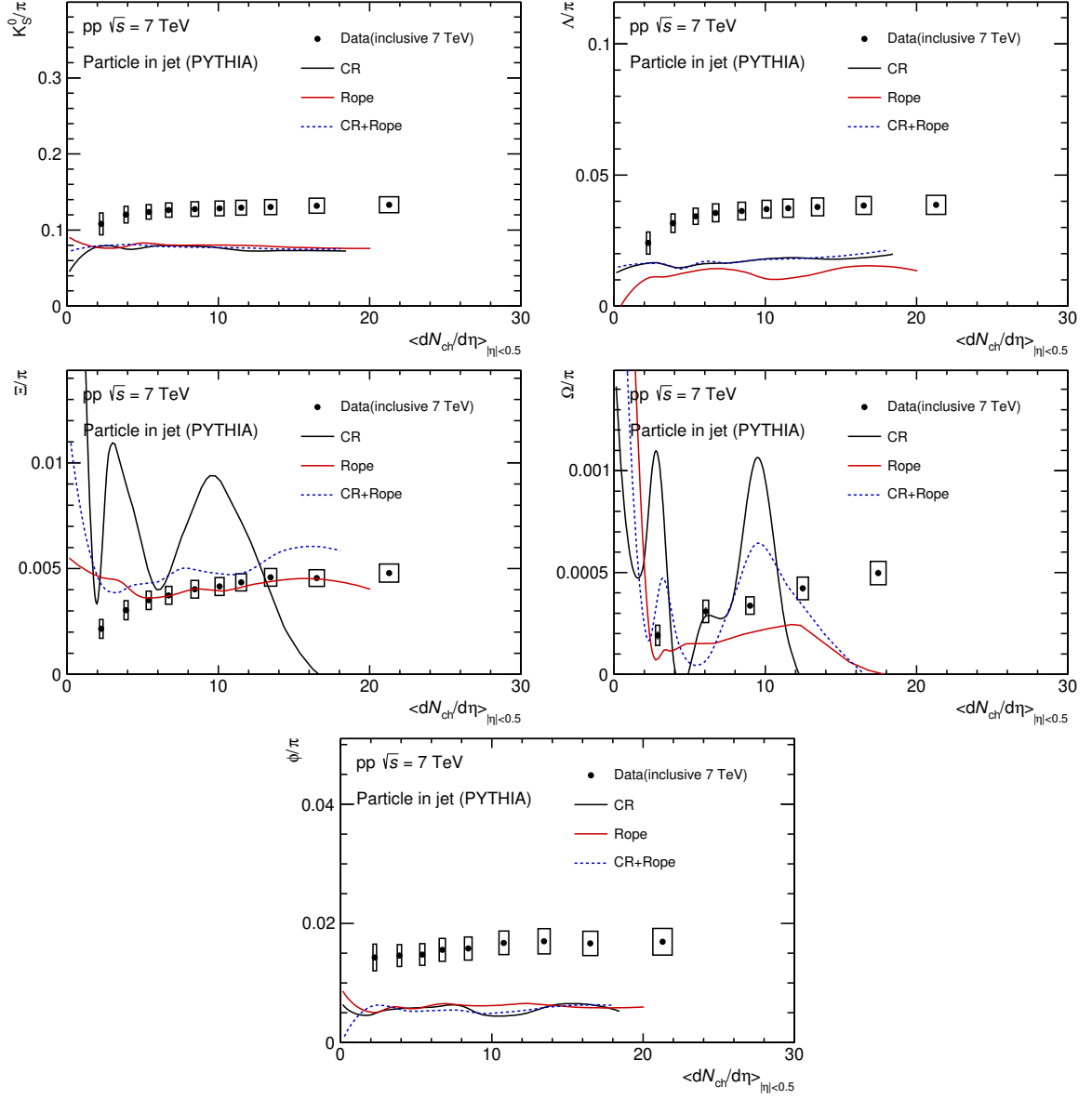
**Figure 5:** Inclusive integrated yields ratios of strange particle to  $\pi$  with  $\langle dN_{ch}/d\eta \rangle$ . (Data taken from arXiv:1606.07424v2 and arXiv:1807.11321v2)



