Supplementary material

This appendix contains supplementary material that will posted on the public CDS record but will not appear in the paper. Variations of Fig. 4 are presented in Figs. 6 to 9 to facilitate the discussion of these results at conferences.

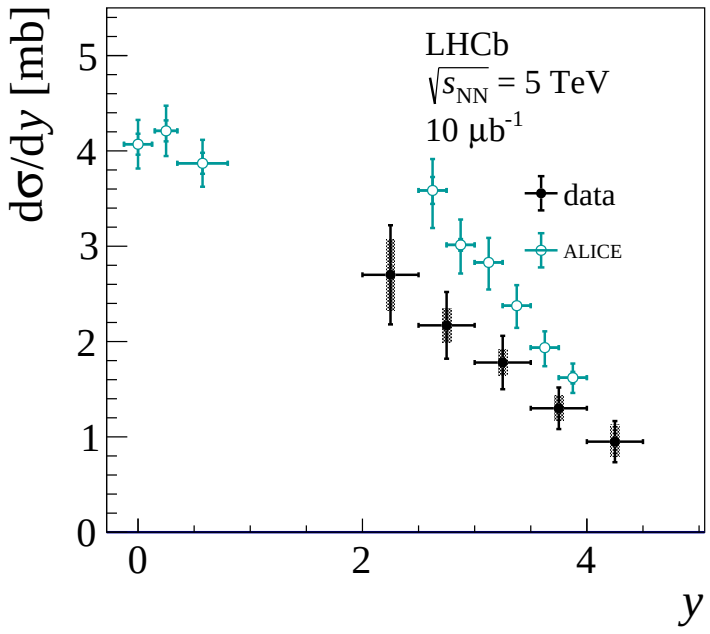

Figure 5: Differential cross-section as a function of rapidity for coherent J/ψ production compared to a measurement from the ALICE collaboration [1, 2]. The LHCb measurements are shown as points, where inner and outer error bars represent the statistical and the total uncertainties respectively.

In Fig. 5 the result at hands is compared with the result from the ALICE collaboration. The two measurements apparently deviate. In order to quantify the deviation, we summed up the values from Table 3 in the interval $2.5 < y < 4$ to be $2.63 \pm 0.38\,\text{mb}$ and then compared to the value from ALICE [1], $2.549 \pm 0.022\,(\text{stat.})^{+0.209}_{-0.237}\,(\text{syst.})/1.5\,\text{mb}$

$$\frac{\sigma_{\text{Alice}} - \sigma_{\text{LHCb}}}{\sqrt{\sigma^2_{\sigma_{\text{LHCb}}} + \sigma^2_{\sigma_{\text{Alice}}}}} = 2.3\ .$$

The statistical and systematic uncertainties were added in quadrature. In case of asymmetric uncertainties the direction was chosen according to the direction of the deviation. Given that for LHCb the dominant uncertainty arises from the luminosity determination, while for ALICE the largest uncertainty originates form the signal purity estimate, and both experimental setups are very different, the systematic uncertainties are assumed to be statistically independent. The two results deviate by 2.3 standard deviations.Improvements on the systematic uncertainties for both measurements may shed more light.

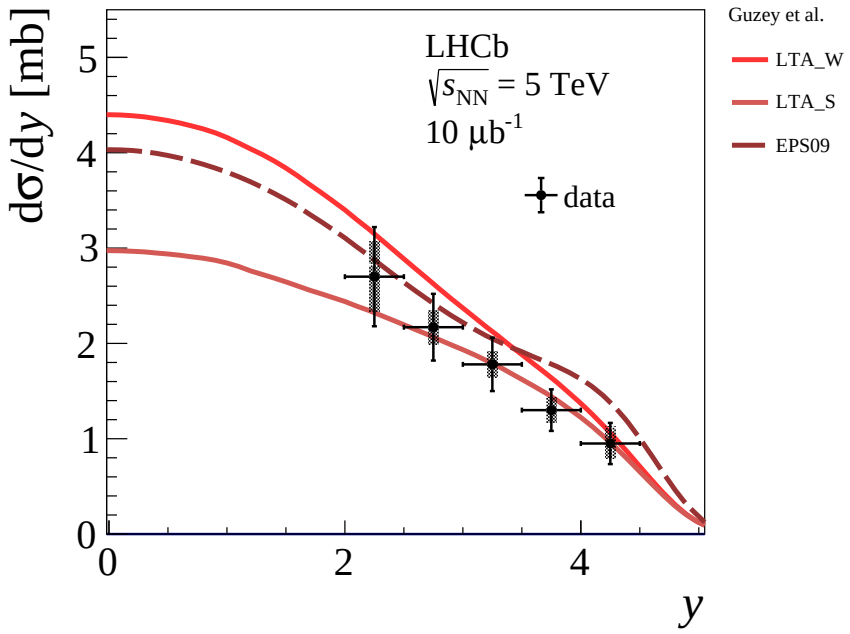

Figure 6: Differential cross-section as a function of rapidity for coherent J/ψ production compared to NRQCD predictions [3]. For the LHCb measurements the inner and outer error bars represent the statistical and the total uncertainties, respectively.

