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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:nonDiffractive = 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

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

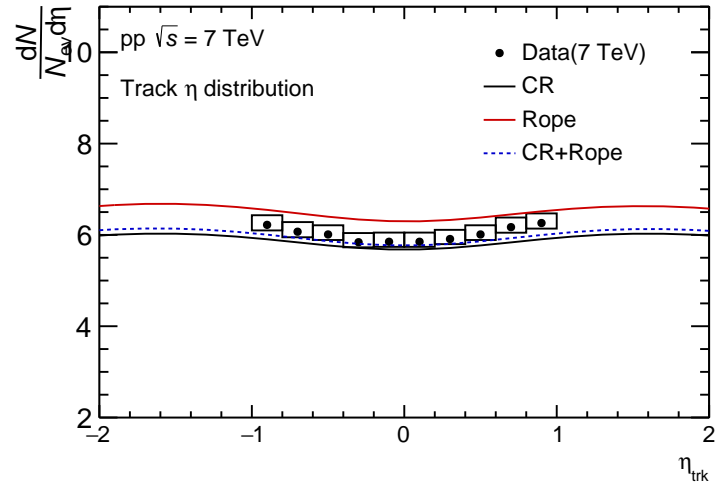


Figure 1: Track η distribution.(Data got from arXiv:1004.3514v3)

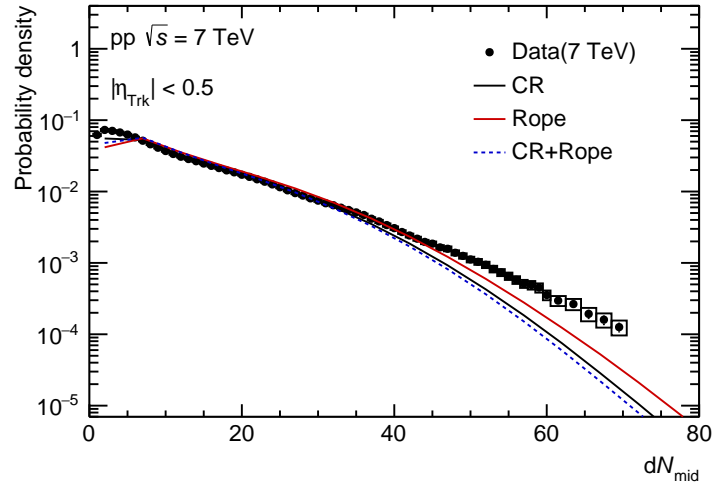


Figure 2: Number of mid-rapidity tracks (N_{mid}) distribution.(Data got from arXiv:1004.3514v3)

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

42 **References**

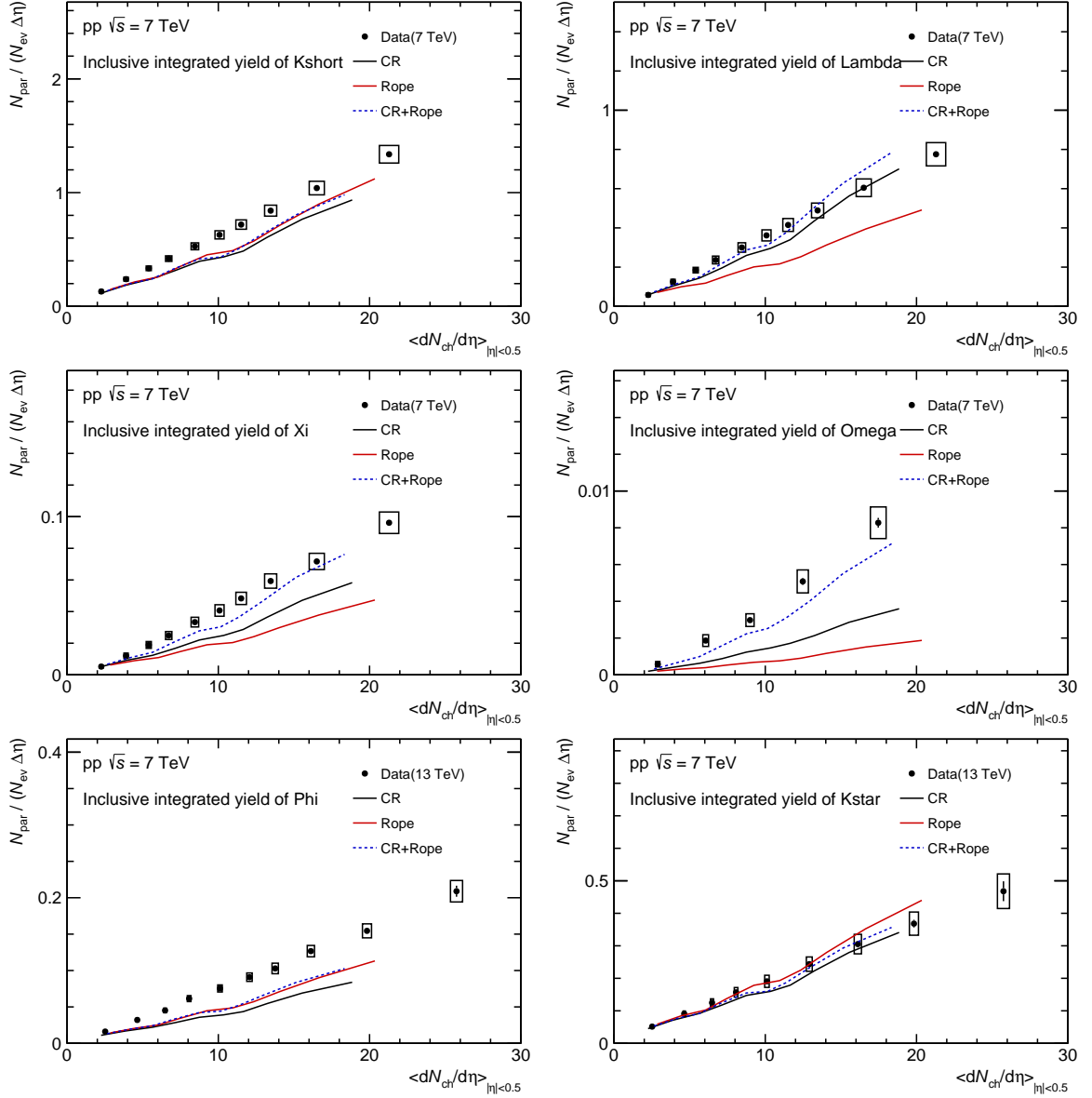


Figure 3: Inclusive integrated yields of particles with $\langle dN_{ch}/d\eta \rangle$. (Data taken from arXiv:1606.07424v2 and arXiv:1910.14397v1)

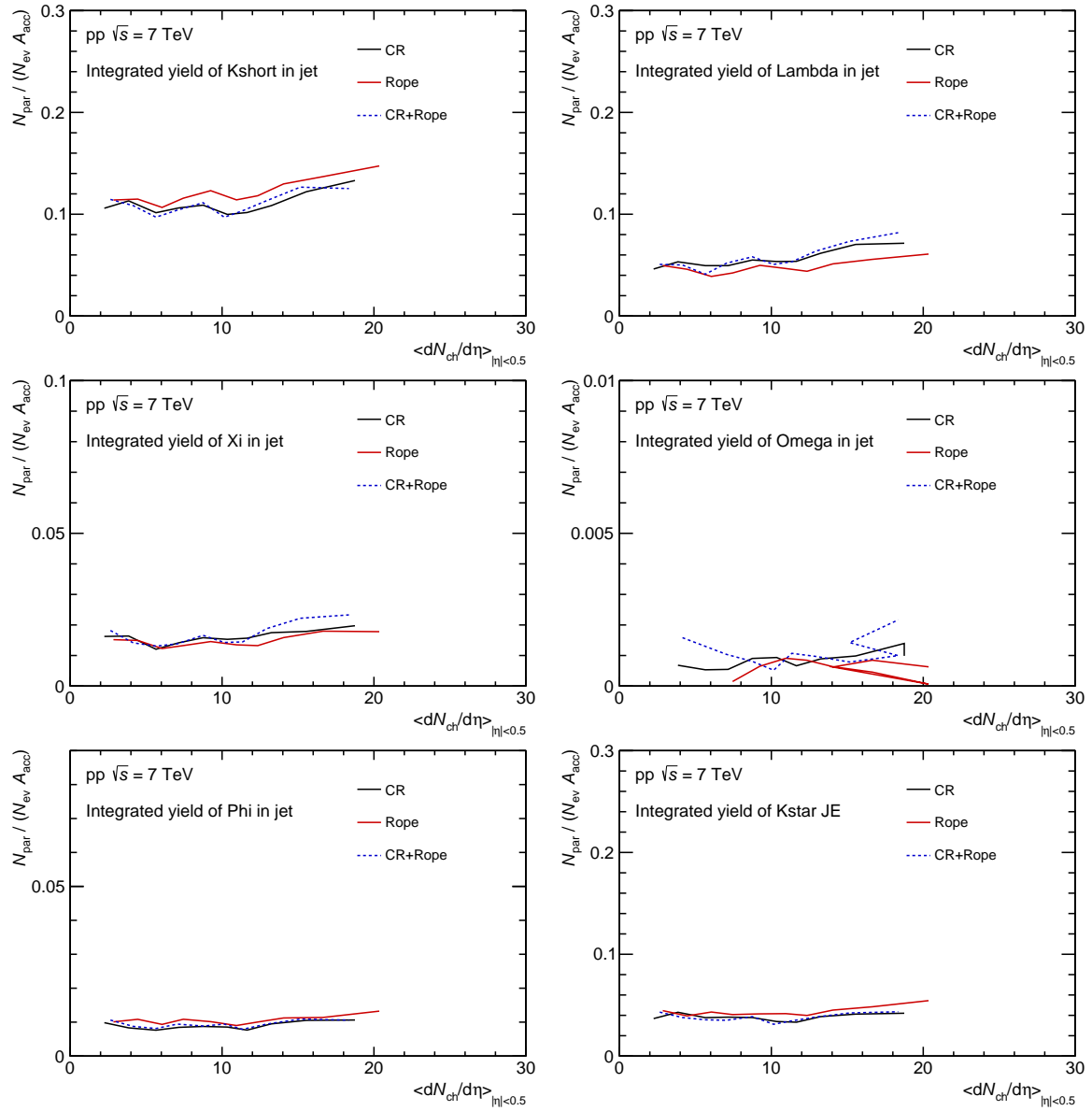


Figure 4: Integrated yields of particles in jet with $\langle dN_{ch}/d\eta \rangle$. (Data point at 13 TeV is used hadron-strange correlation method)