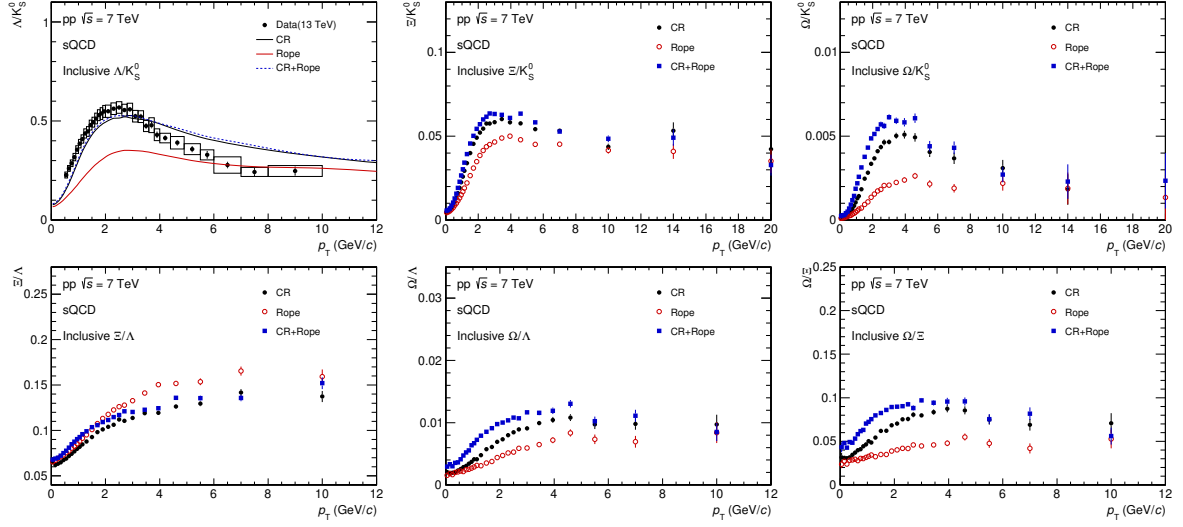
**Figure 6:** Inclusive integrated yields ratios of strange particle to  $\phi$  with  $\langle dN_{ch}/d\eta \rangle$ .



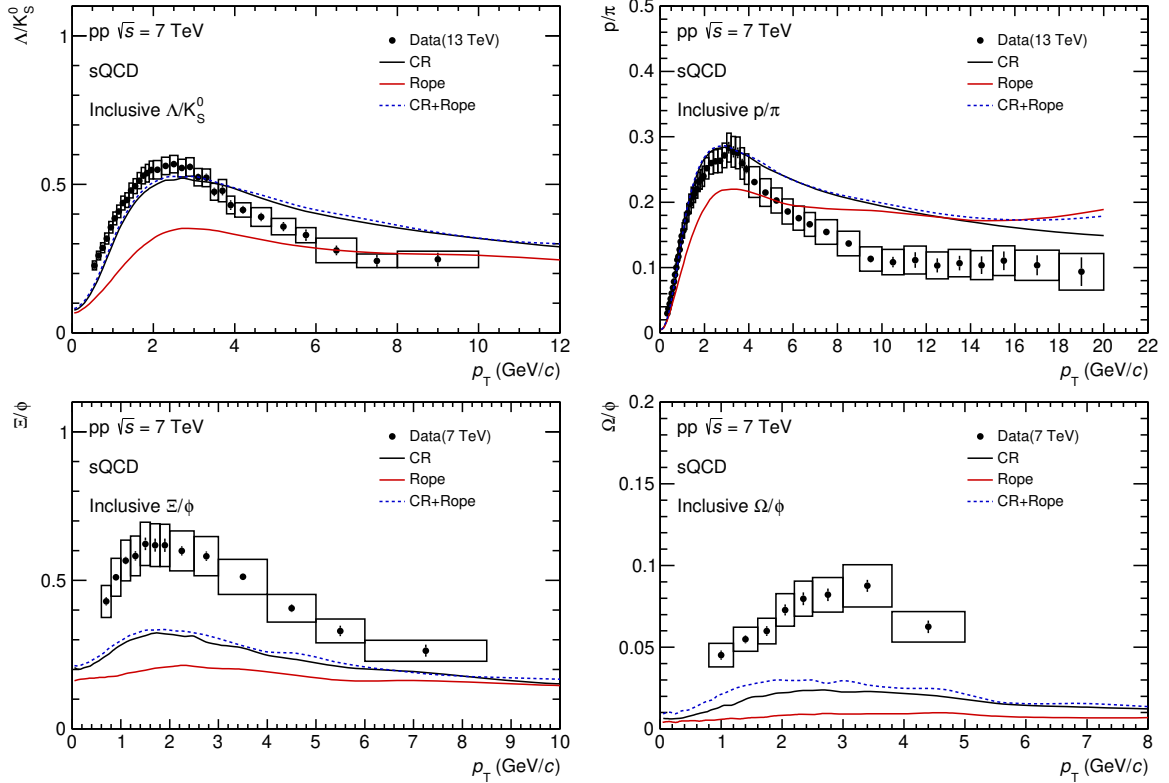
**Figure 7:** Inclusive integrated yields ratios of strange baryon to baryon with  $\langle dN_{ch}/d\eta \rangle$ .



