

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 = 7000.  
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**

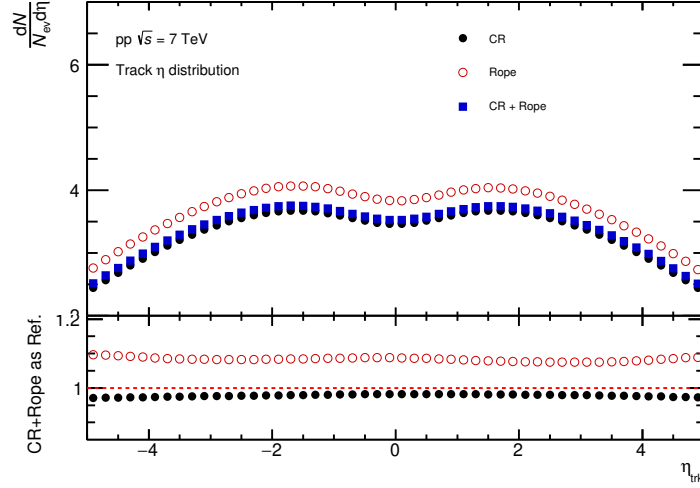
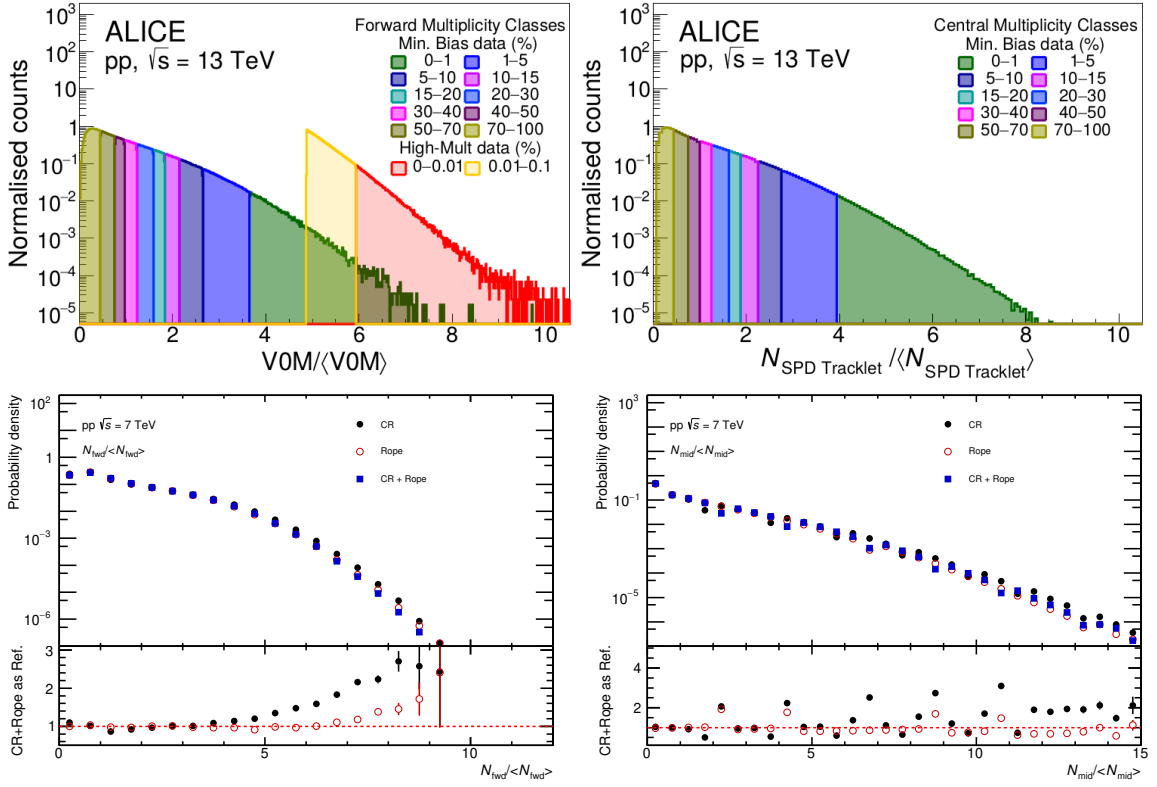
25    Ropewalk:RopeHadronization = on  
26    Ropewalk:doShoving = on  
27    Ropewalk:tInit = 1.5  
28    Ropewalk:deltat = 0.05  
29    Ropewalk:tShove = 0.1  
30    Ropewalk:gAmplitude = 0.

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

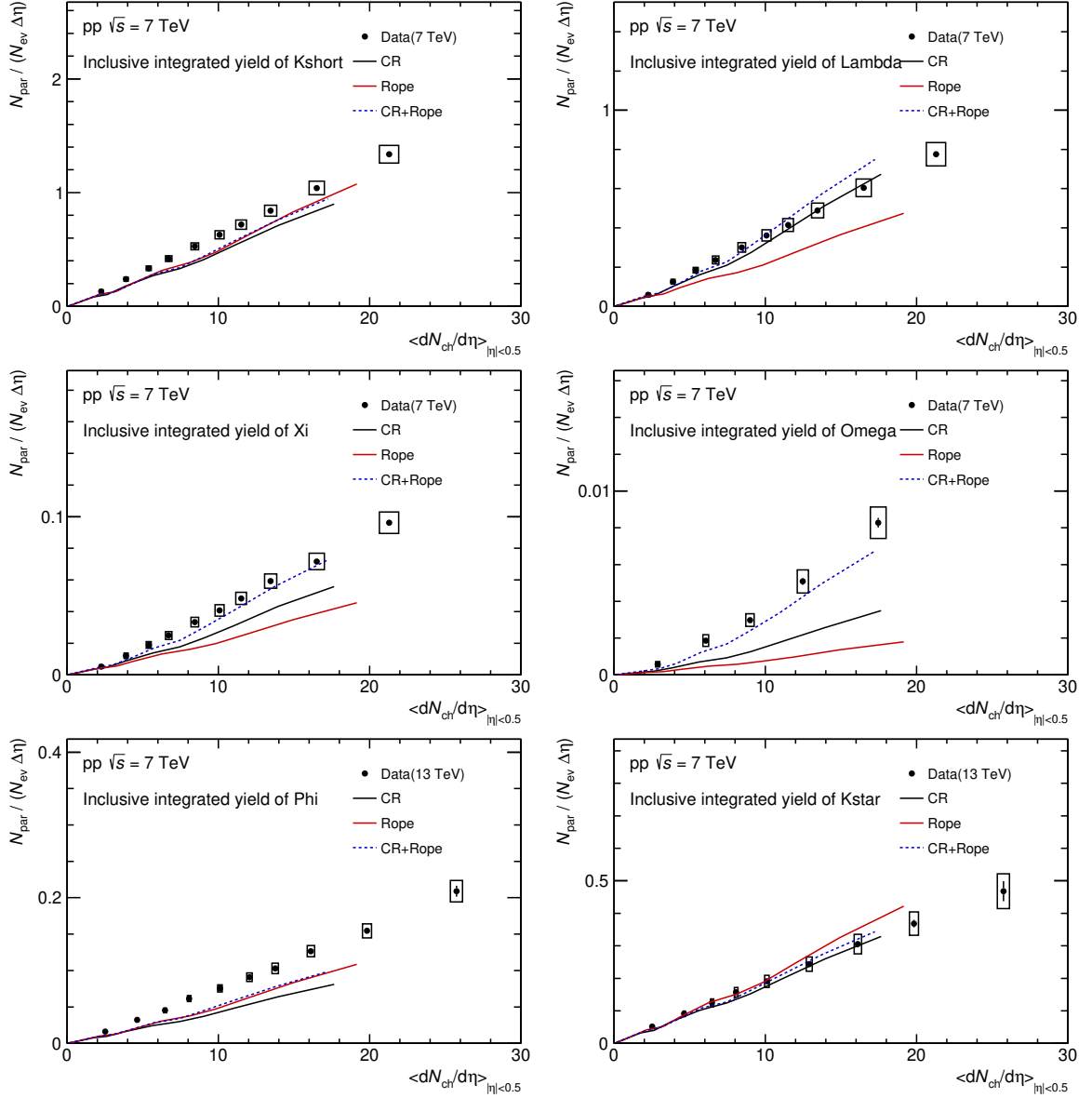
36

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

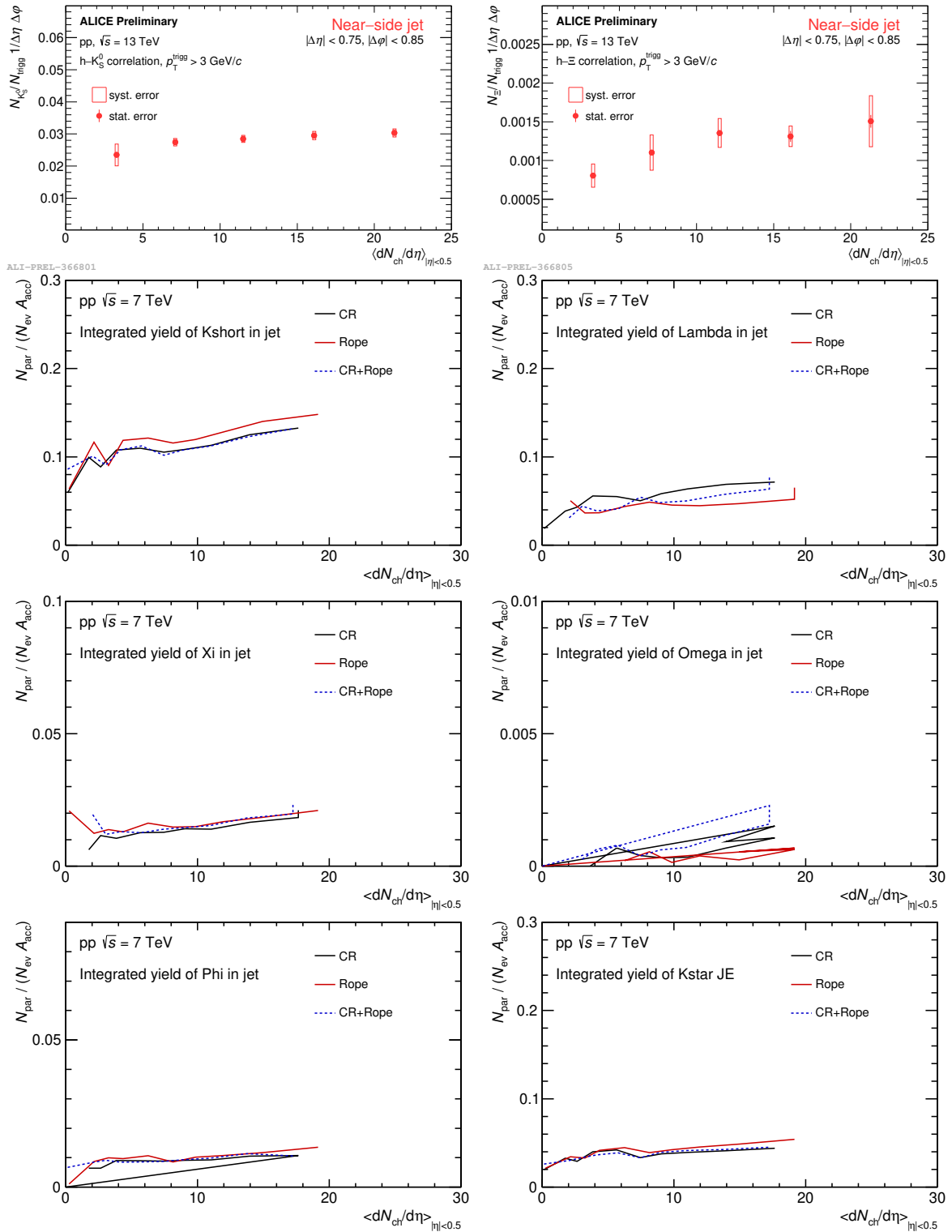

 Figure 1: Track  $\eta$  distribution.