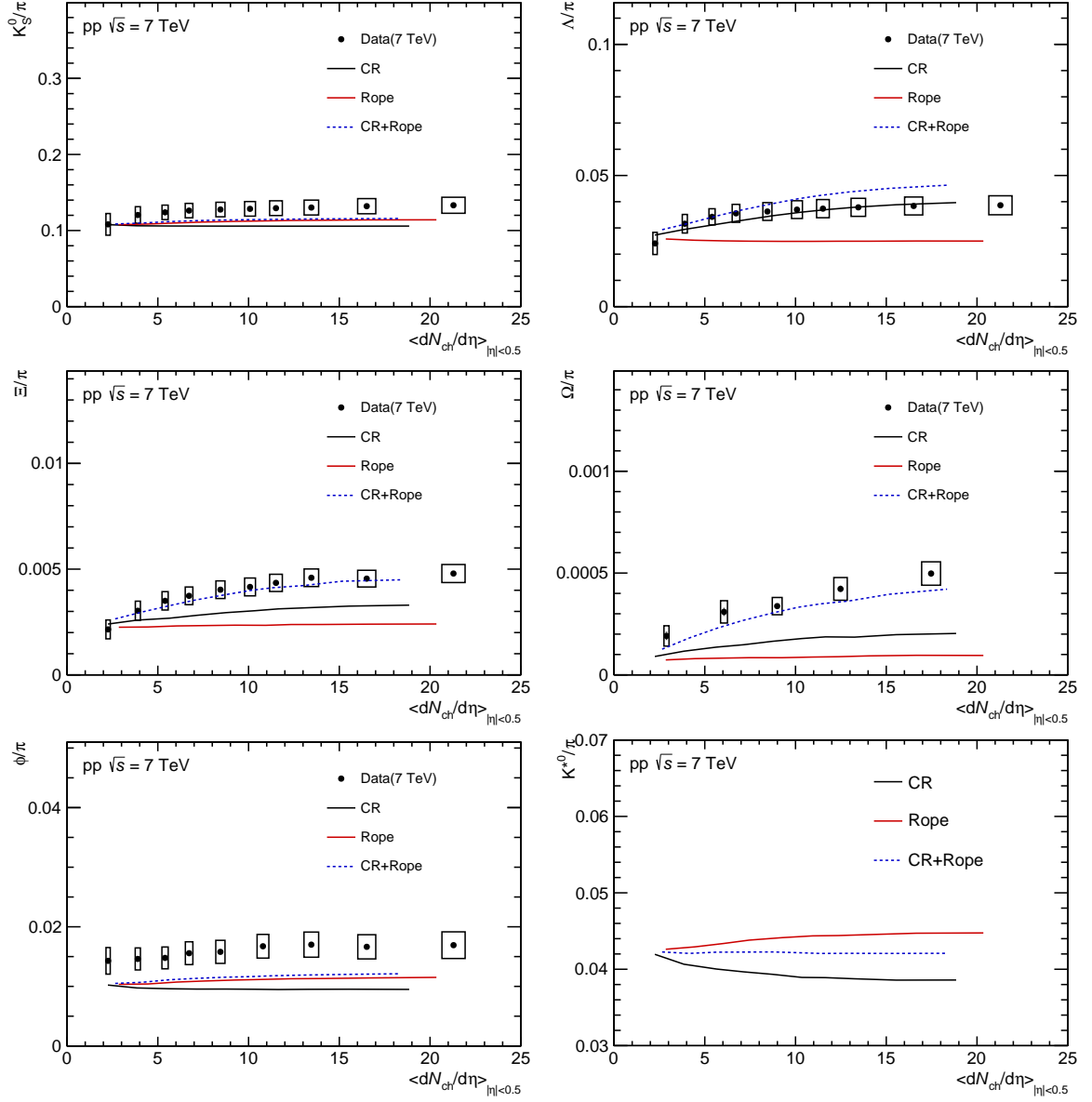


Figure 5: Inclusive integrated yields ratios of strange particle to π with $\langle dN_{ch}/d\eta \rangle$. (Data taken from arXiv:1606.07424v2 and arXiv:1807.11321v2)

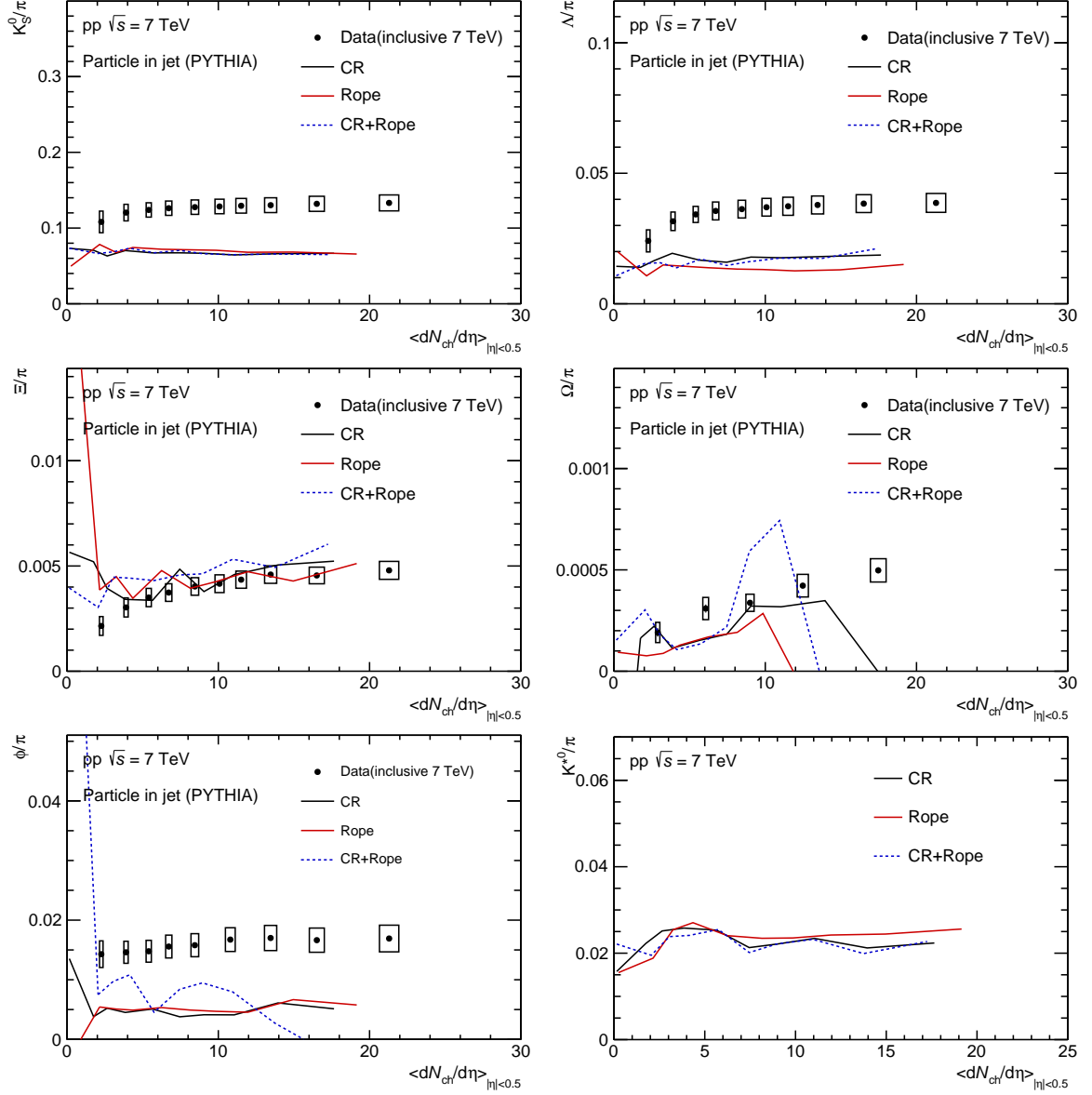


Figure 6: Integrated yields ratios in jet of strange particle to π with $\langle dN_{\text{ch}}/d\eta \rangle$. (Data taken from arXiv:1606.07424v2 and arXiv:1807.11321v2)

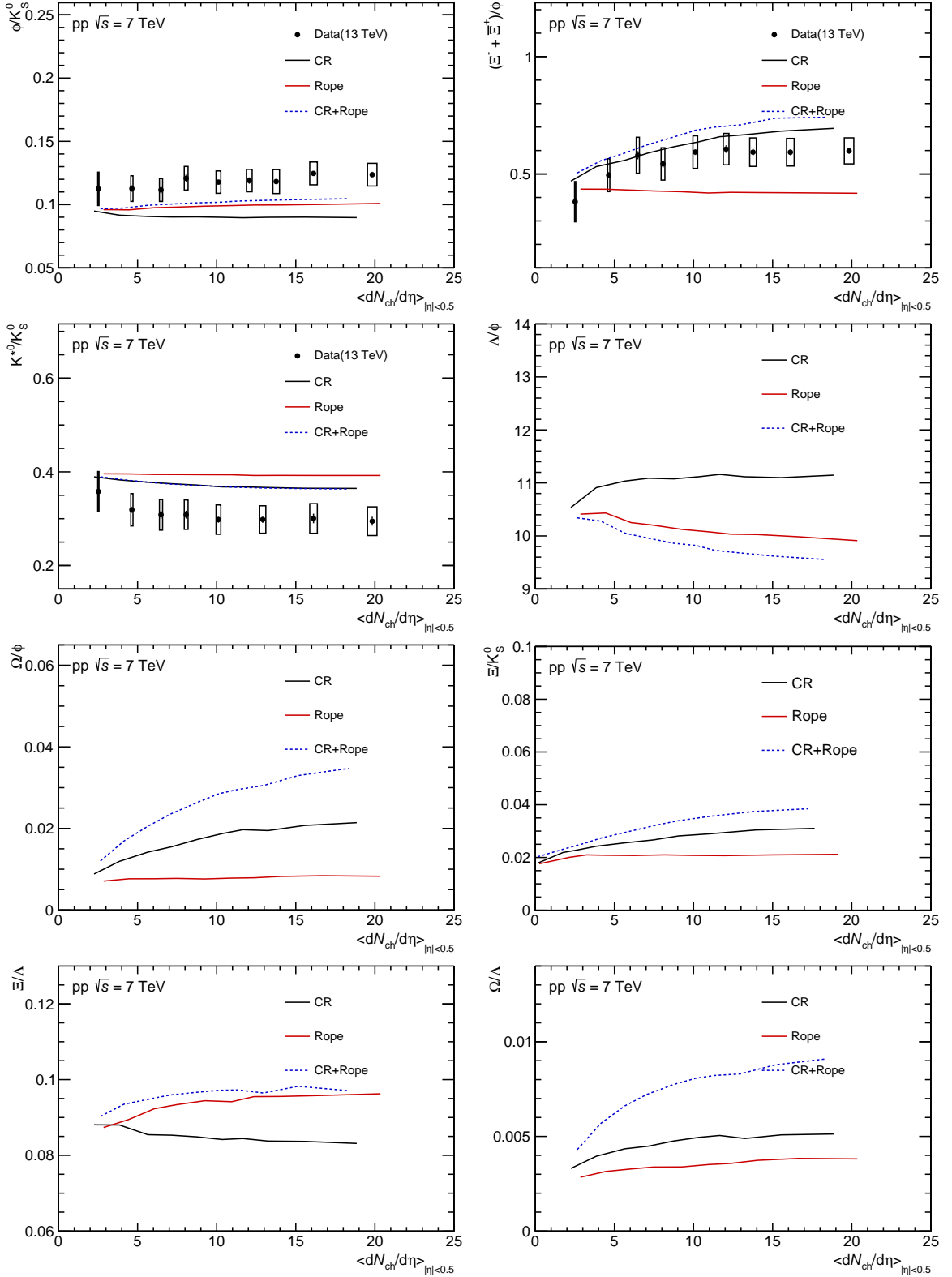


Figure 7: Inclusive integrated yields ratios with $\langle dN_{ch}/d\eta \rangle$. (Data taken from arXiv:1910.14397v1)