**Figure 8:** Integrated yields ratios in jet of strange particle to  $\pi$  with  $\langle dN_{ch}/d\eta \rangle$ . (Data taken from arXiv:1606.07424v2 and arXiv:1807.11321v2)

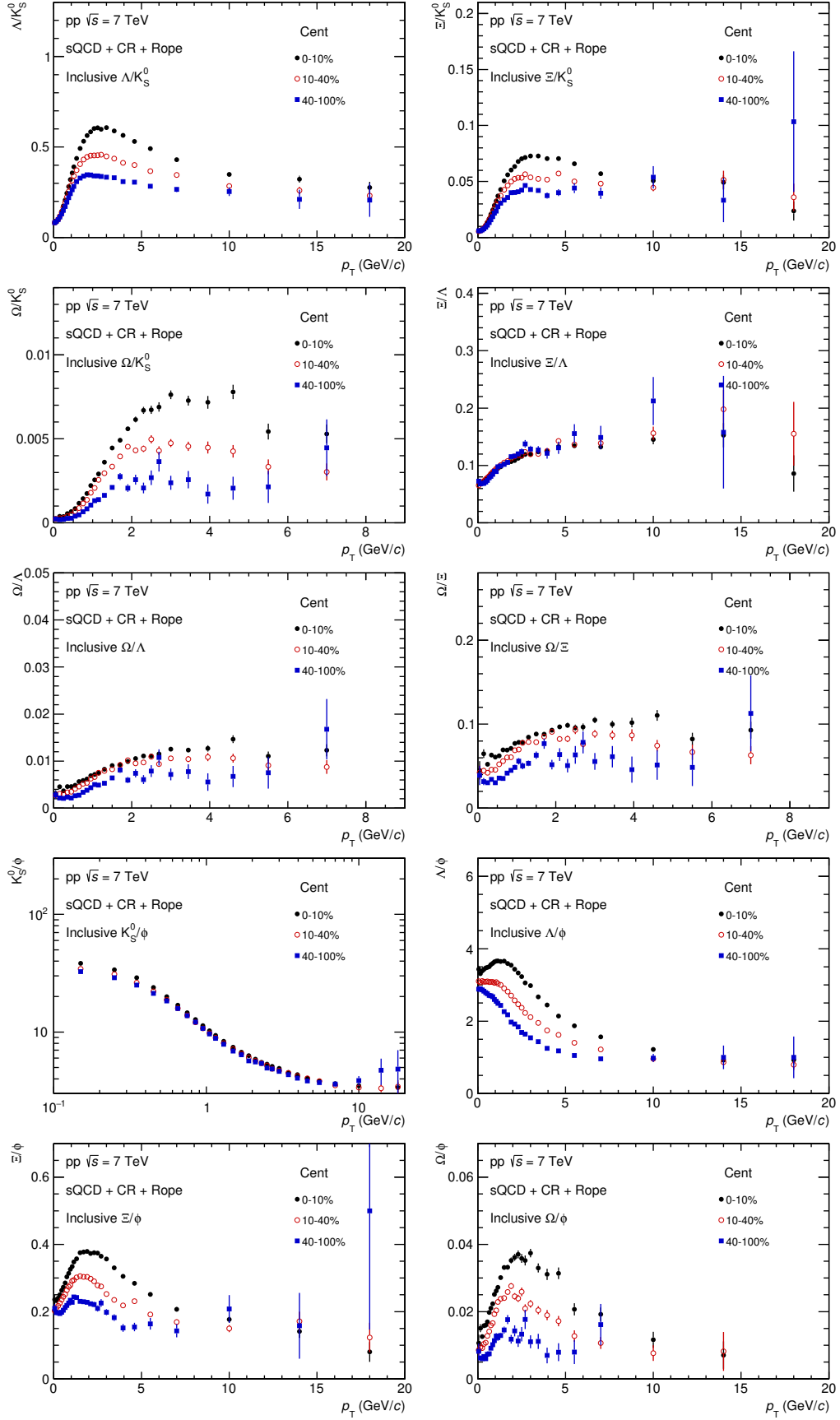


**Figure 9:** Inclusive baryon-to-meson ratio(top) and Baryon-to-meson ratio(bottom) with  $p_T$  distribution. (Only find data point of Lambda/Kshort in 13 TeV from arXiv:2005.11120)