 Figure 2:  $N_{\text{fwd}} / \langle N_{\text{fwd}} \rangle$  (left) and  $N_{\text{mid}} / \langle N_{\text{mid}} \rangle$  (right) distribution. (Data got from arXiv:2009.09434)

## 2 Simulate with PYTHIA 8 sQCD with CR1 and rope

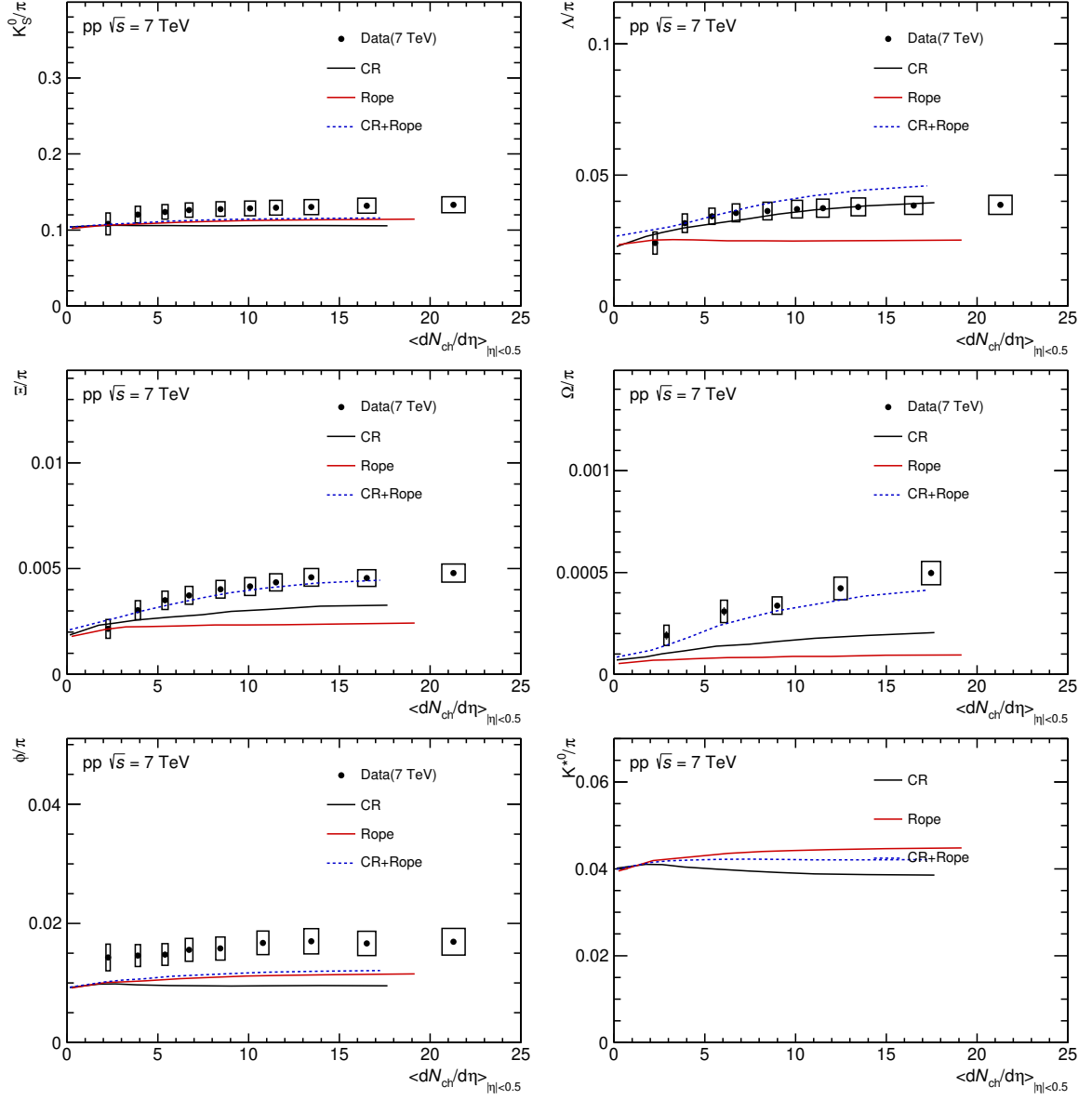
## References



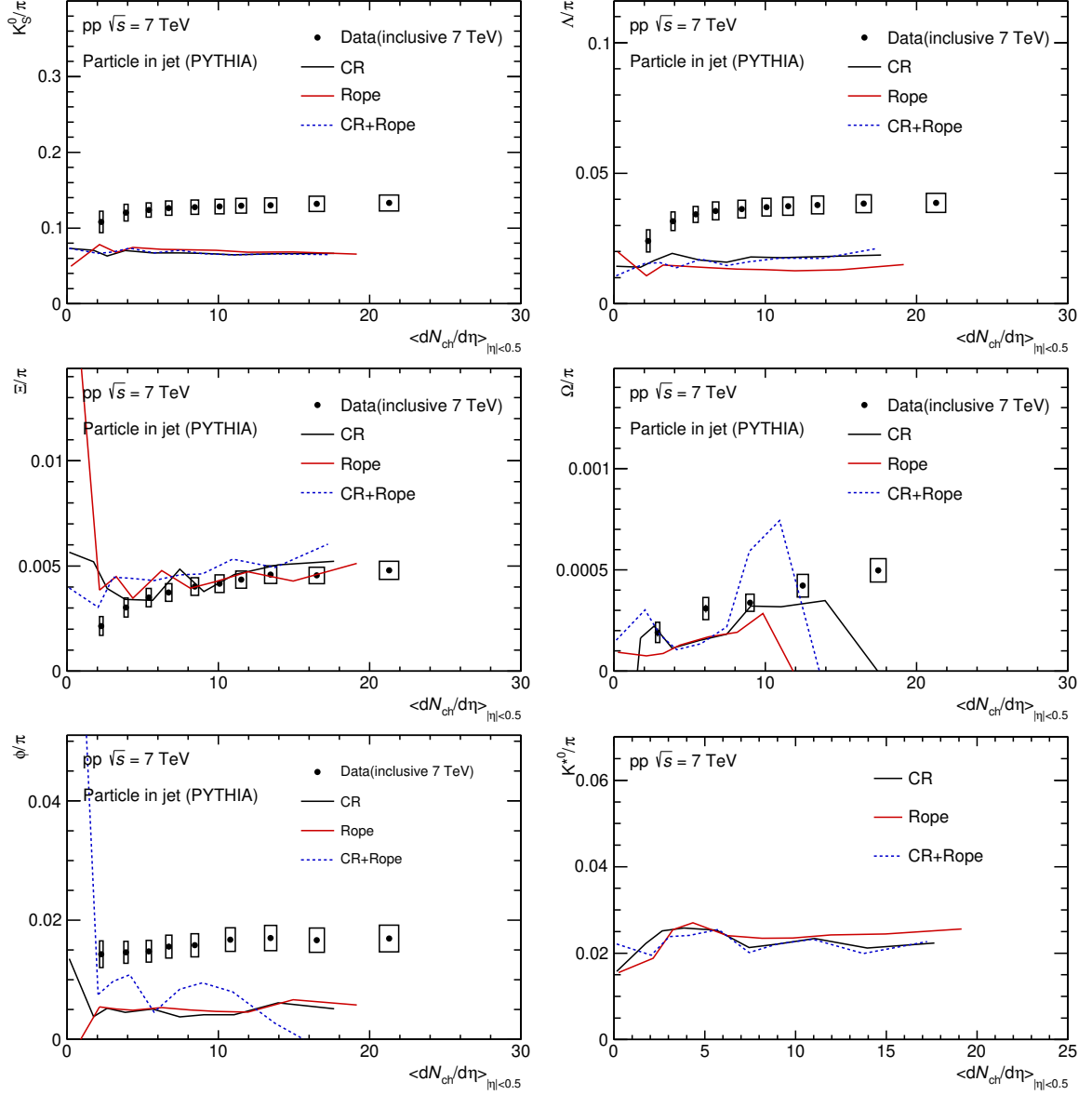
**Figure 3:** Inclusive integrated yields of particles with  $\langle dN_{ch}/d\eta \rangle$ . (Data taken from arXiv:1606.07424v2 and arXiv:1910.14397v1)