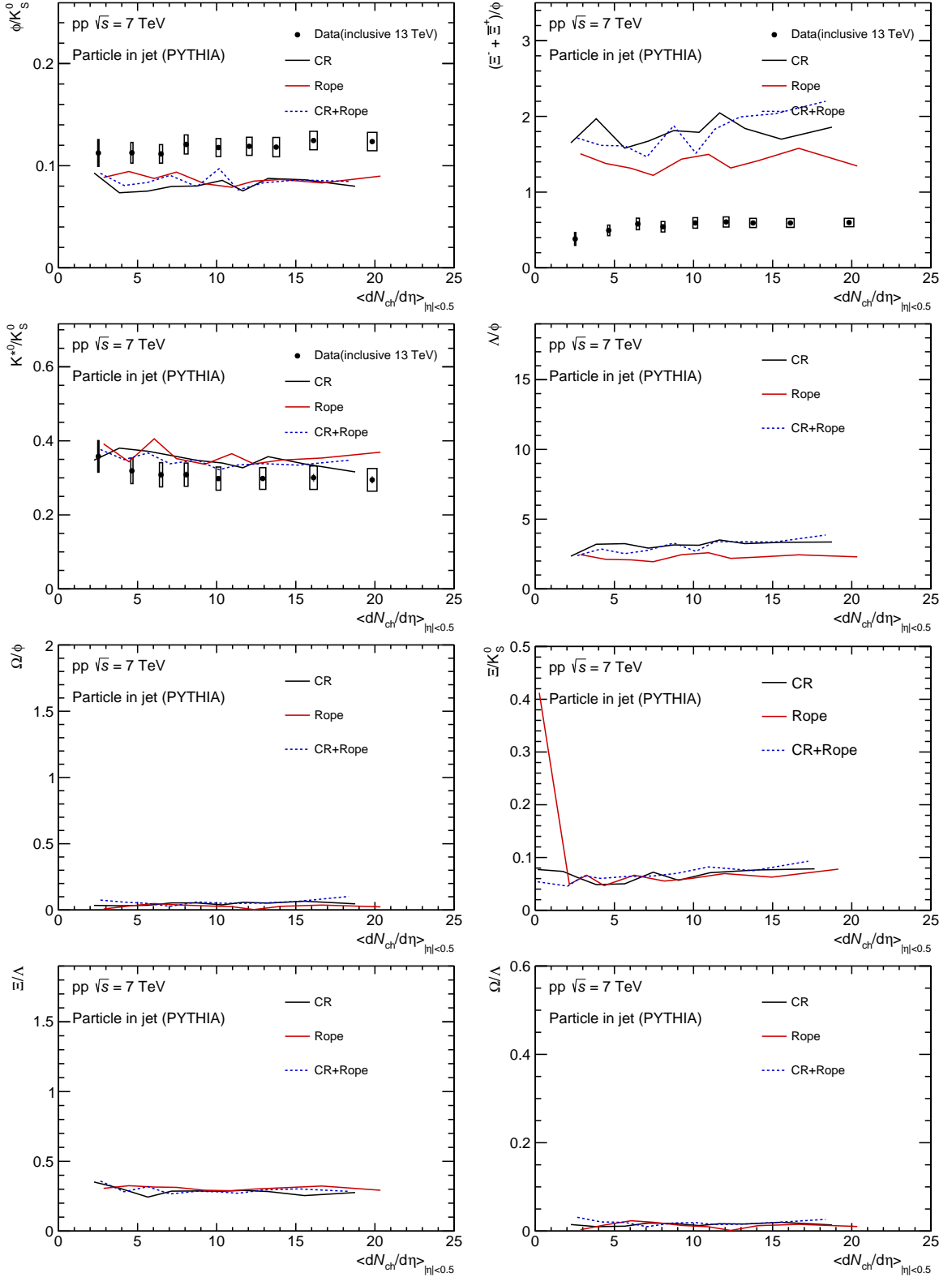


Figure 8: JC integrated yields ratios with $\langle dN_{ch}/d\eta \rangle$. (Data taken from arXiv:1910.14397v1)

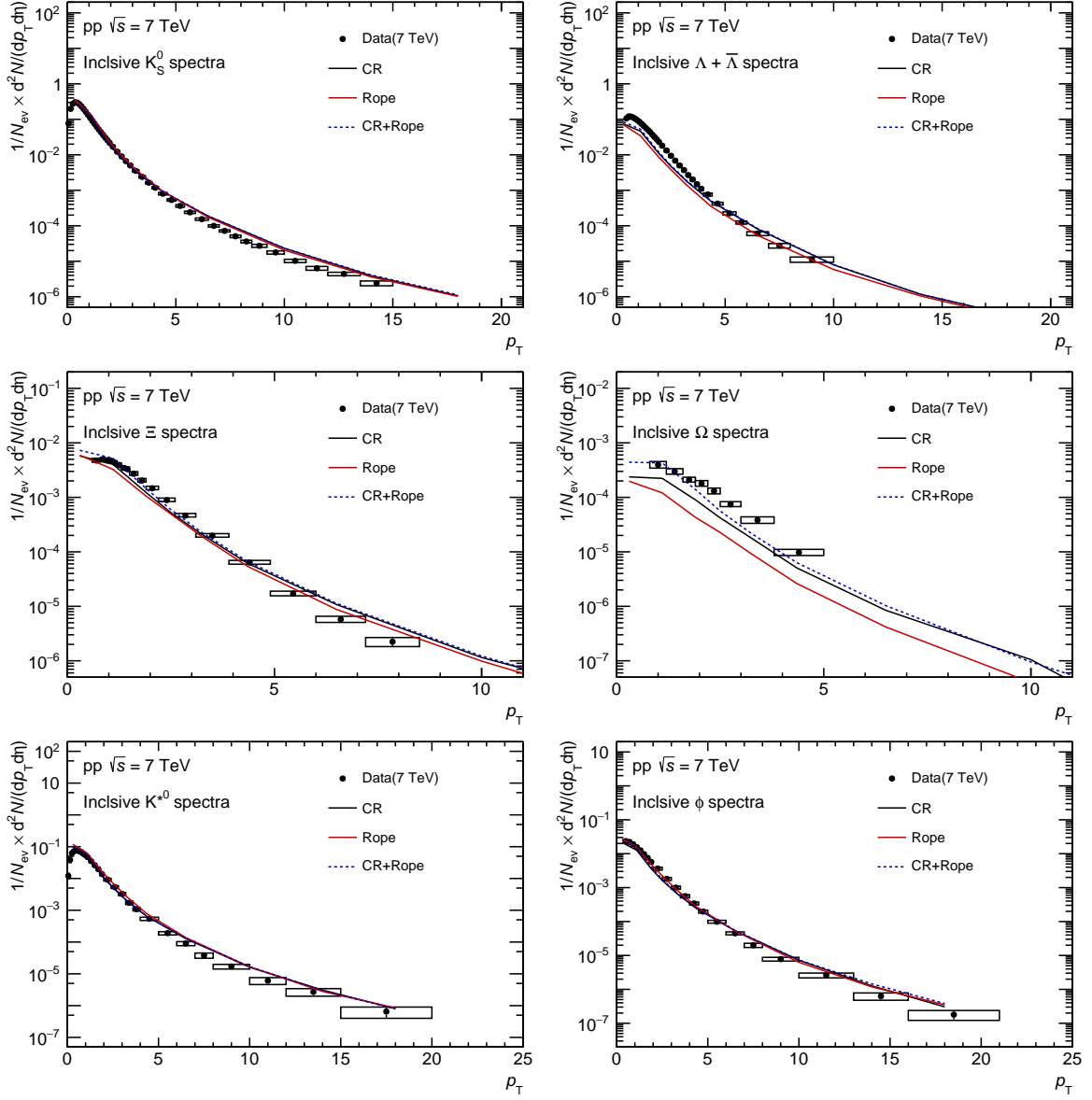
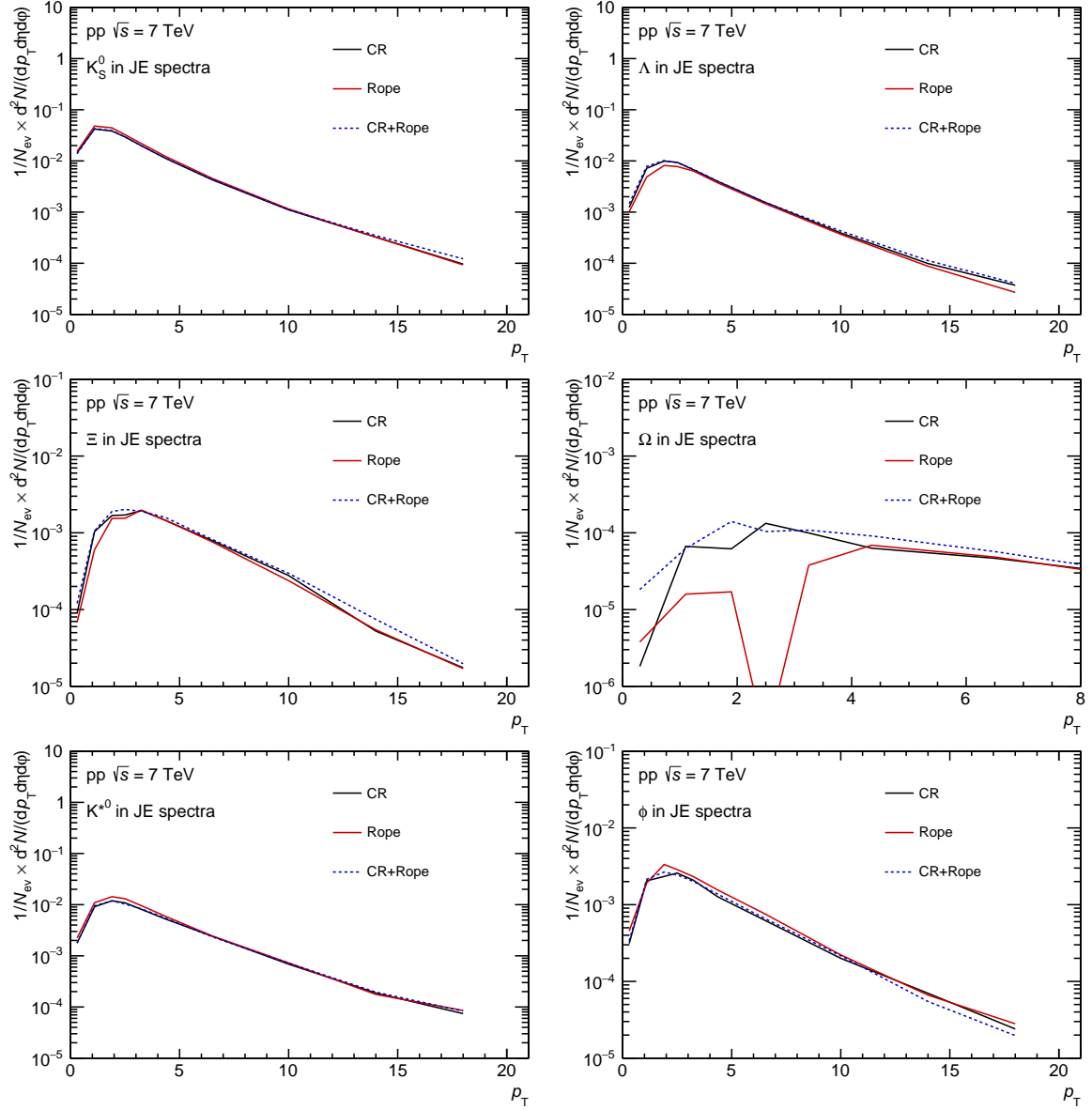