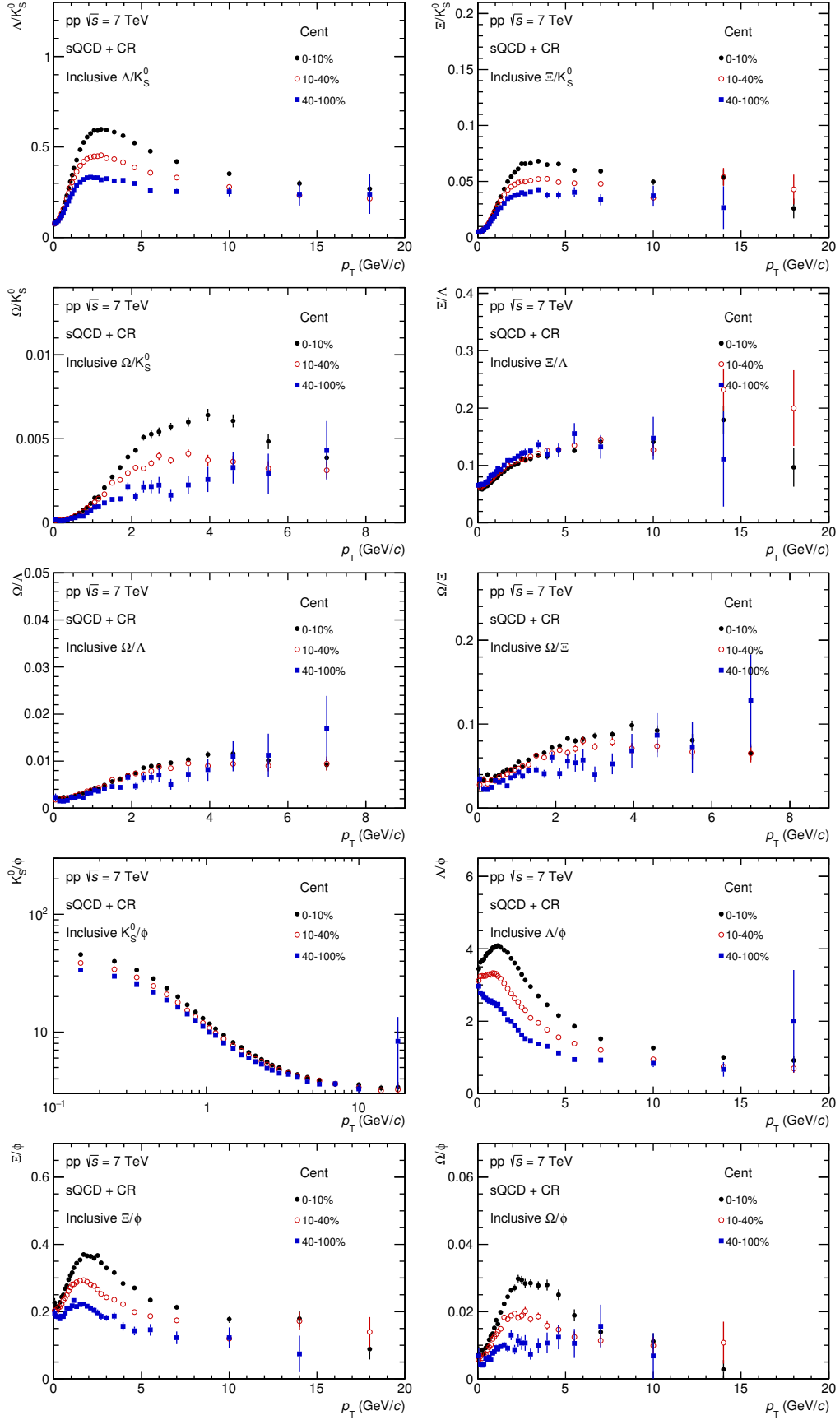


**Figure 10:** Inclusive baryon-to-meson ratio(top) with  $p_T$  distribution.(data points are taken from arXiv:2005.11120)