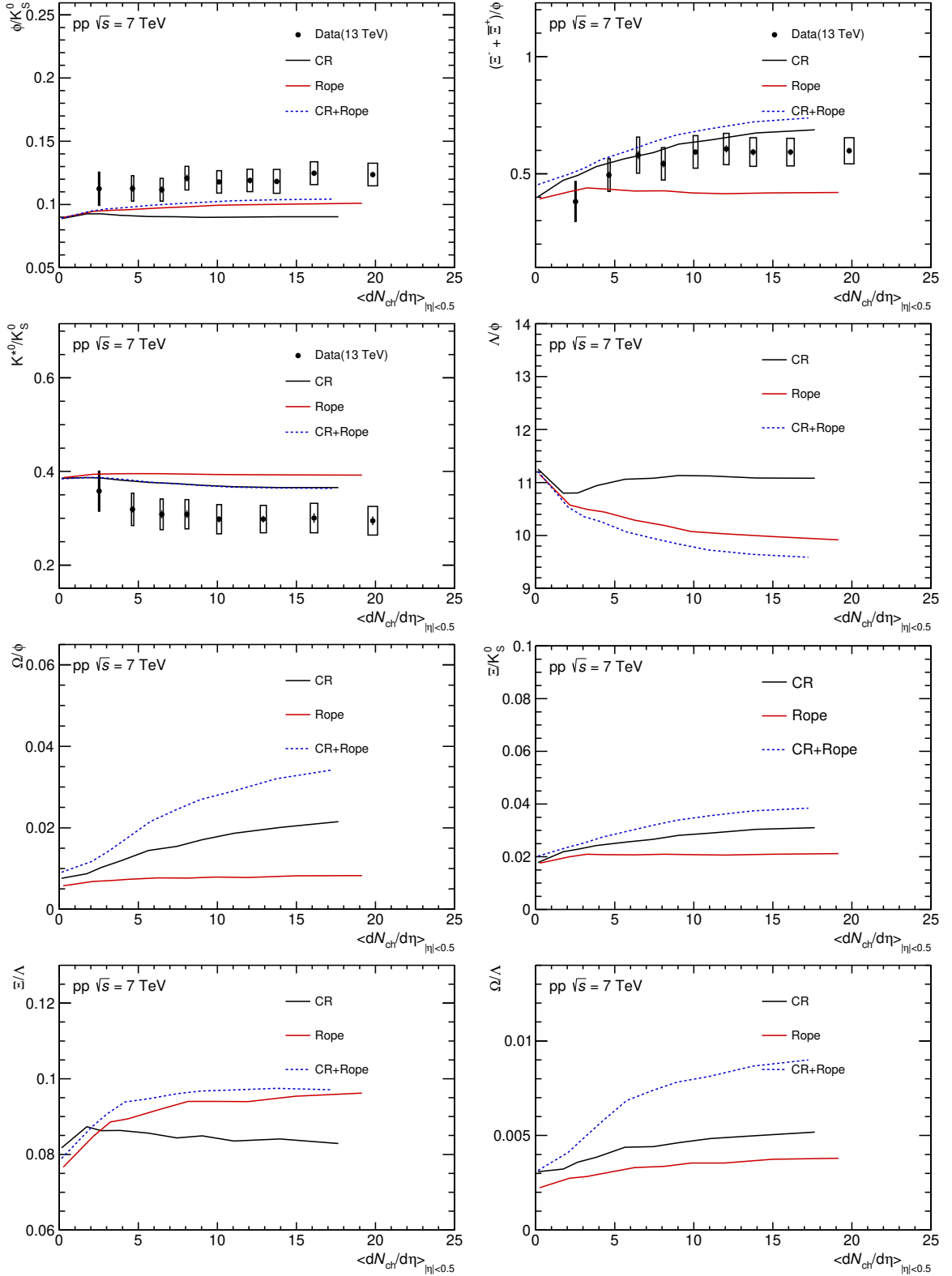
**Figure 4:** Integrated yields of particles in jet with  $\langle dN_{ch}/d\eta \rangle$ . (Data point at 13 TeV is used hadron-strange correlation method)



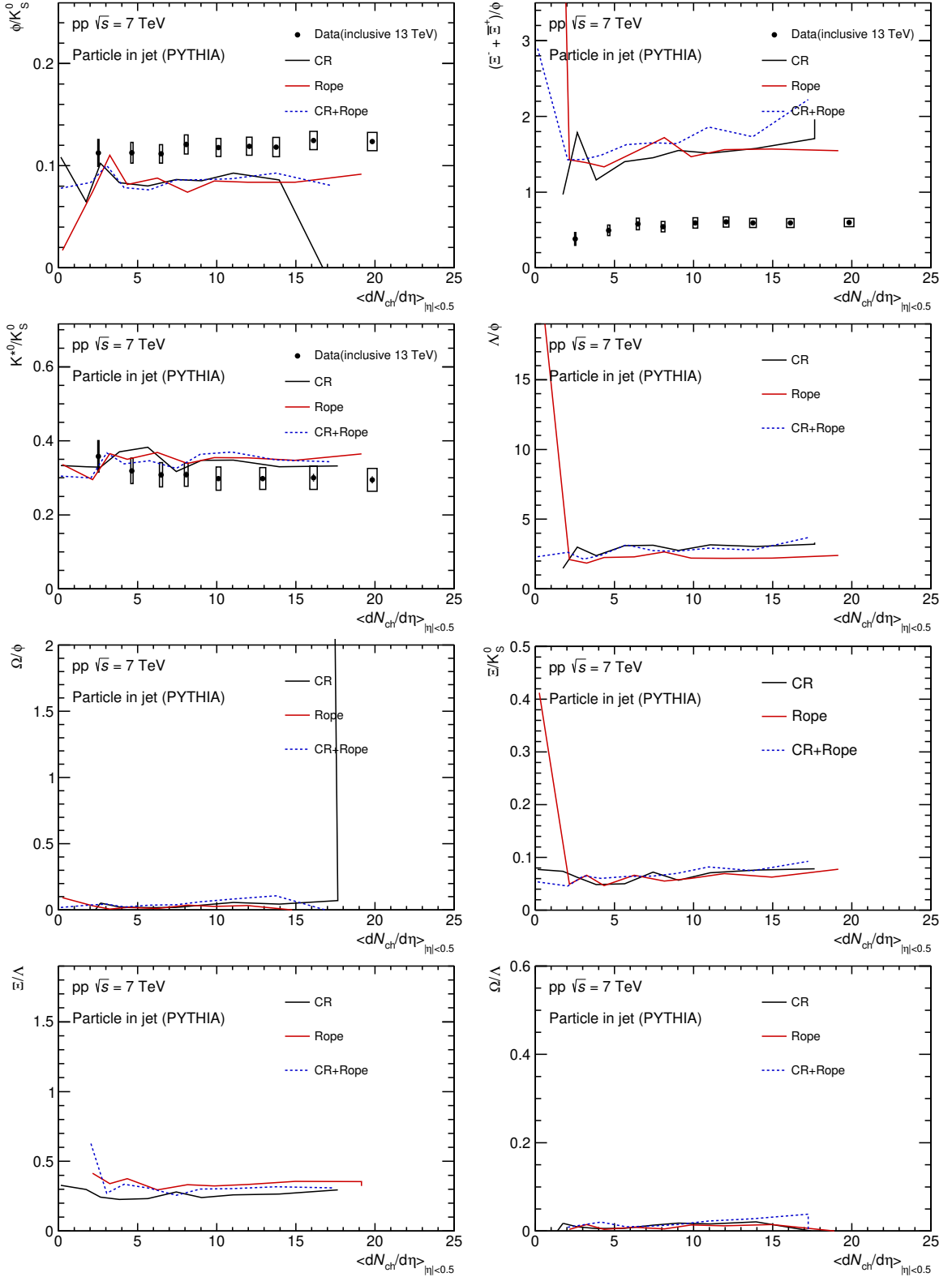
**Figure 5:** Inclusive integrated yields ratios of strange particle to  $\pi$  with  $\langle dN_{ch}/d\eta \rangle$ . (Data taken from arXiv:1606.07424v2 and arXiv:1807.11321v2)



**Figure 6:** Integrated yields ratios in jet of strange particle to  $\pi$  with  $\langle dN_{\text{ch}}/d\eta \rangle$ . (Data taken from arXiv:1606.07424v2 and arXiv:1807.11321v2)

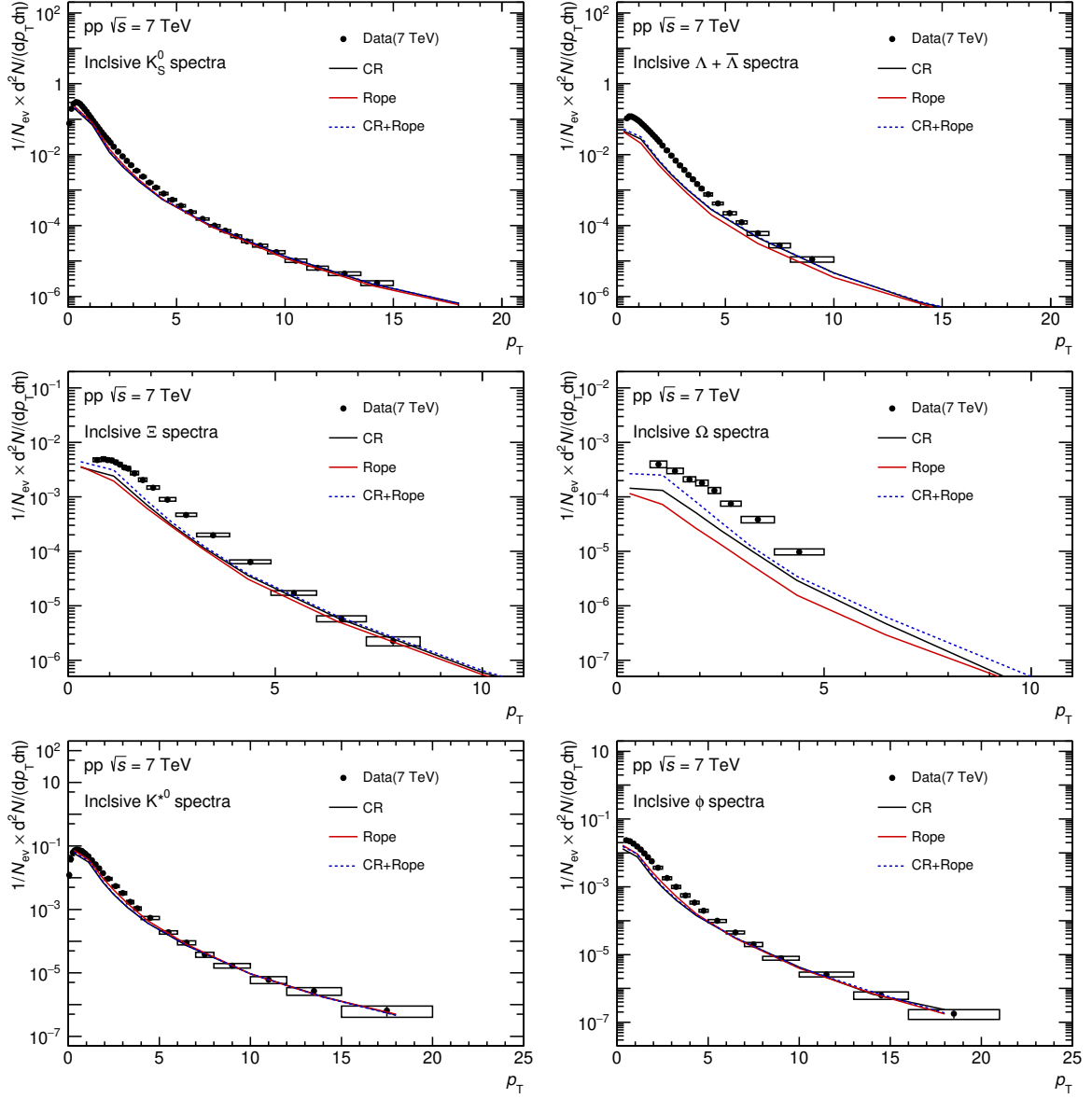


**Figure 7:** Inclusive integrated yields ratios with  $\langle dN_{ch}/d\eta \rangle$ . (Data taken from arXiv:1910.14397v1)