Figure 9: Inclusive particle p_T spectra. The different acceptance with data (for PYTHIA $|\eta| < 0.75$, data $|y| < 0.5$) (Data taken from arXiv:2005.11120, arXiv:1204.0292v3 and arXiv:1910.14410)


 Figure 10: Particle in jet p_T spectra.

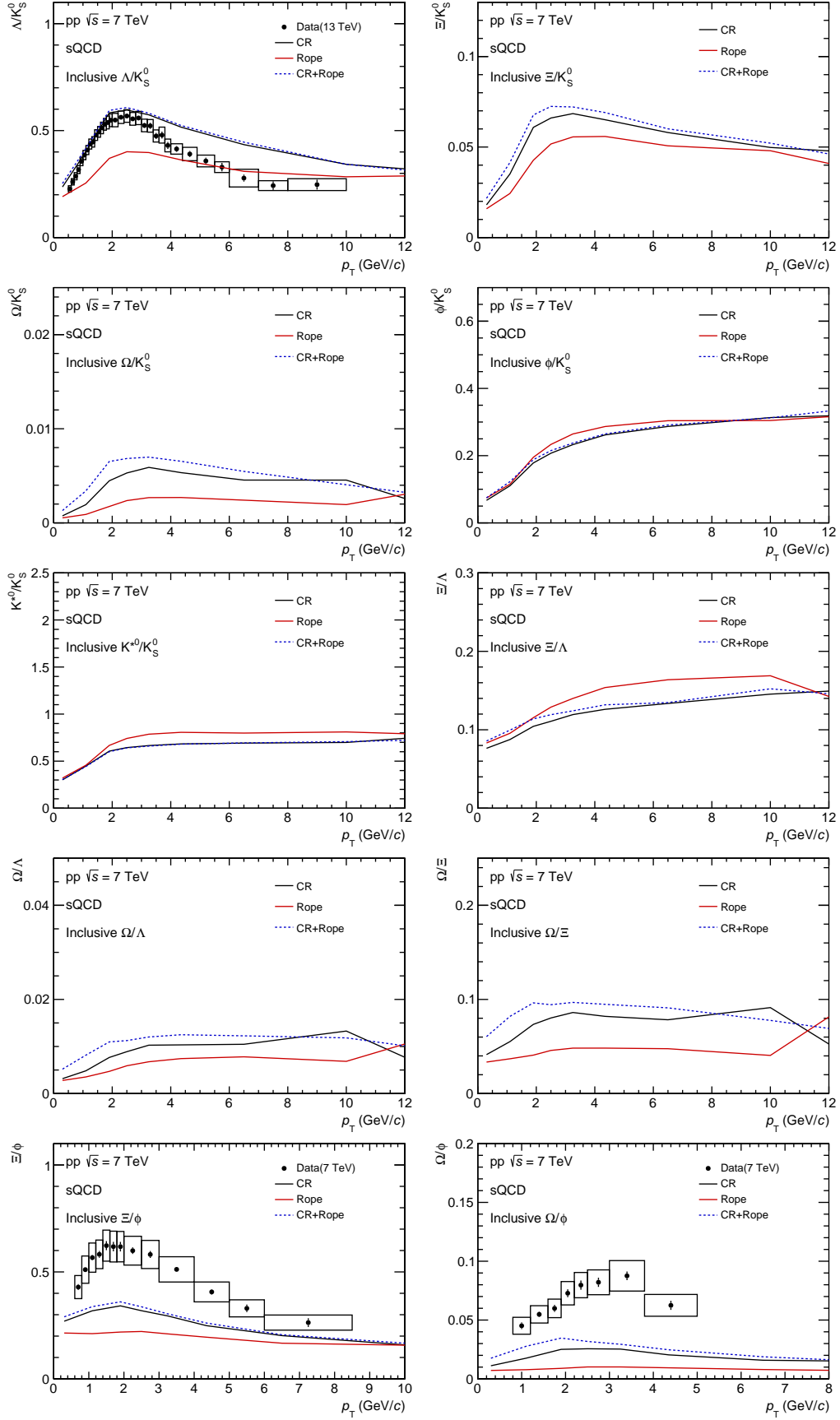
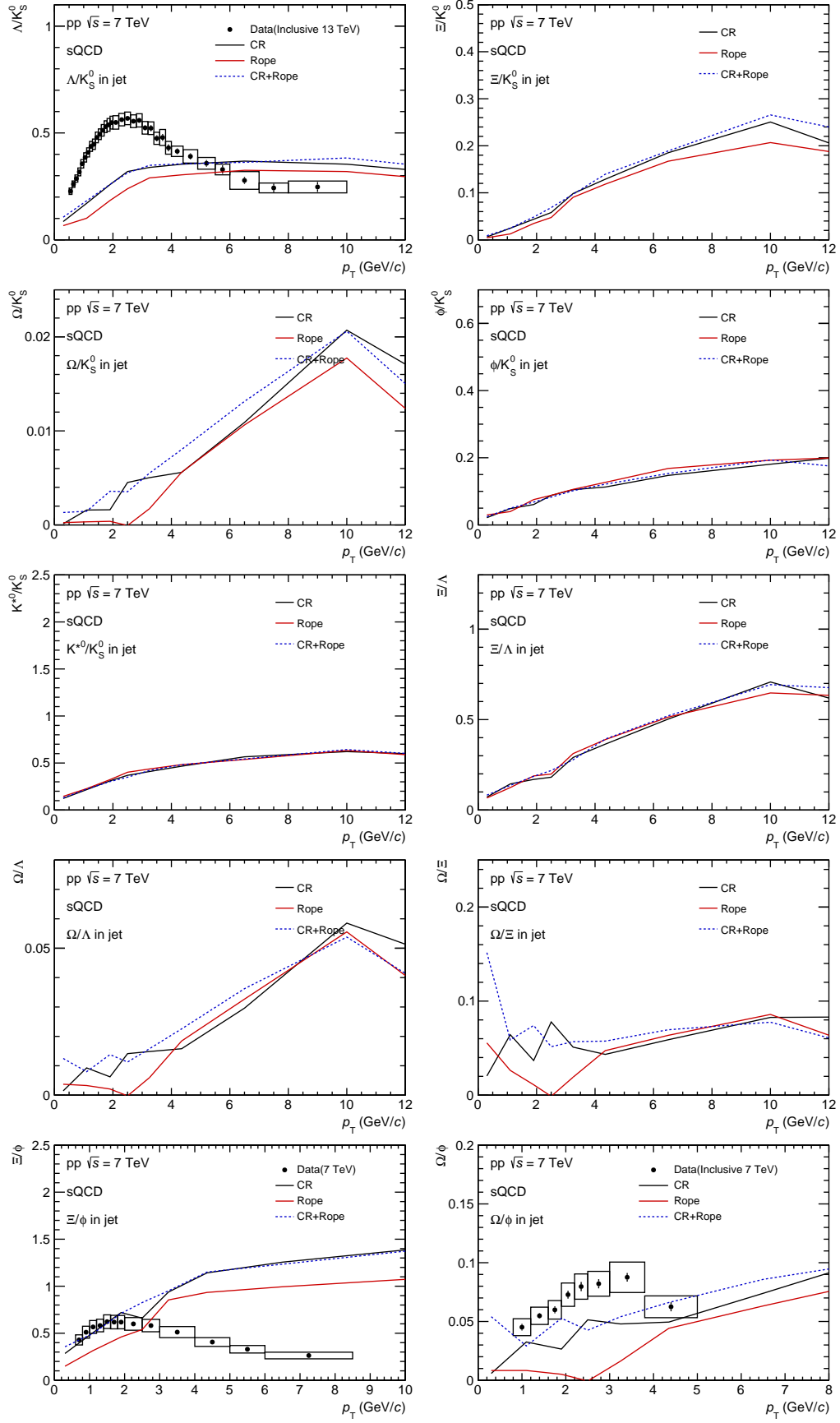


Figure 11: Inclusive particle ratios with p_T distribution. (Data taken from arXiv:2005.11120)