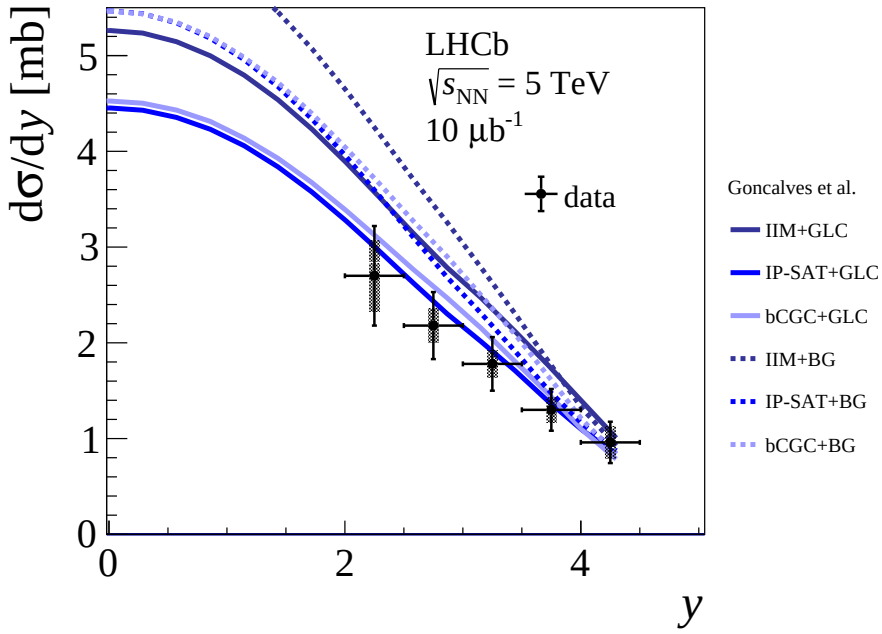

Figure 7: Differential cross-section as a function of rapidity for coherent J/ψ production compared to Colour-Dipole based predictions using the boosted Gaussian (BG) wave function [4, 5] and the Gauss-LC (GLC) wave function [4, 5]. The LHCb measurements are shown as points, where inner and outer error bars represent the statistical and the total uncertainties respectively.

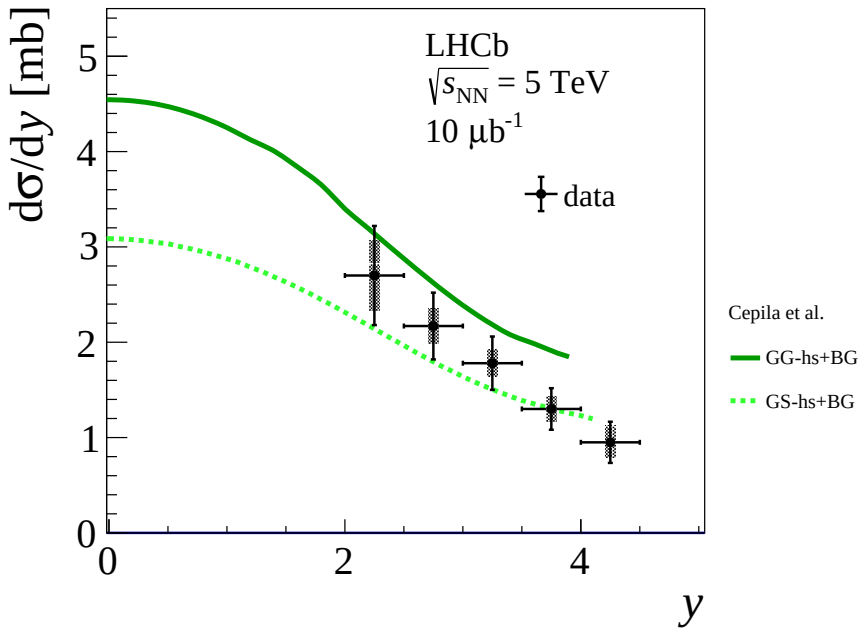

Figure 8: Differential cross-section as a function of rapidity for coherent J/ψ production compared to Colour-Dipole based predictions from Ref. [6]. The LHCb measurements are shown as points, where inner and outer error bars represent the statistical and the total uncertainties respectively.

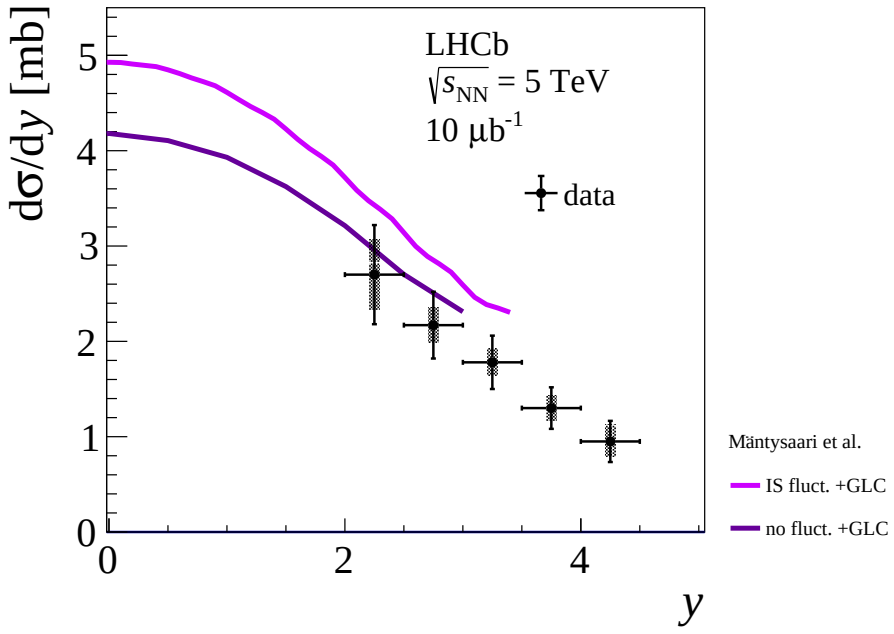

Figure 9: Differential cross-section as a function of rapidity for coherent J/ψ production compared to Colour-Dipole based predictions with and without taking into account initial state fluctuations [7]. The LHCb measurements are shown as points, where inner and outer error bars represent the statistical and the total uncertainties respectively.

References

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