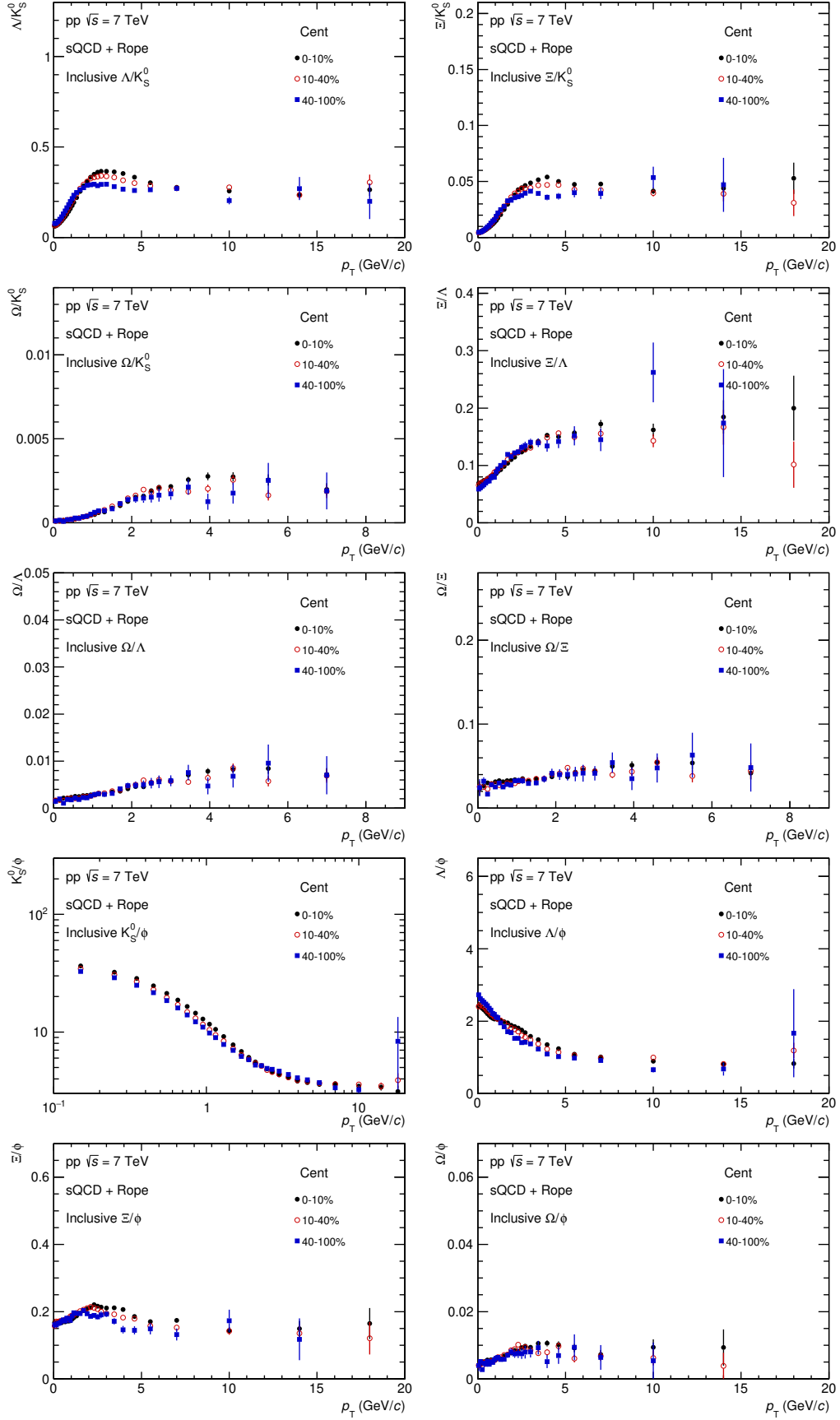




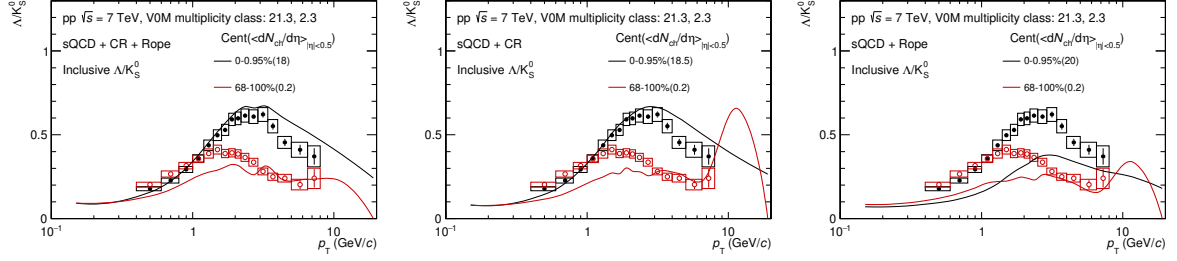
**Figure 11:** Baryon-to-meson ratio(top) and Baryon-to-meson ratio(bottom) with  $p_T$  distribution in different centrality bins (CR + Rope).