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

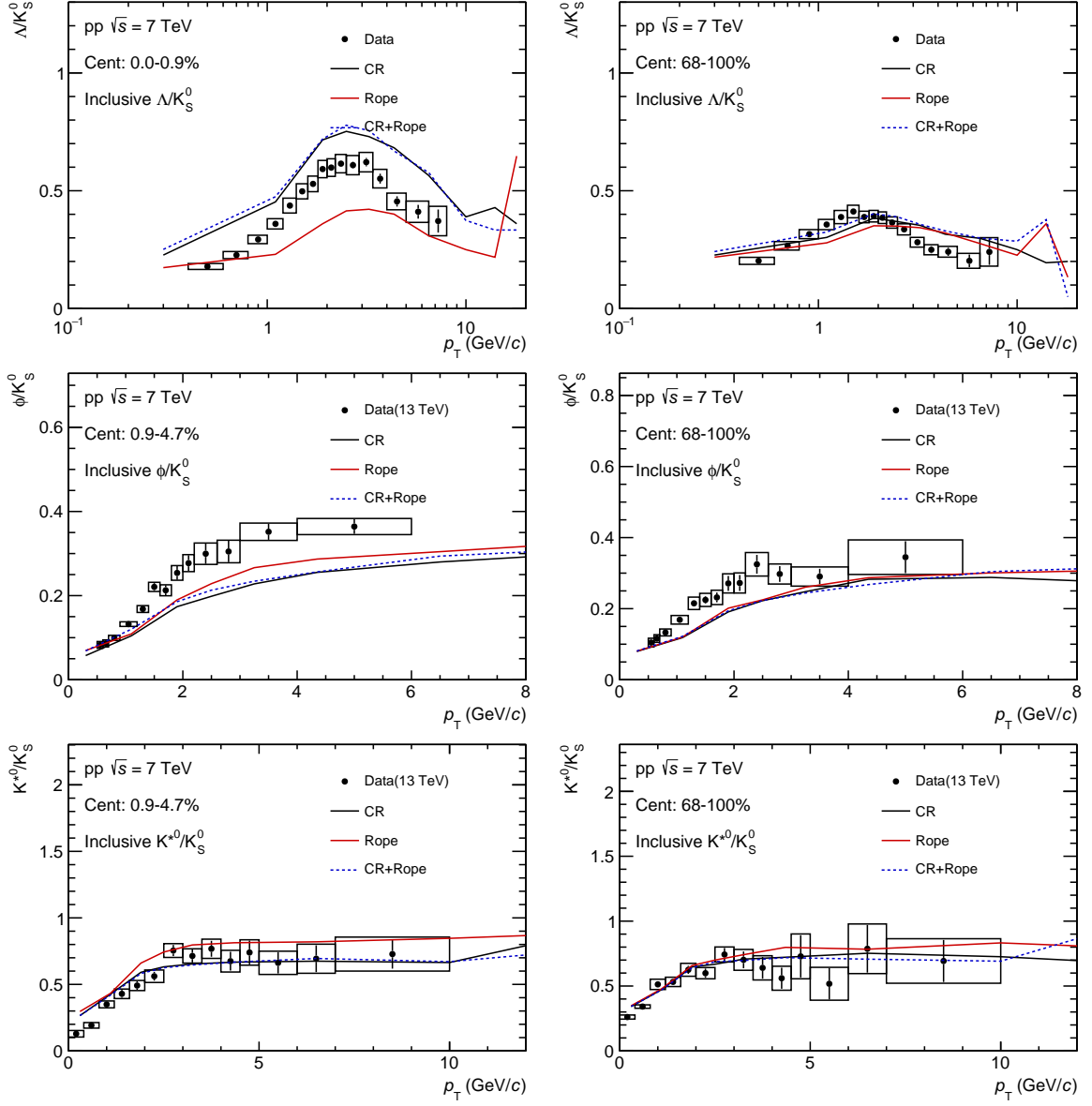


Figure 13: Inclusive particle ratios with p_T distribution in center and peripheral centrality bins. (Data taken from arXiv:1807.11321v2 and arXiv:1910.14397v1)

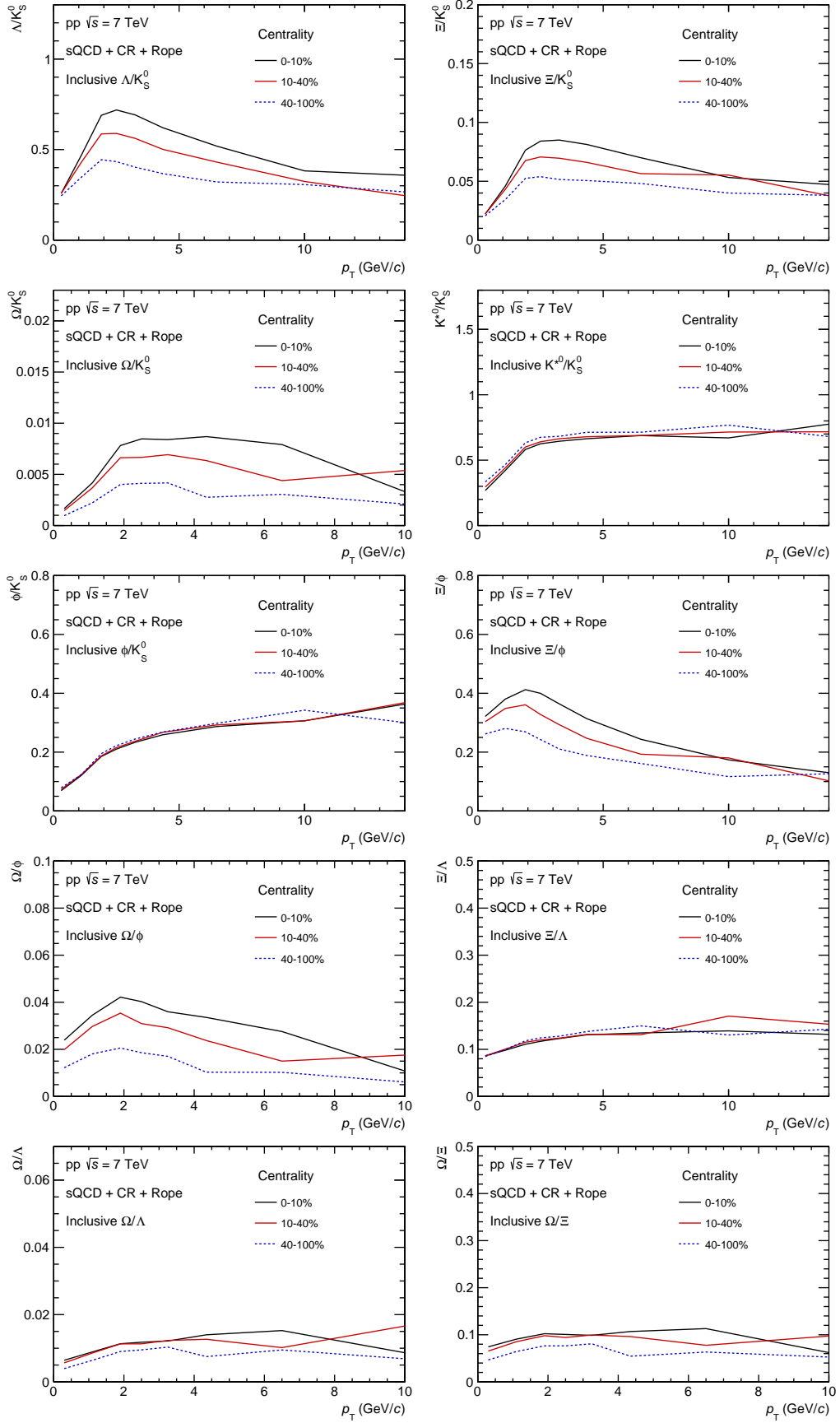
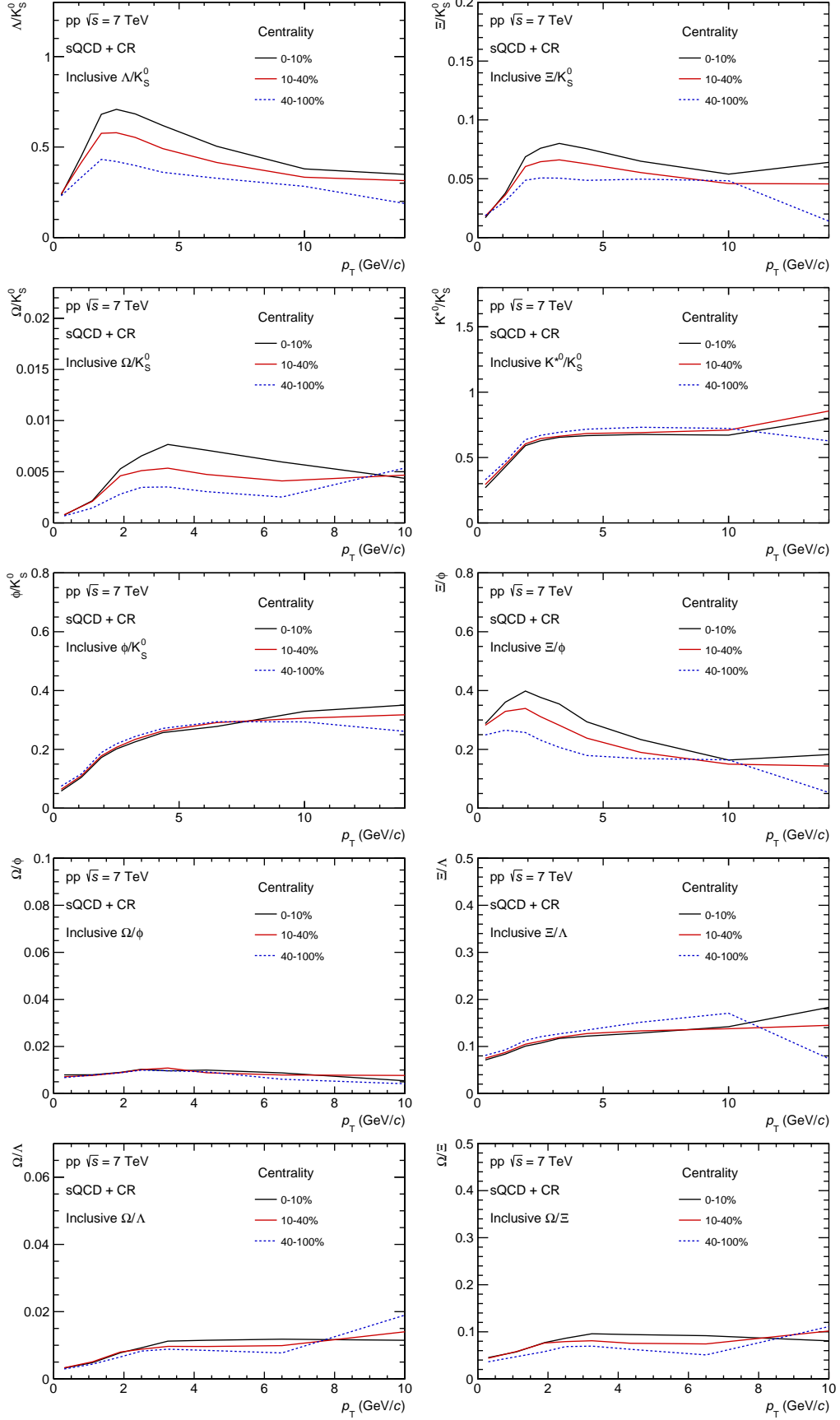
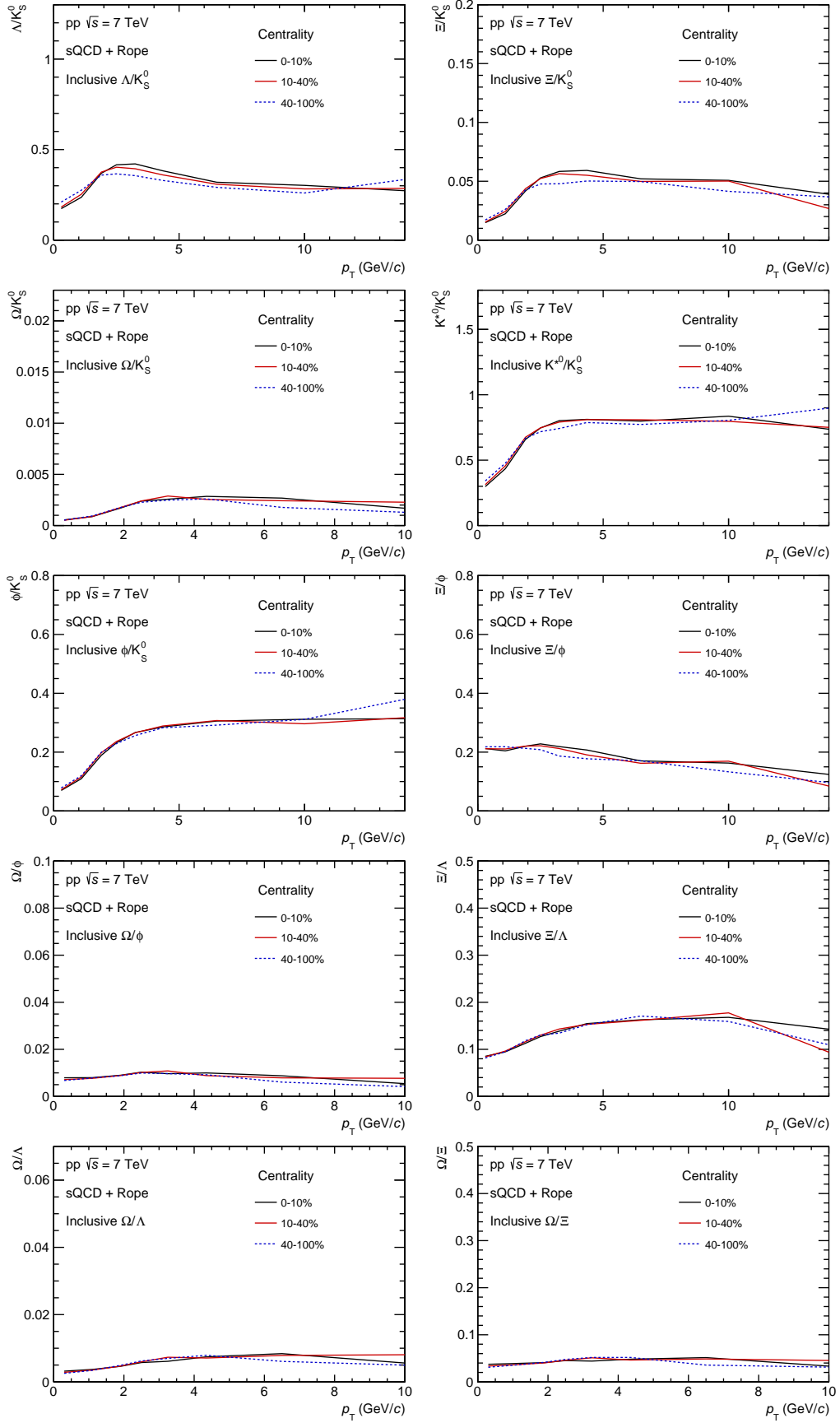