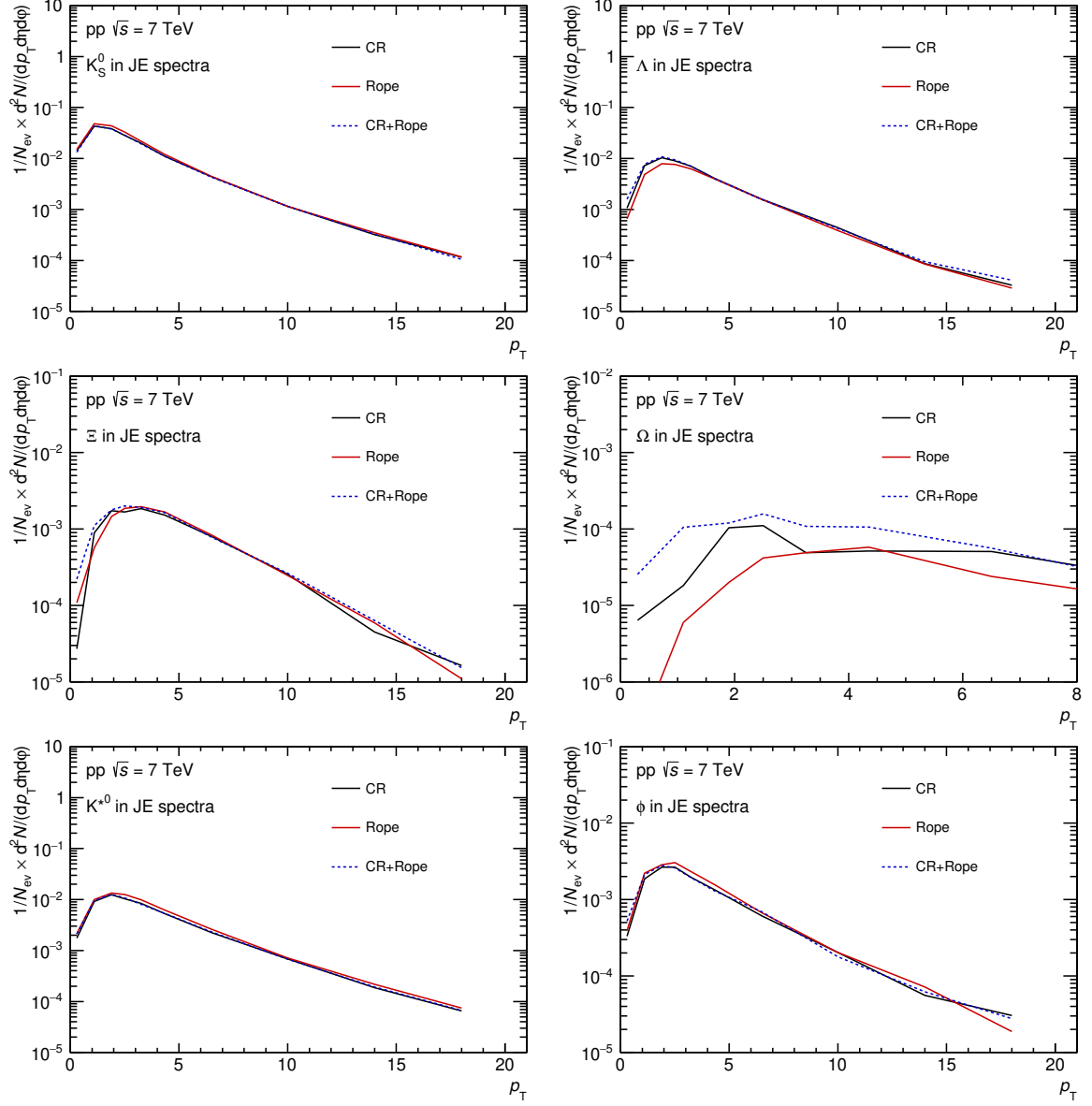


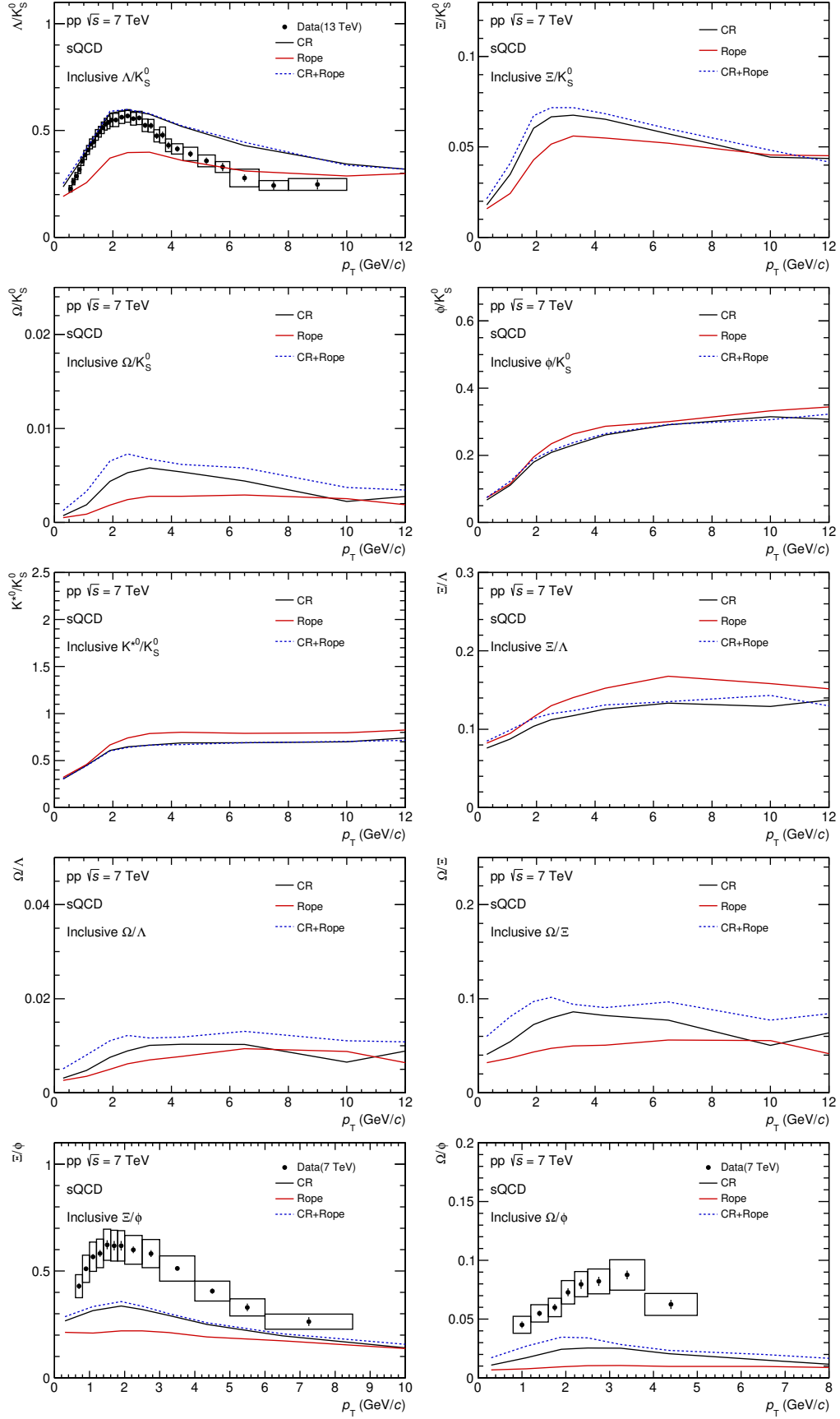
**Figure 8:** JC integrated yields ratios with  $\langle dN_{ch}/d\eta \rangle$ . (Data taken from arXiv:1910.14397v1)