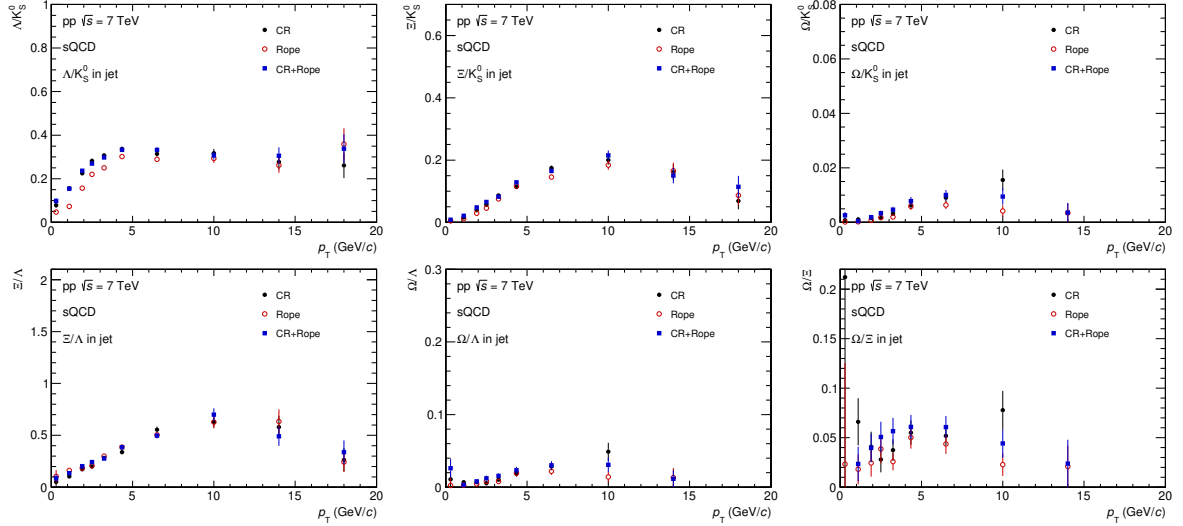
**Figure 12:** Baryon-to-meson ratio(top) and Baryon-to-meson ratio(bottom) with  $p_T$  distribution in different centrality bins (CR).