Figure 14: Particle ratios with p_T distribution in different centrality bins (CR + Rope).


 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).

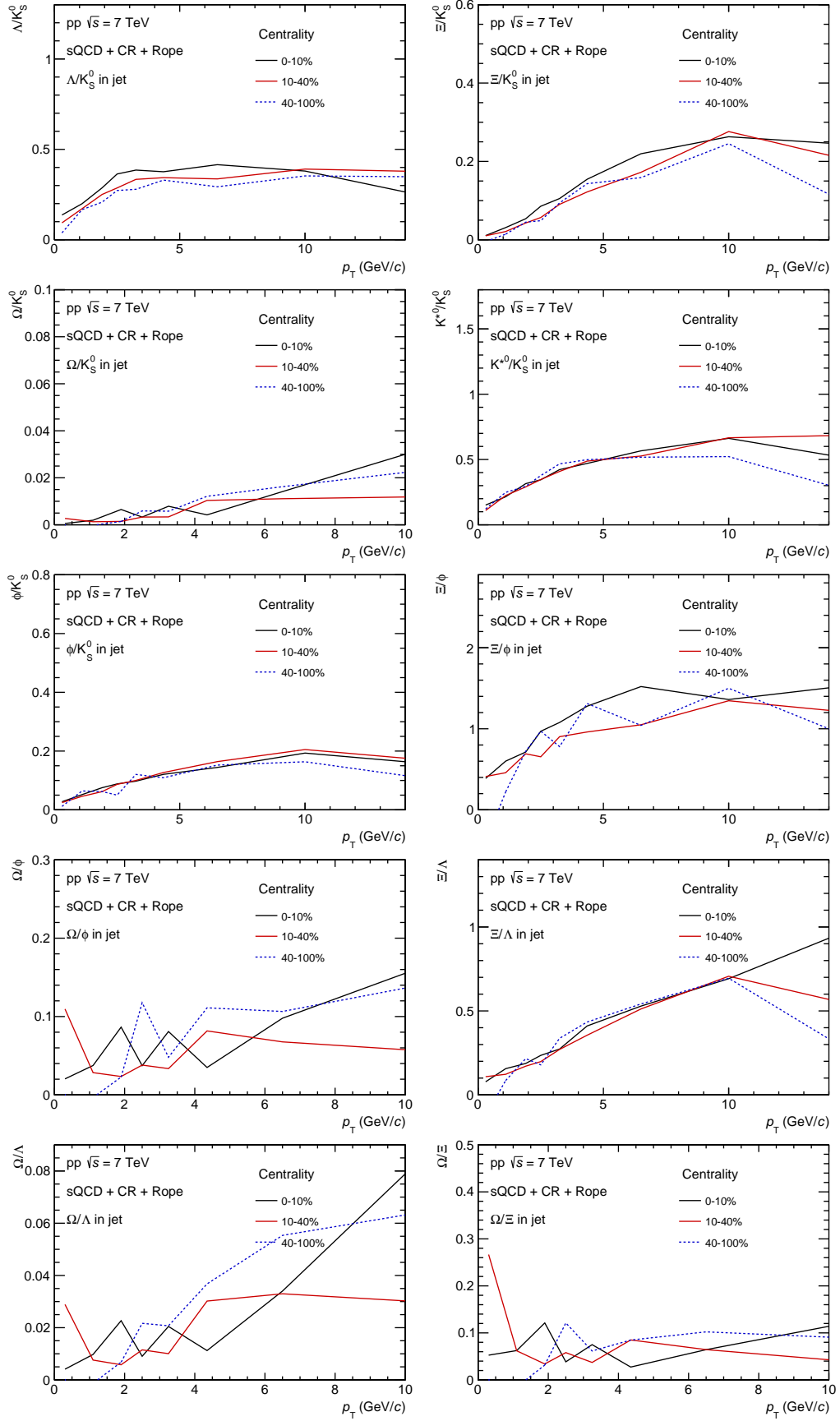


Figure 17: Particle ratios in jet with p_T distribution in different centrality bins (CR+Rope).

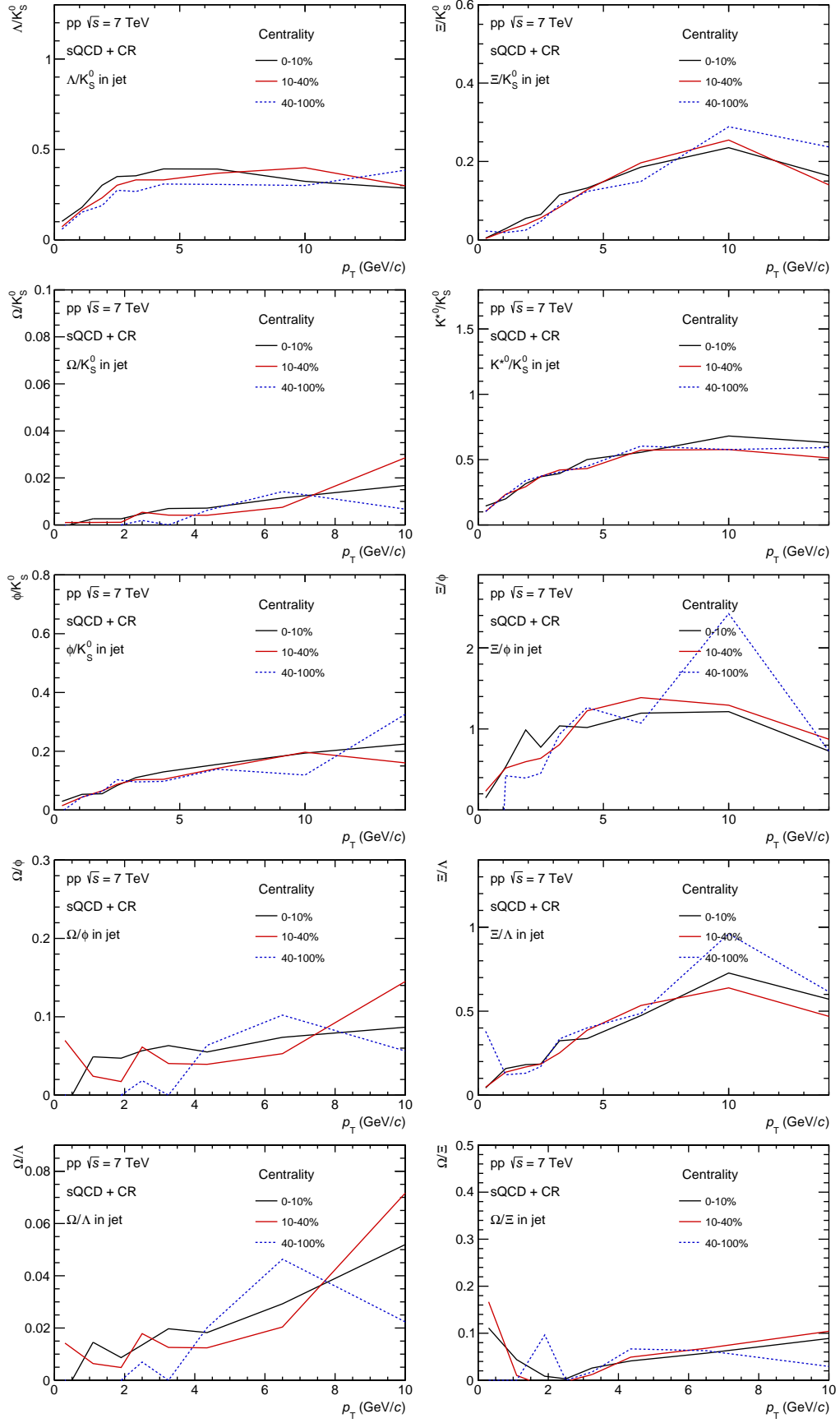


Figure 18: Particle ratios in jet with p_T distribution in different centrality bins (CR).