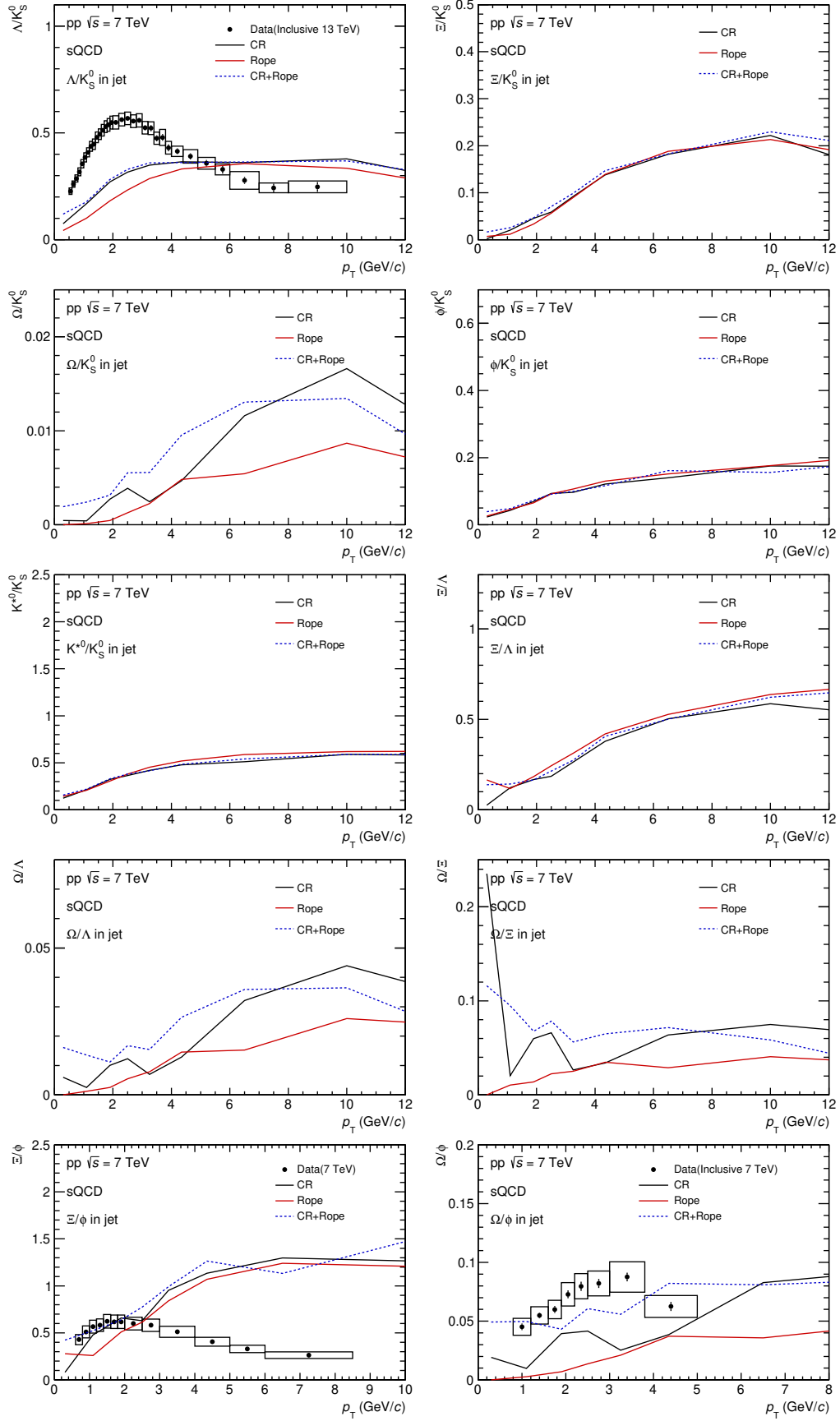


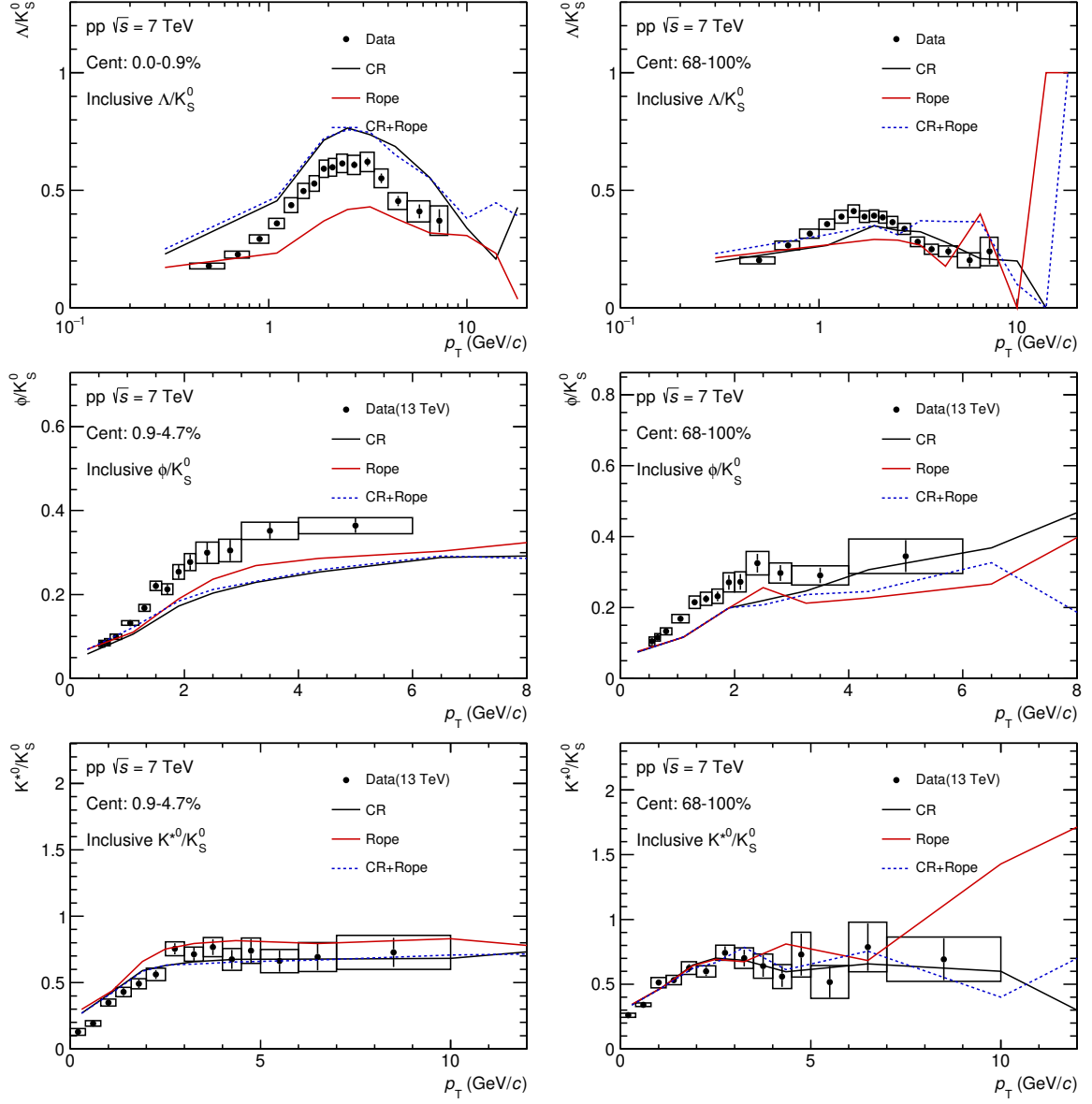
**Figure 9:** Inclusive particle  $p_T$  spectra. The different acceptance with data (for PYTHIA  $|\eta| < 0.75$ , data  $|y| < 0.5$ ) (Data taken from arXiv:2005.11120, arXiv:1204.0292v3 and arXiv:1910.14410)


 Figure 10: Particle in jet  $p_T$  spectra.

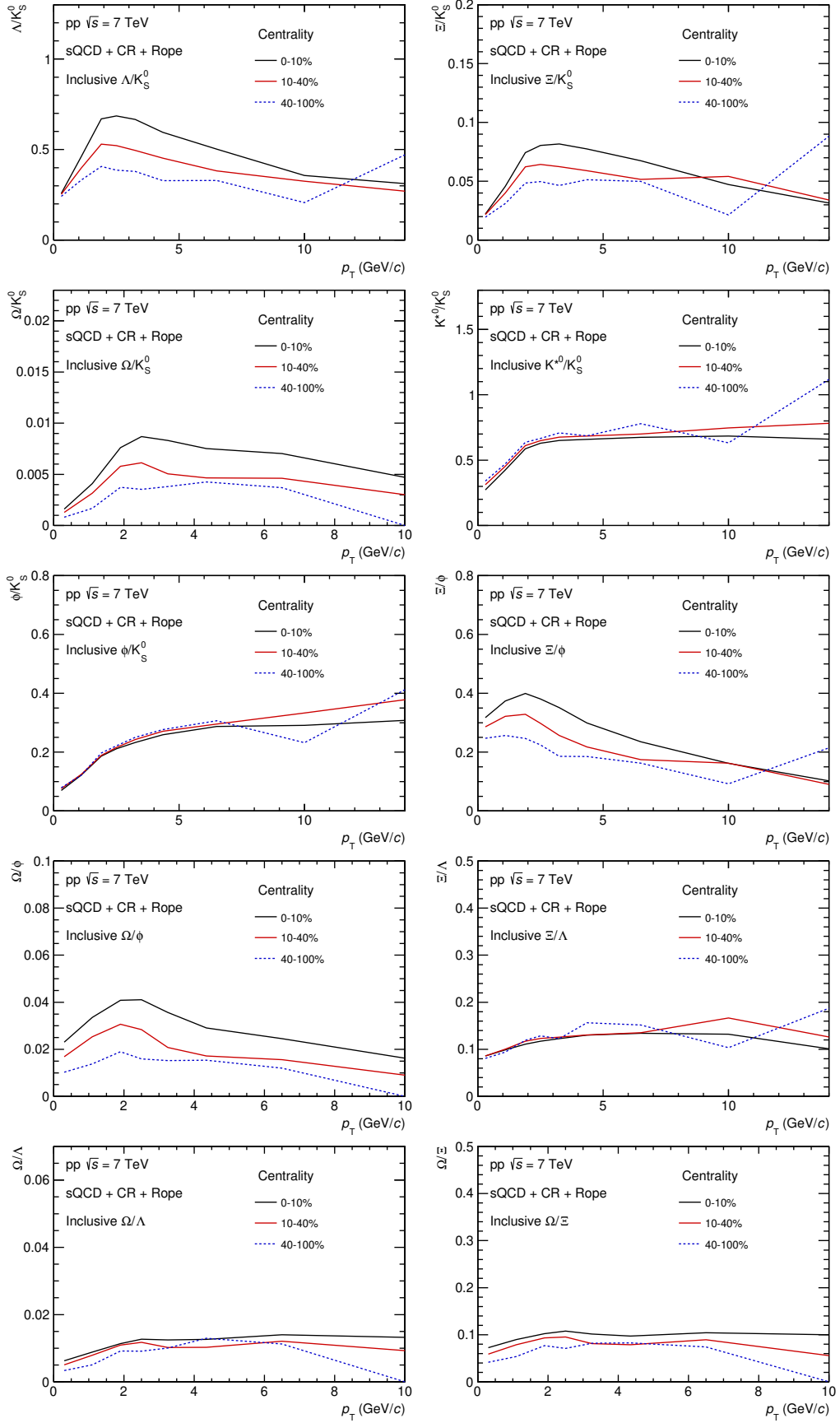


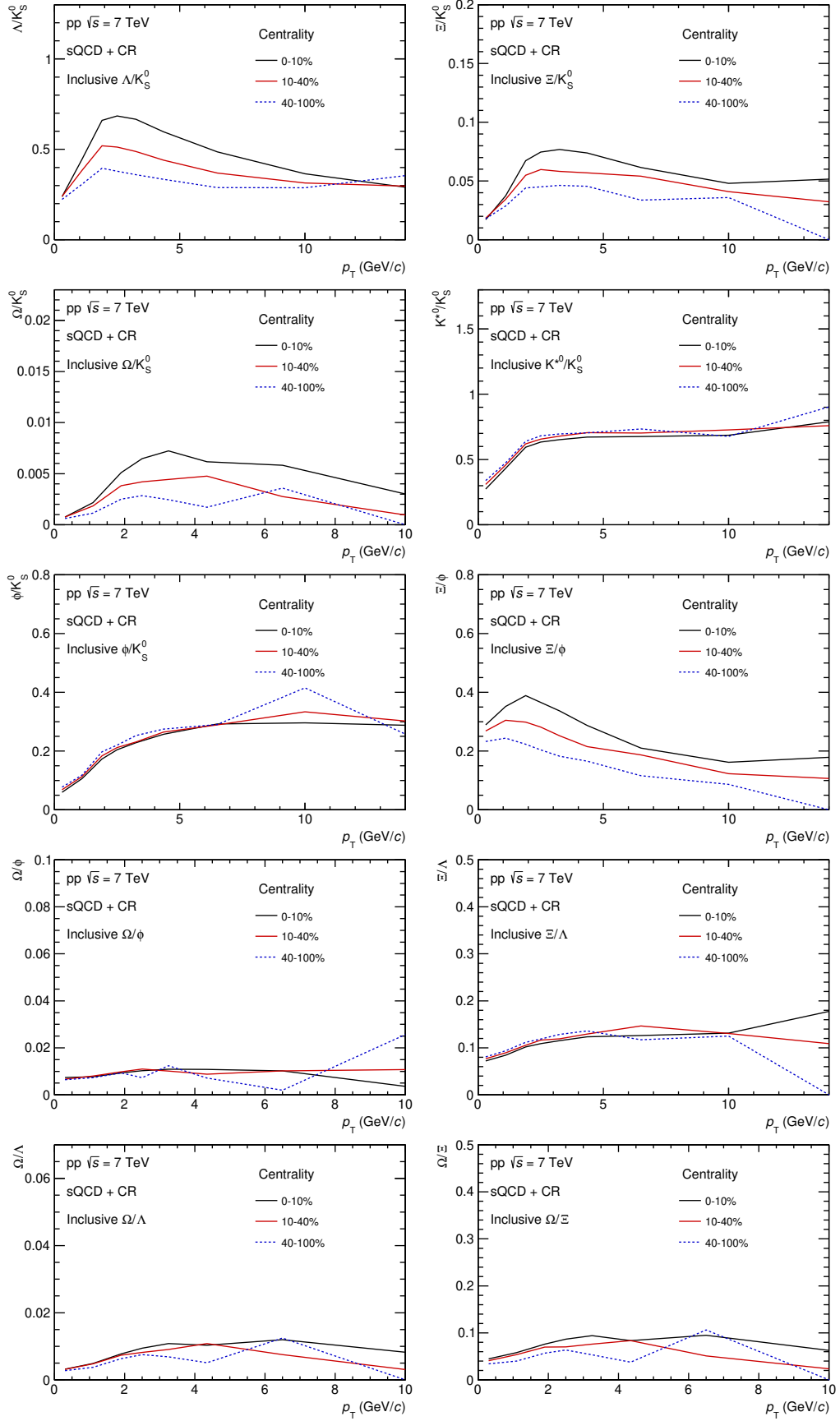
**Figure 11:** Inclusive particle ratios with  $p_T$  distribution. (Data taken from arXiv:2005.11120)