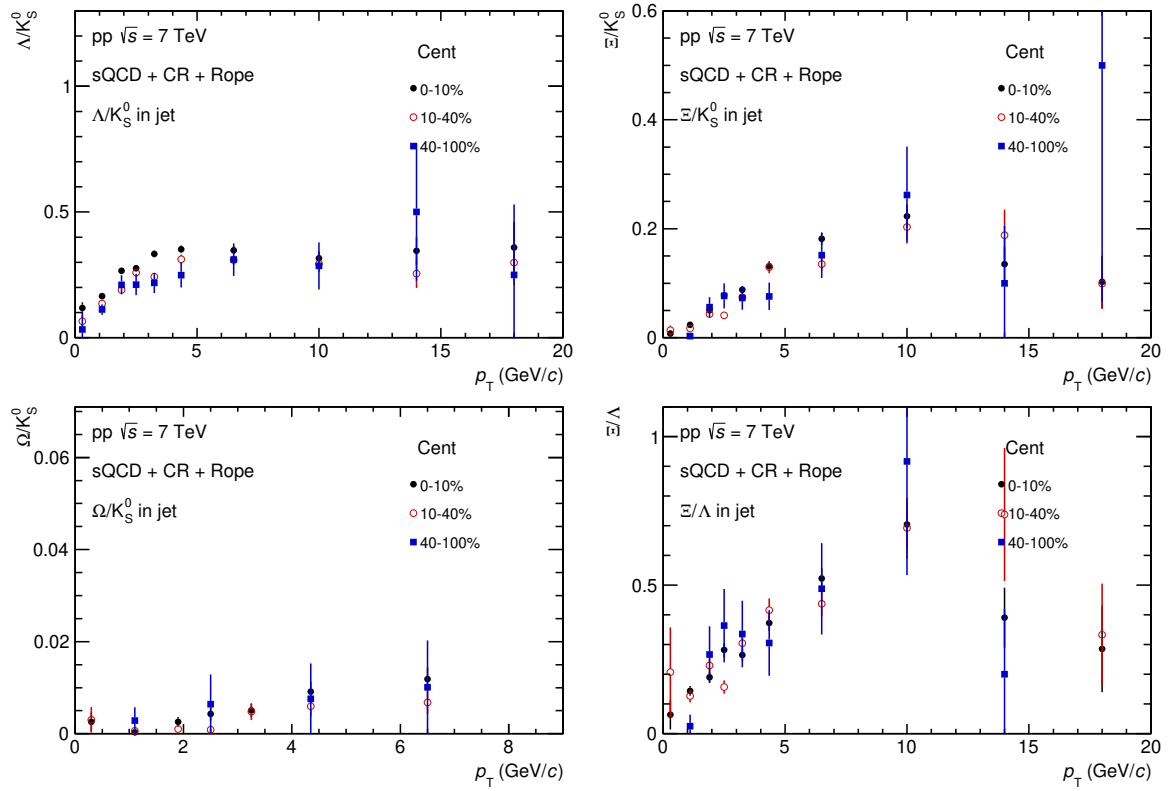
**Figure 13:** Baryon-to-meson ratio(top) and Baryon-to-meson ratio(bottom) with  $p_T$  distribution in different centrality bins (Rope).



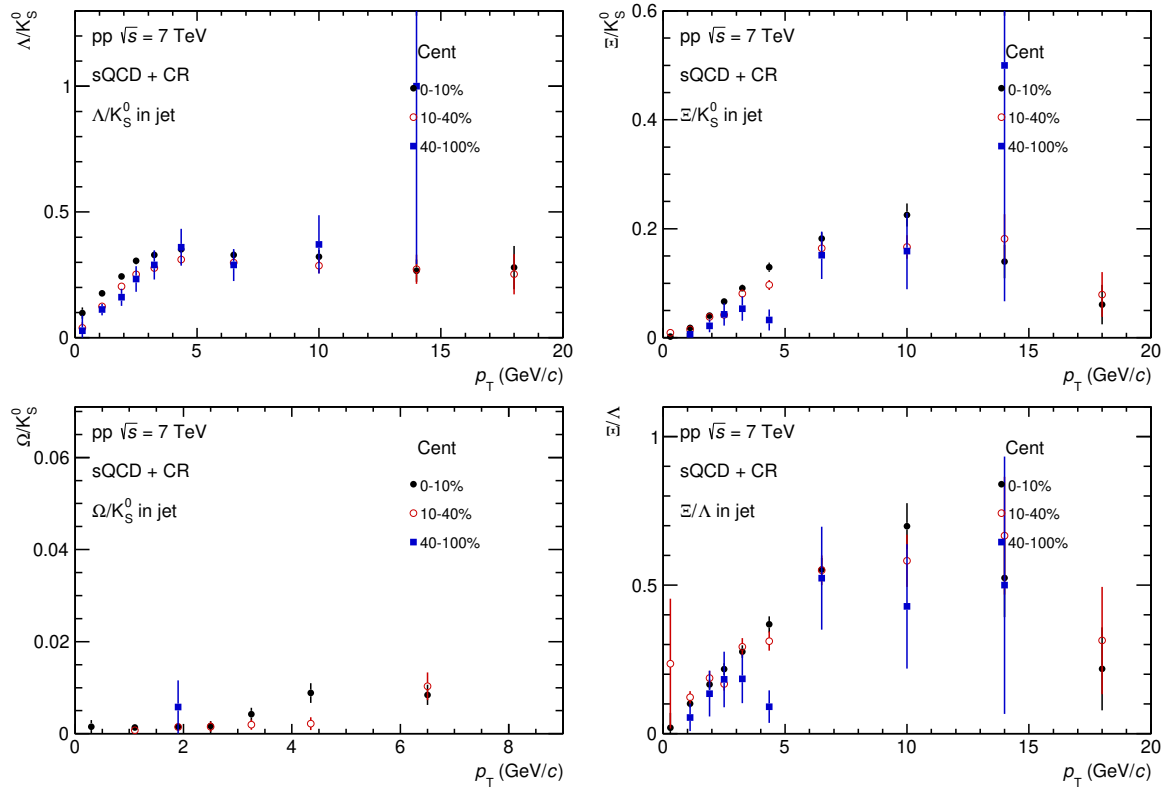
**Figure 14:**  $\Lambda/K_S^0$  ratio with  $p_T$  distribution in large multiplicity bin(black) and small multiplicity bin(red) with different PYTHIA parameters.