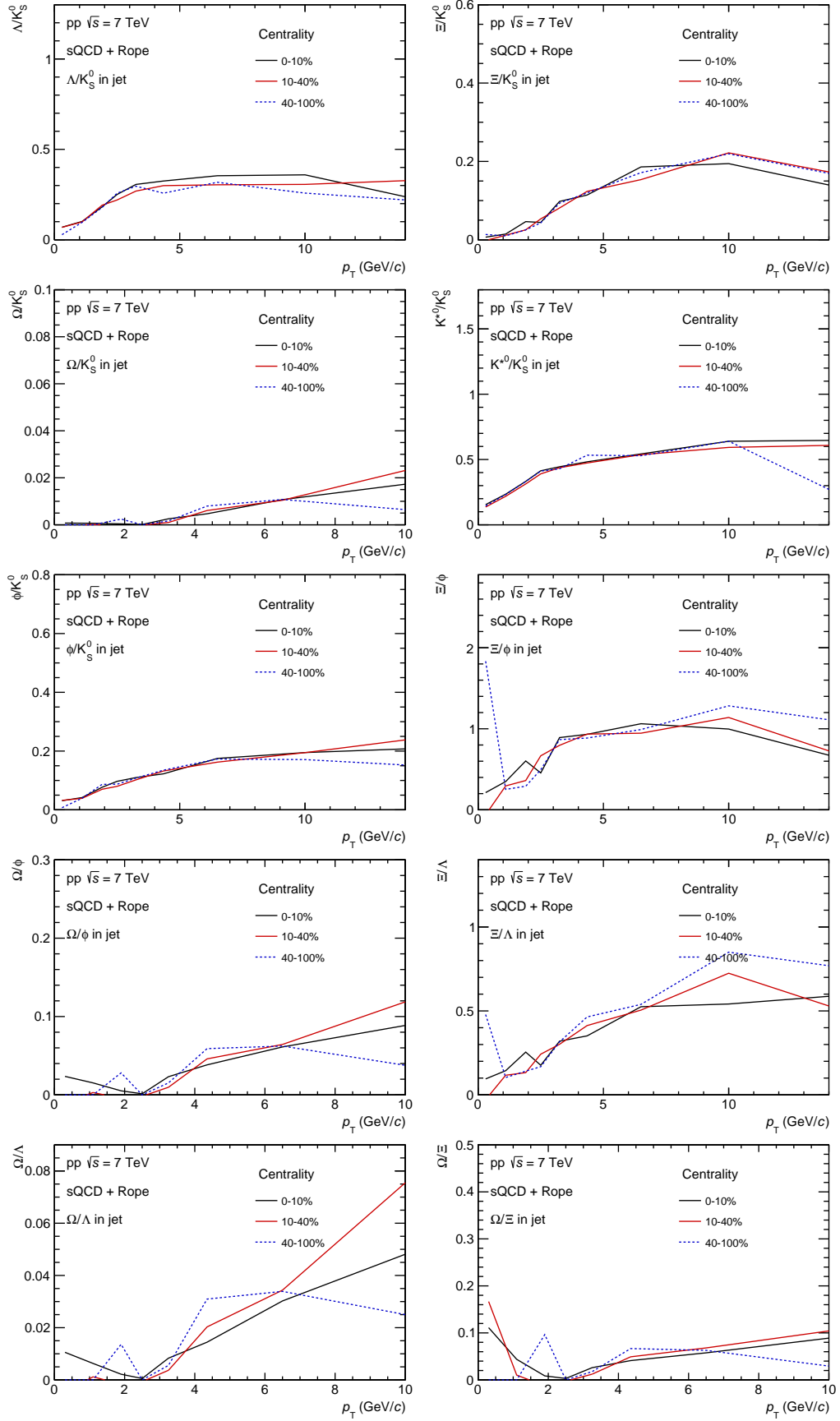


Figure 19: Particle ratios in jet with p_T distribution in different centrality bins (Rope).

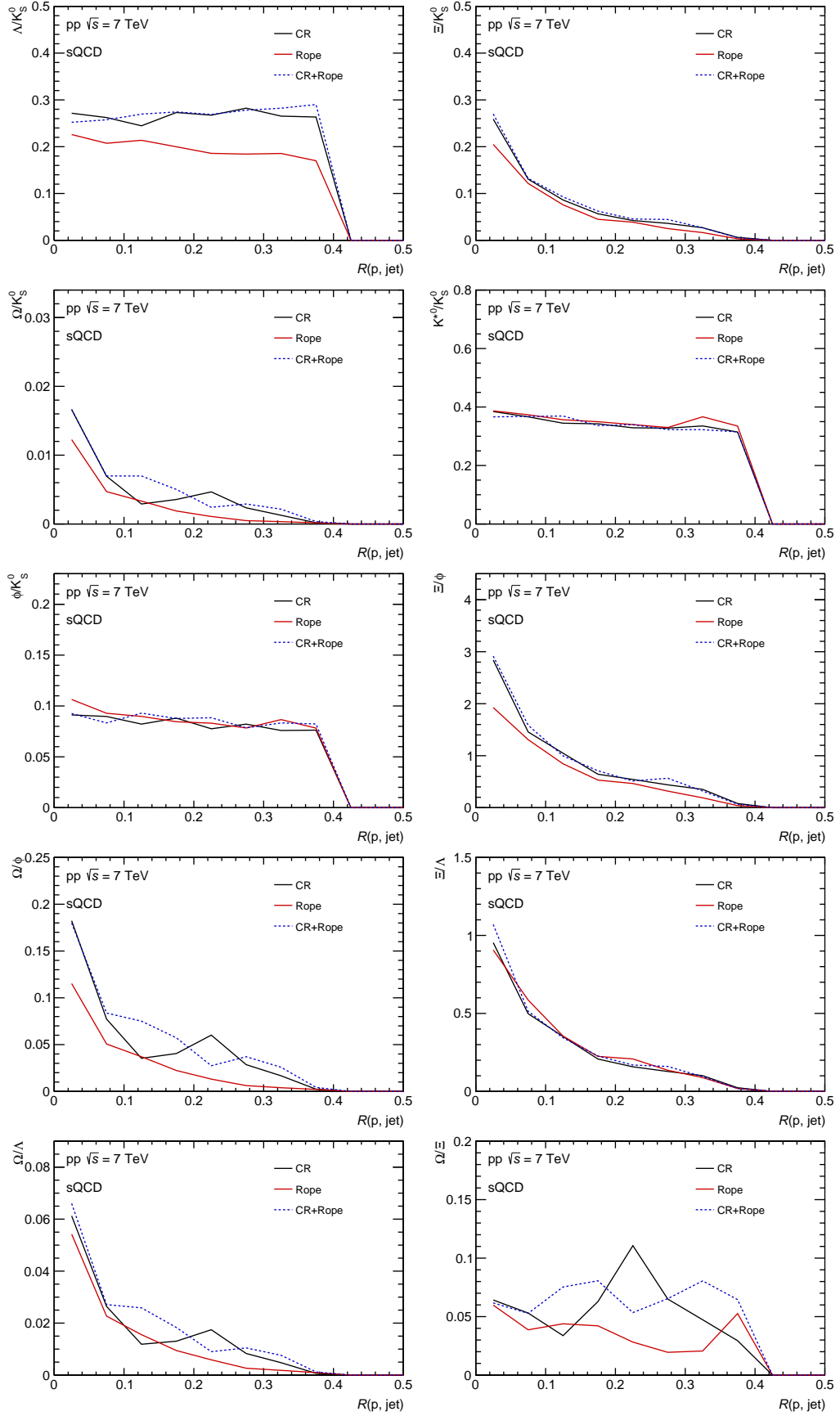


Figure 20: Particle ratios to jet axis range ($R(P, \text{jet})$) distribution. (The multi-strange hadrons (Ξ , Ω) have strong enhance at small $R(P, \text{jet})$)