 Figure 12: Particle ratios in jet with  $p_T$  distribution. (Data taken from arXiv:2005.11120)

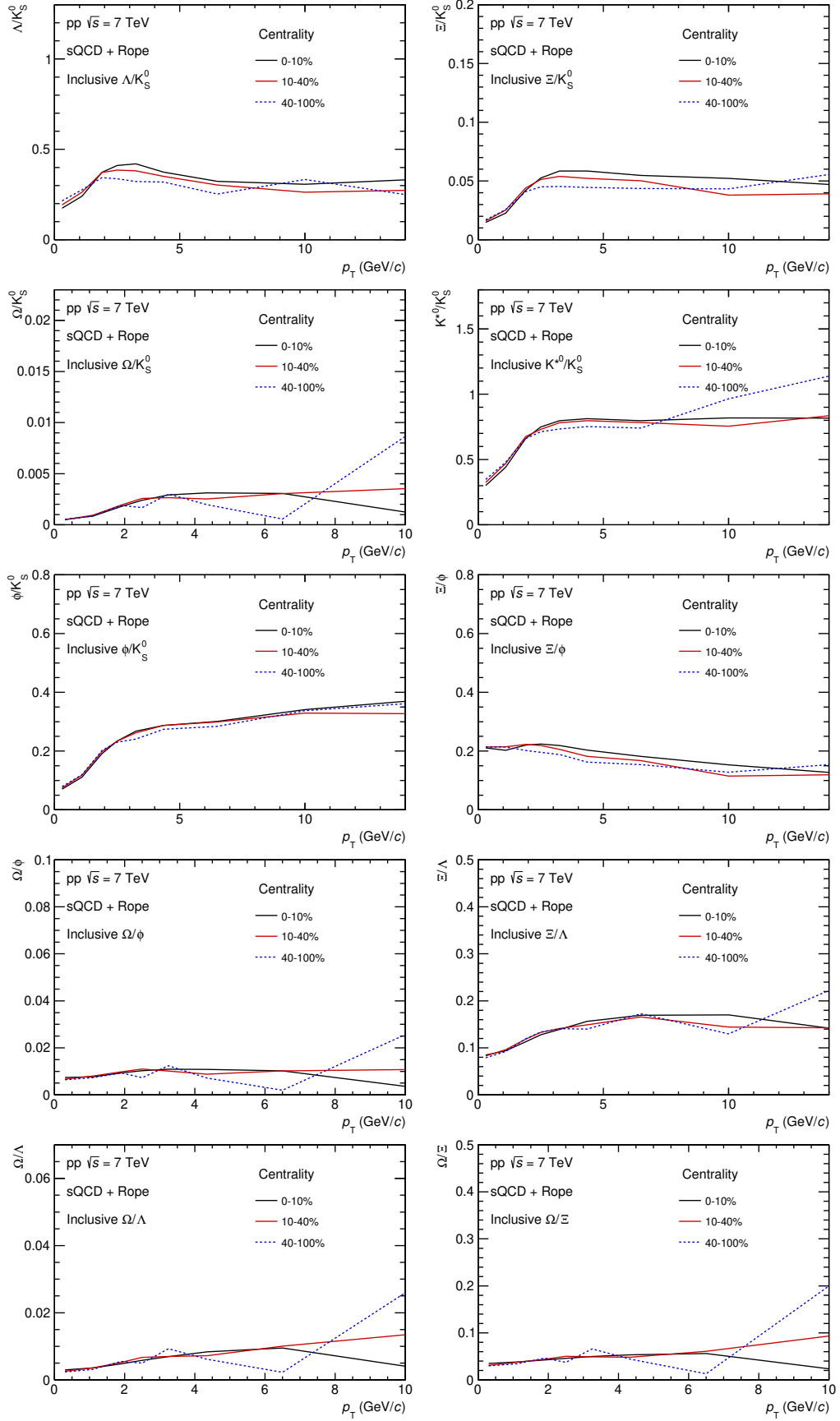


**Figure 13:** Inclusive particle ratios with  $p_T$  distribution in center and peripheral centrality bins. (Data taken from arXiv:1807.11321v2 and arXiv:1910.14397v1)


 Figure 14: Particle ratios with  $p_T$  distribution in different centrality bins (CR + Rope).