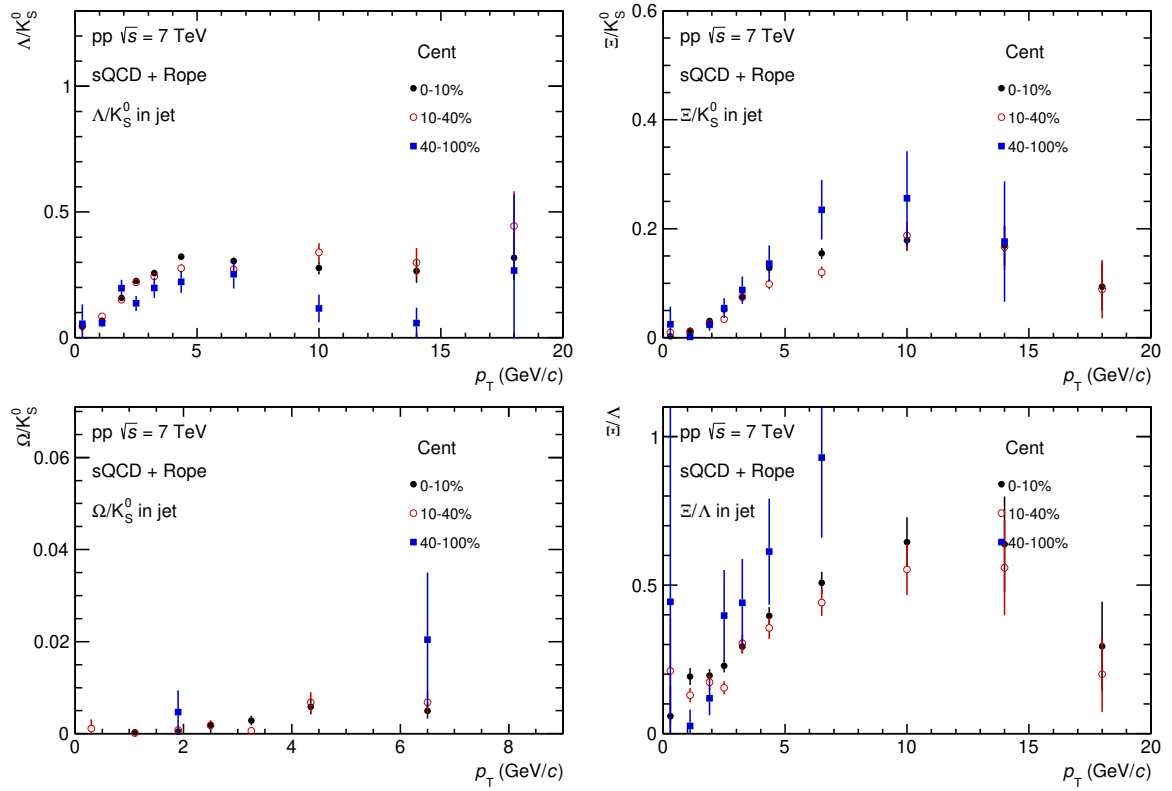
**Figure 15:** Baryon-to-meson ratio(top) and Baryon-to-meson ratio(bottom) in jets with  $p_T$  distribution.



**Figure 16:** Baryon-to-meson ratio(top) and Baryon-to-meson ratio(bottom) in jets with  $p_T$  distribution in different centrality bins (CR + Rope).



**Figure 17:** Baryon-to-meson ratio(top) and Baryon-to-meson ratio(bottom) in jets with  $p_T$  distribution in different centrality bins (CR).



**Figure 18:** Baryon-to-meson ratio(top) and Baryon-to-meson ratio(bottom) in jets with  $p_T$  distribution in different centrality bins (Rope).