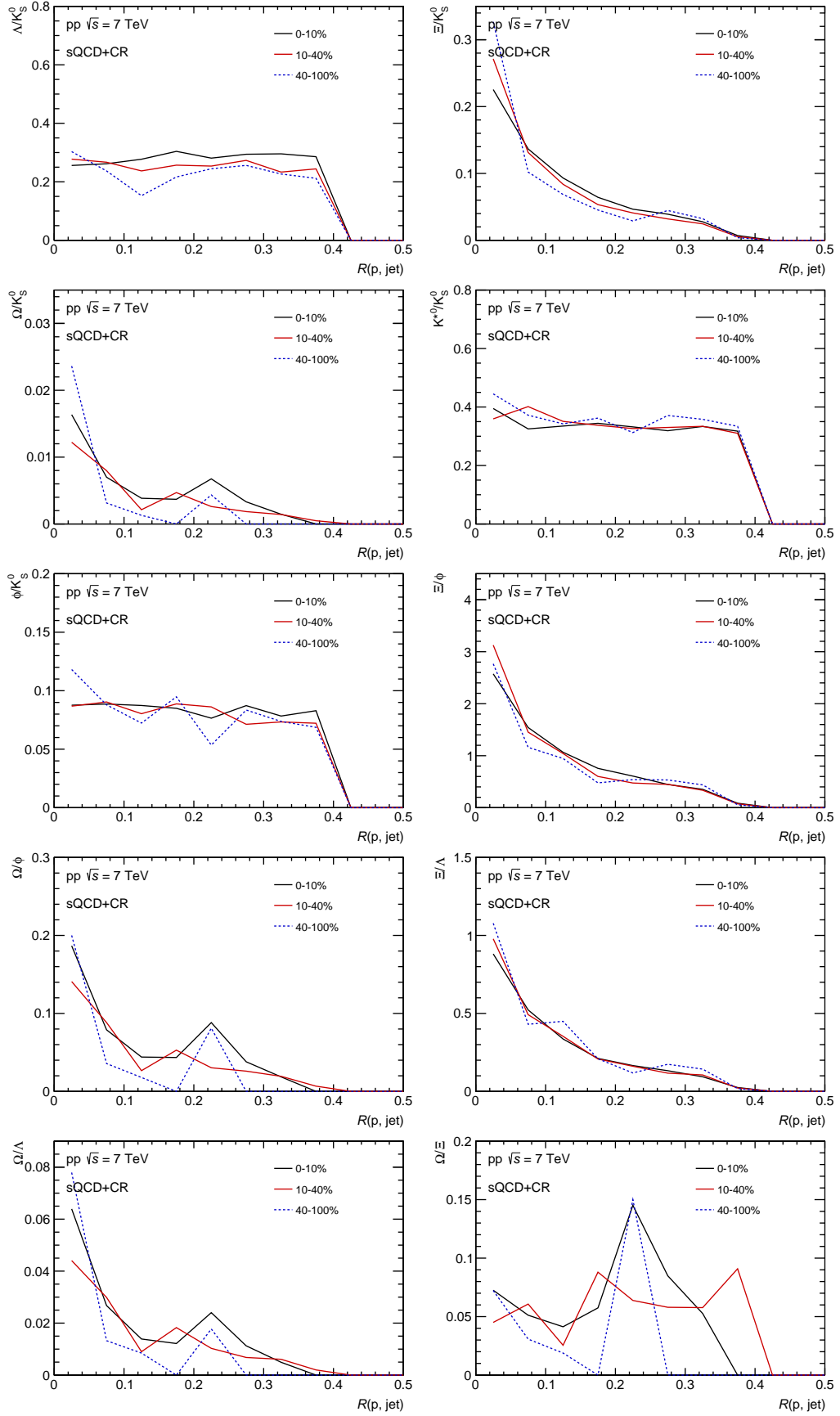


Figure 21: Particle ratios to jet axis range ($R(P, \text{jet})$) distribution. (The multi-strange hadrons (Ξ , Ω) have strong enhance at small $R(P, \text{jet})$)

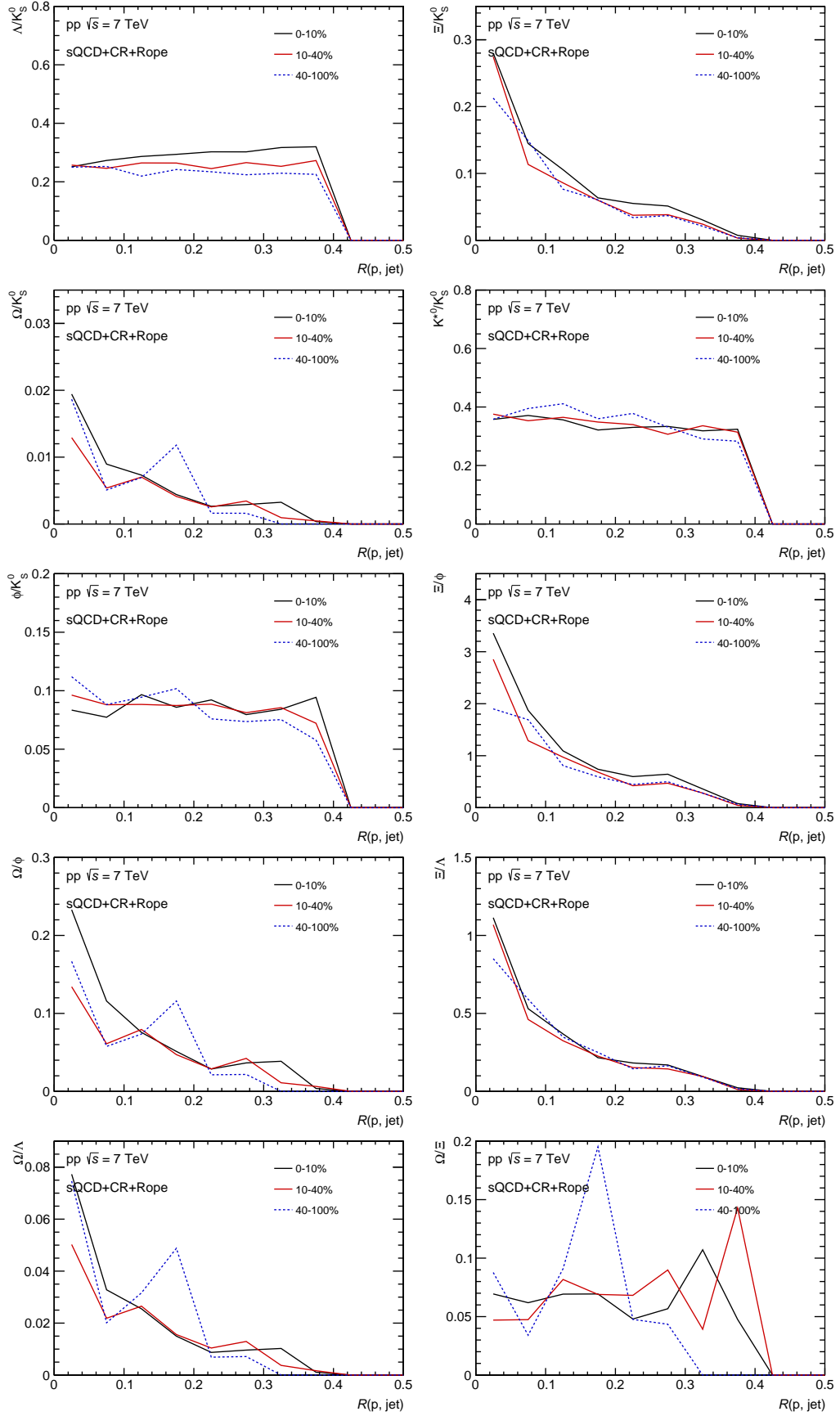


Figure 22: Particle ratios to jet axis range ($R(P, \text{jet})$) distribution. (The multi-strange hadrons (Ξ , Ω) have strong enhance at small $R(P, \text{jet})$)

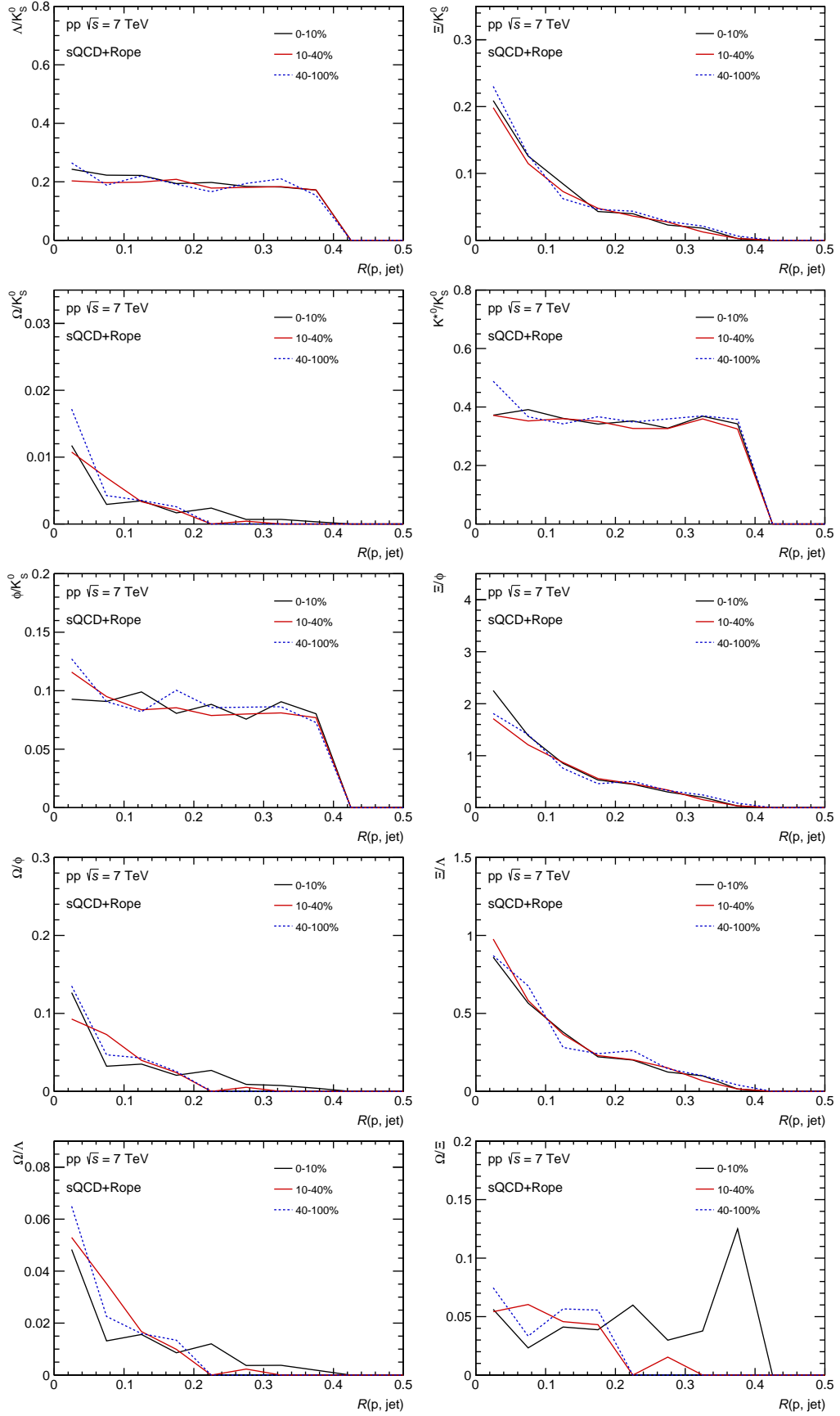


Figure 23: Particle ratios to jet axis range ($R(P, \text{jet})$) distribution. (The multi-strange hadrons (Ξ , Ω) have strong enhance at small $R(P, \text{jet})$)