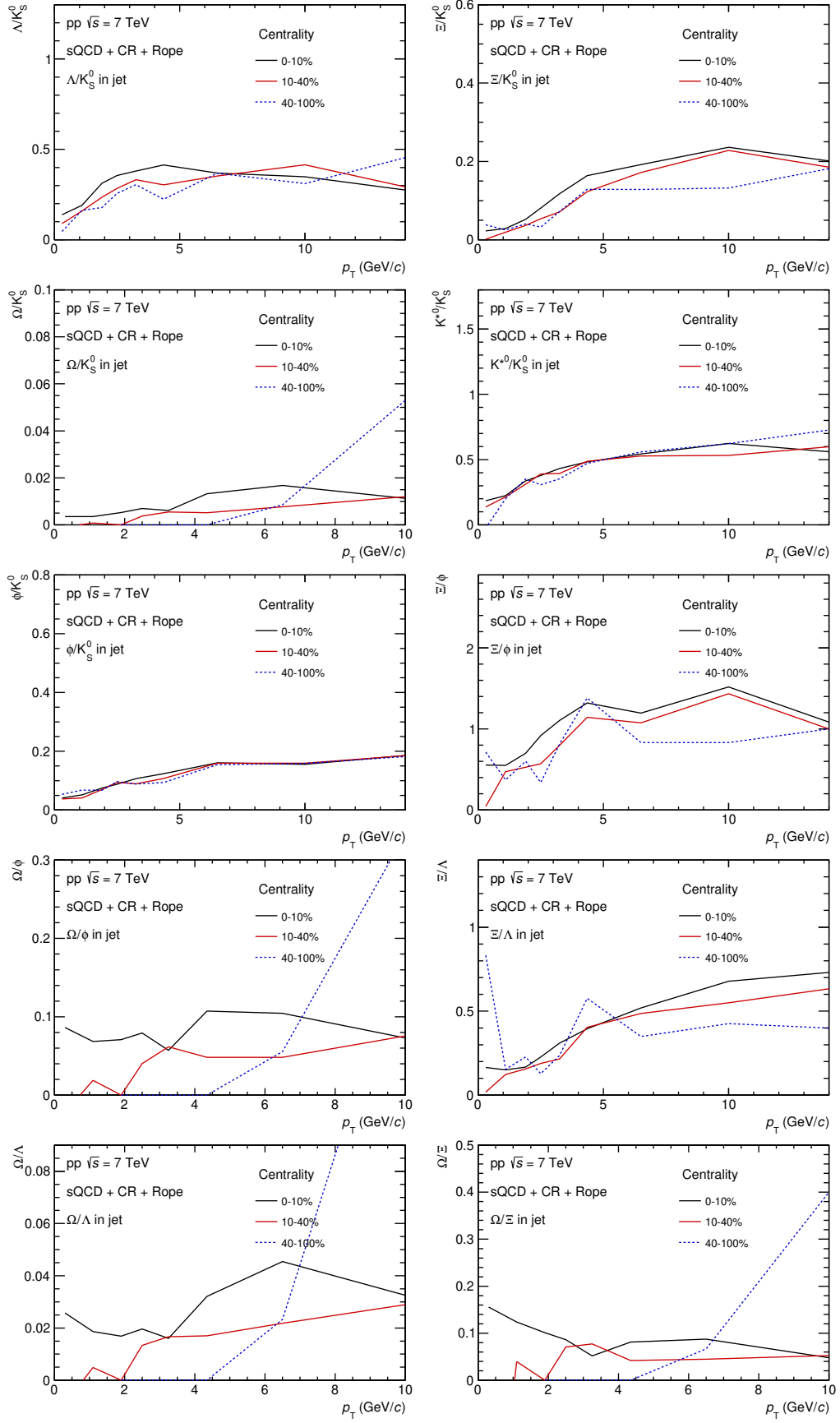


**Figure 15:** Particle ratios with  $p_T$  distribution in different centrality bins (CR).

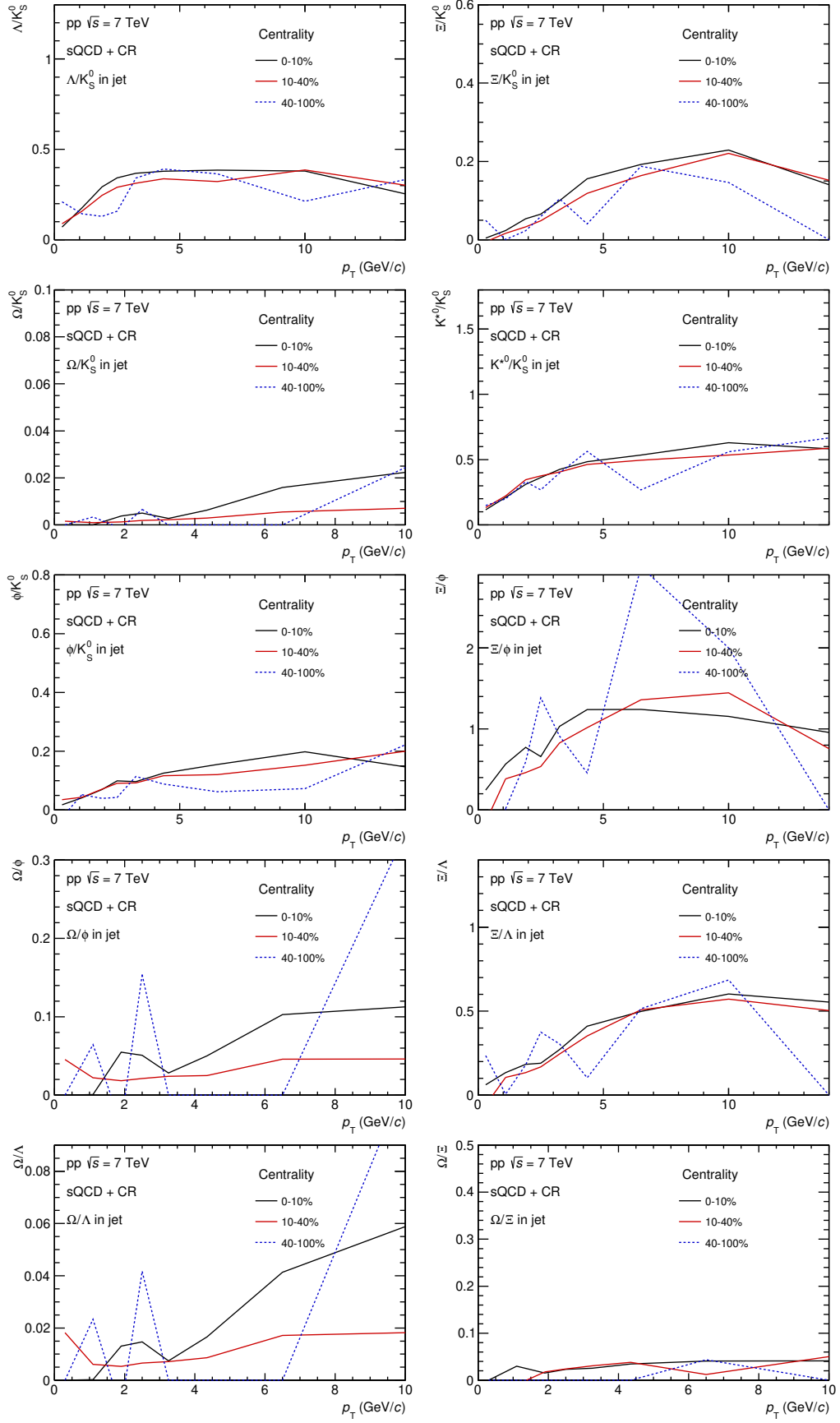


**Figure 16:** Particle ratios with  $p_T$  distribution in different centrality bins (Rope).

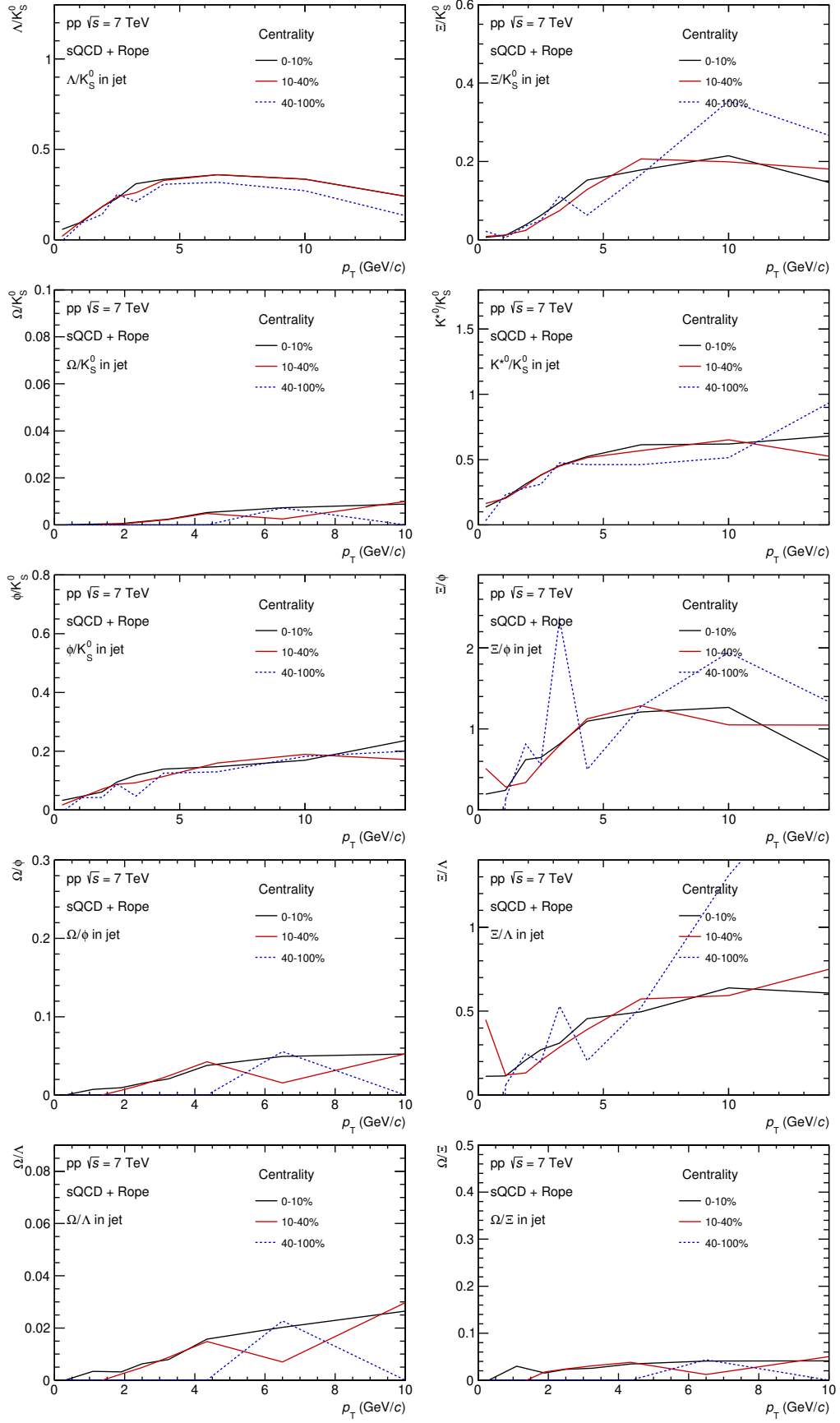




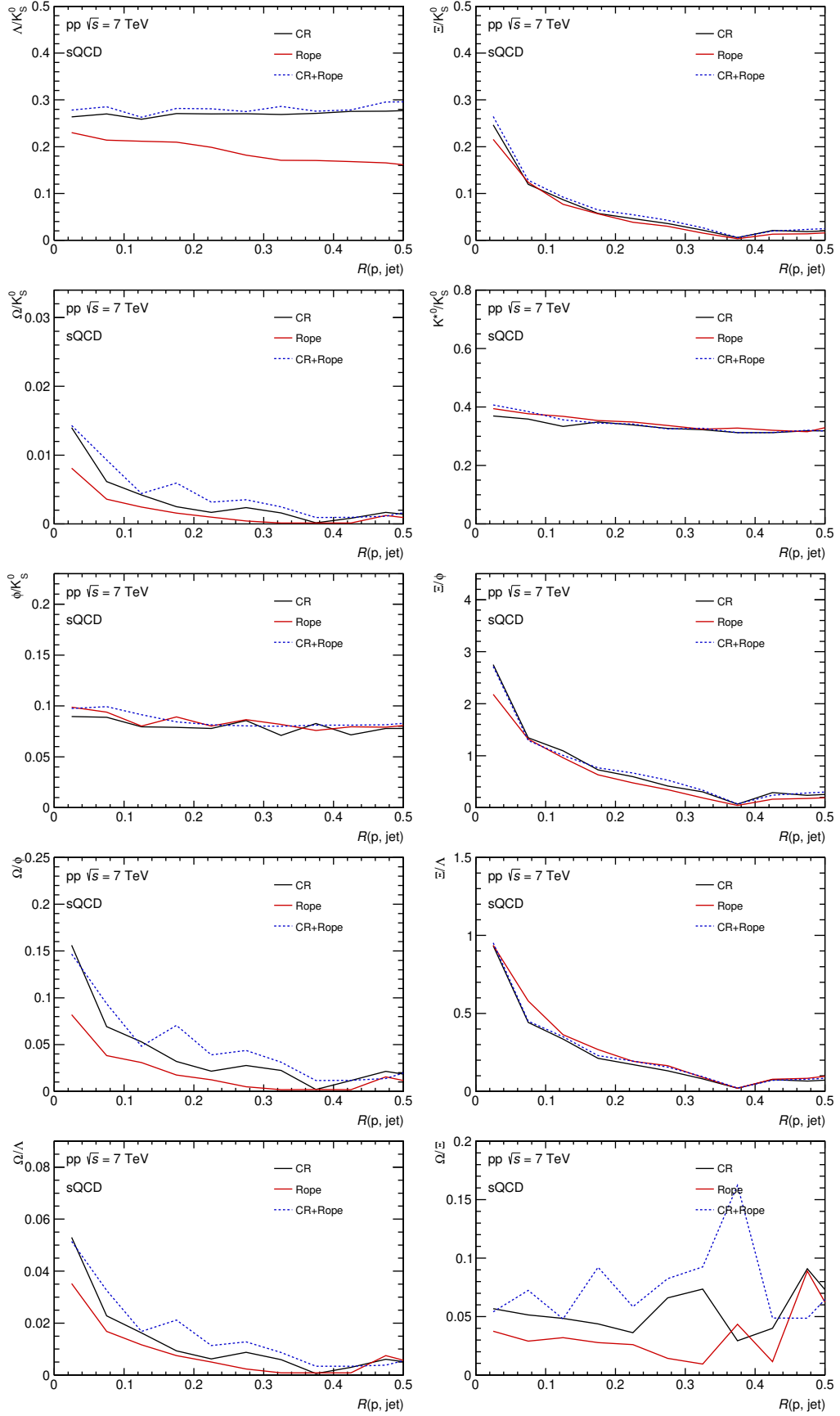
**Figure 17:** Particle ratios in jet with  $p_T$  distribution in different centrality bins (CR+Rope).



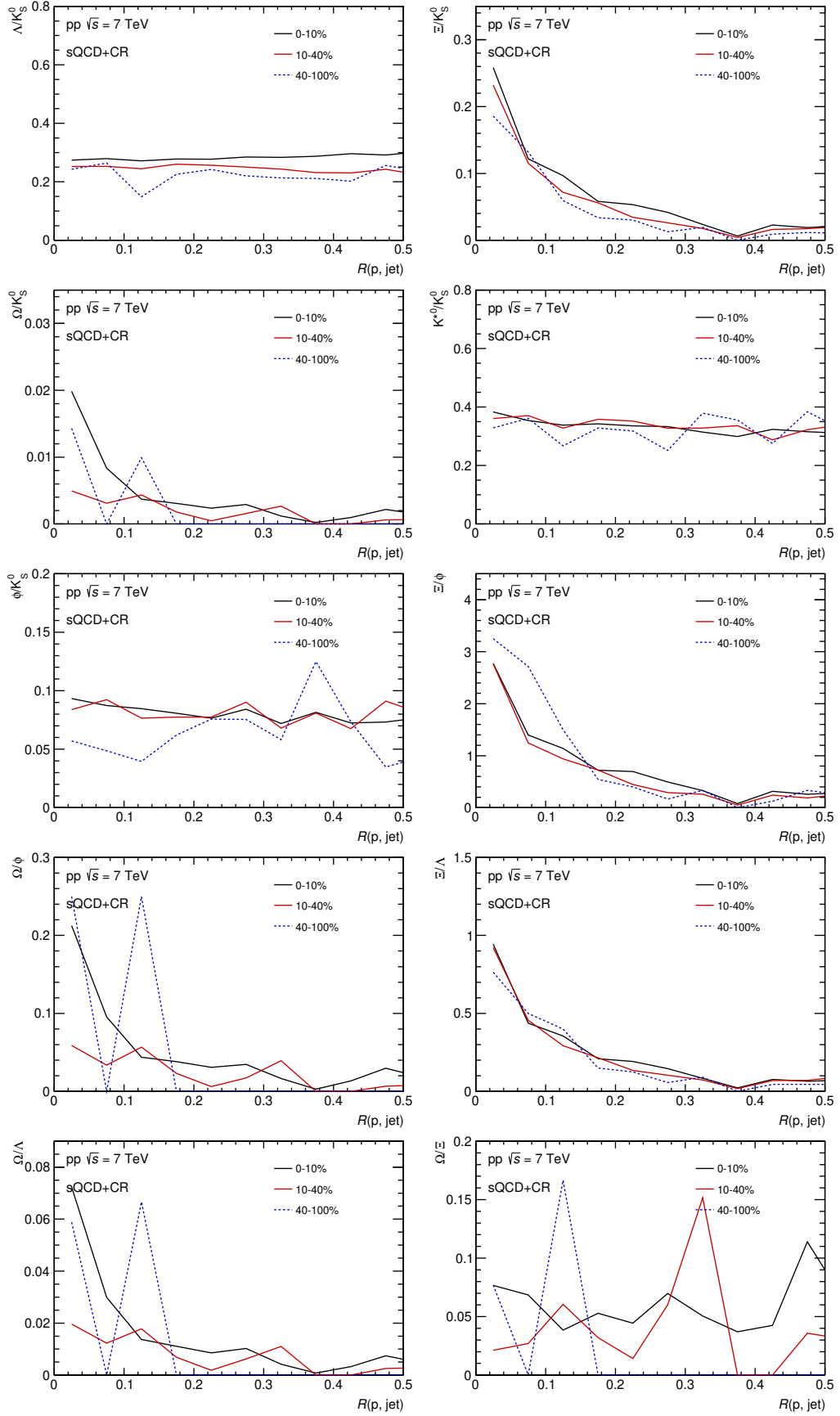
**Figure 18:** Particle ratios in jet with  $p_T$  distribution in different centrality bins (CR).



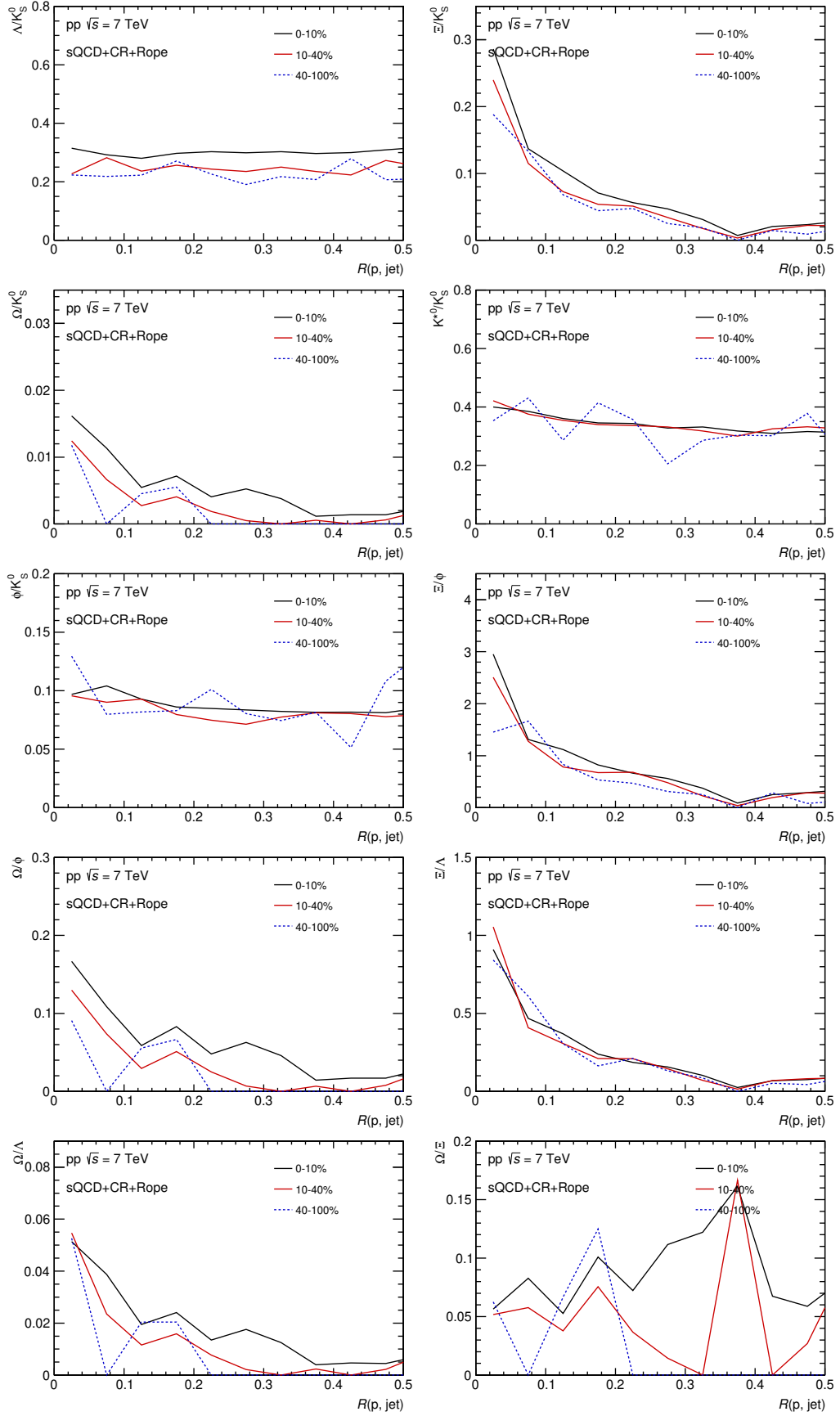
**Figure 19:** Particle ratios in jet with  $p_T$  distribution in different centrality bins (Rope).



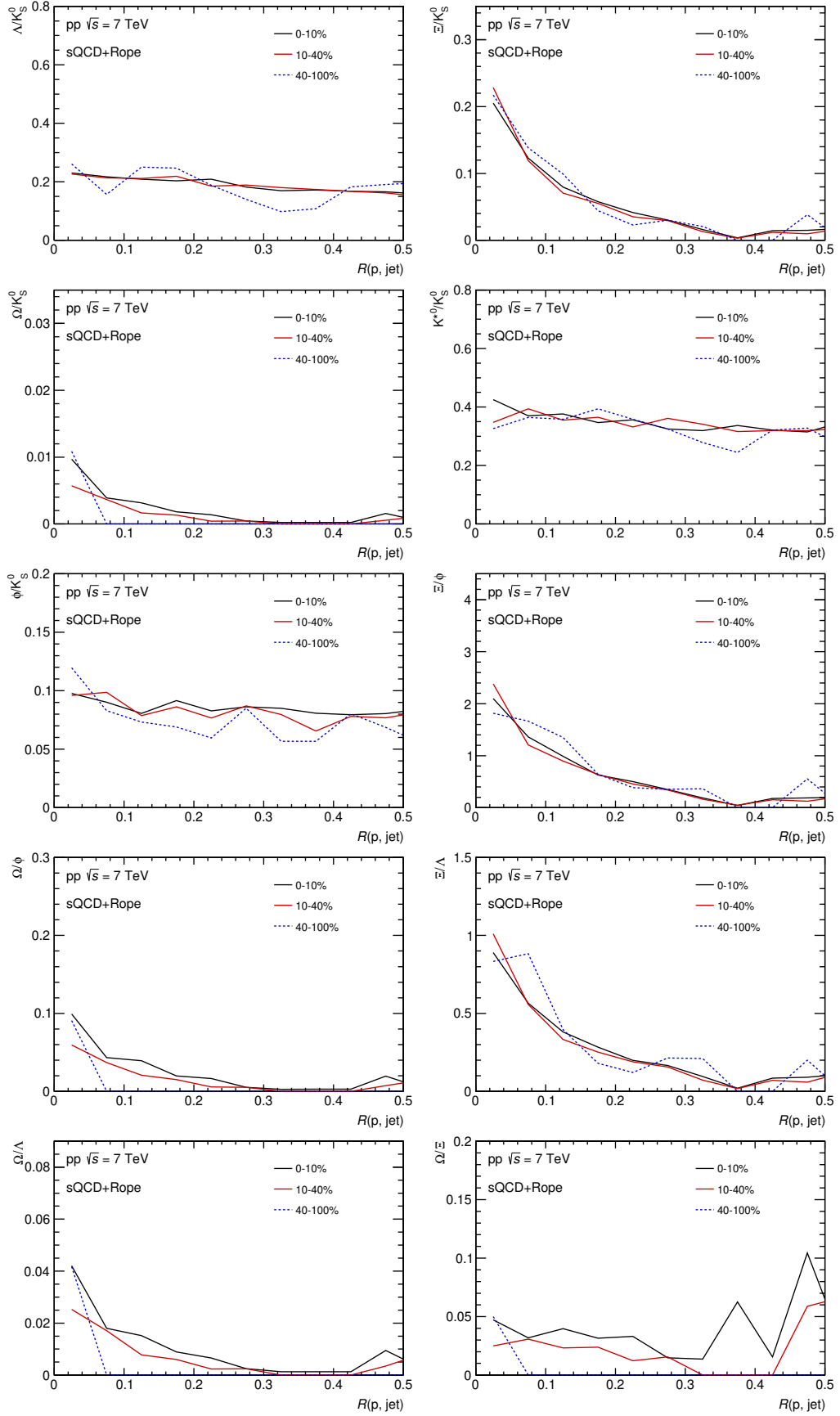
**Figure 20:** Particle ratios to jet axis range ( $R(P, \text{jet})$ ) distribution. (The multi-strange hadrons ( $\Xi$ ,  $\Omega$ ) have strong enhance at small  $R(P, \text{jet})$ )



**Figure 21:** Particle ratios to jet axis range ( $R(P, \text{jet})$ ) distribution. (The multi-strange hadrons ( $\Xi$ ,  $\Omega$ ) have strong enhance at small  $R(P, \text{jet})$ )



**Figure 22:** Particle ratios to jet axis range ( $R(P, \text{jet})$ ) distribution. (The multi-strange hadrons ( $\Xi$ ,  $\Omega$ ) have strong enhance at small  $R(P, \text{jet})$ )



**Figure 23:** Particle ratios to jet axis range ( $R(P, \text{jet})$ ) distribution. (The multi-strange hadrons ( $\Xi$ ,  $\Omega$ ) have strong enhance at small  $R(P, \text{jet})$ )