

278 short-distance dynamics) is computed using the colour-singlet model, where the wave func-
 279 tion at the origin $|R(0)|^2 = 0.48 \text{ GeV}^3$ is determined from the leptonic decay width of the J/ψ :

$$280 \Gamma(J/\psi \rightarrow e^+e^-) = \frac{16\alpha^2}{9m_\psi^2} |R(0)|^2 = 4.72 \text{ keV}.$$

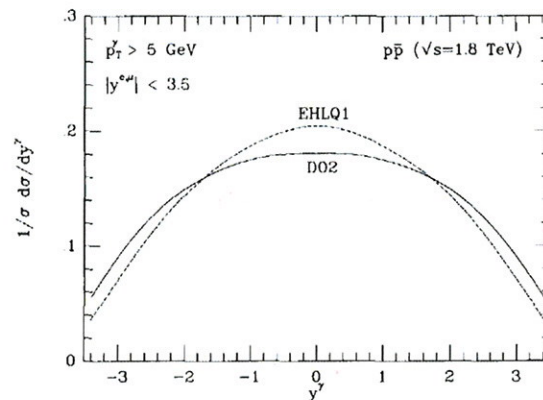


FIG. 4. Normalised differential cross section in γ for $J/\psi + \gamma$ (taken from [4]).

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$\bar{p}p$ collisions

\rightarrow uncollinear, or hadronic

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The cuts applied to the data are the following: $p_T^\gamma = p_T^\psi > 5 \text{ GeV}$ for the photon and J/ψ trans-
 \uparrow In order to match the experimental constraints,

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verse momentum and $|y^{\gamma, e, \mu}| < 3.5$ for the rapidities of the photon and the leptons. In Fig. 4 the

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rapidity distribution and the p_T spectrum of the photon are displayed, for two different parametri-

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sations of the gluon content of the photon, namely the EHLQ1 [?] and D02 [?], which make

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different assumptions about the behaviour of the $f_{g/p}$ structure functions. Despite their different

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behaviour at large and small x , the two parametrisations lead to similar results for the differential

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cross section, as shown. Therefore, although the events produced at $\bar{p}p$ collisions might not allow

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to extract useful information about the normalisation of the gluon densities $f_{g/p}$, they might allow

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a detailed measurement of their shape at small x , down to $\sim 10^{-4}$.

291

ep collisions

irrelevant.

de
 despite the difference in cut

Nowadays, the knowledge of gluon PDFs is of course better and one can systematically study the uncertainty of the PDF on given observable. It would therefore be very interesting to update this analysis with modern theoretical tools.

292 In this case the following cuts have been applied: $p_T^\gamma = p_T^\psi > 1.5 \text{ GeV}$ and $-3.5 < y^{\gamma, e, \mu} < 3$
 293 (negative rapidities correspond to the proton beam direction). An observation of a sizable signal,
 294 in these measurements, would be an ~~unambiguous proof for the existence of the~~ *very interesting signal of the* gluon content
 295 inside the photon. The gluon density functions of the photon and the electron are $f_{g/\gamma}$ and $f_{g/e}$ ~~and~~ *)?*
 296 respectively. For the calculation of the latter, the gluon content of the photon $f_{g/\gamma}$ is convoluted
 297 with the photon content of the electron $f_{\gamma/e}$. However, ~~there does not exist a momentum sum rule~~ *the gluon density in a photon,*
 298 for $f_{g/\gamma}$, to allow to extract information on its shape and renormalisation. ~~Fig?~~ *Fig?* shows the nor-
 299 malised rapidity distribution of the photon, using three different parametrisations of the photon
 300 structure functions: DG, LAC1 and LAC3. ~~The first one, is~~ *one* based on the assumption that the gluon
 301 densities inside photons come from gluon radiation off quarks, while in the analysis undertaken
 302 by the other two, ~~the existence of an "intrinsic" gluon content of the photon is taken into account.~~ *and the others assuming*
 303 The large differences ~~between the three curves in fig?~~ *which they obtained shows the discriminative power of $\gamma/\psi + \gamma$ on $f_{g/\gamma}$.* account for the lack of data constraining
 304 ~~$f_{g/\gamma}$ pointing to the essence of more $J/\psi + \gamma$ events at HERA. It should be stated, though, that~~ *As for the pp analysis, it would be worth updating such a study with ~~the~~ modern tools*
 305 ~~there is no guarantee that data will be described by any of these parametrisations.~~ *in view of the Electron-Ion collider and LHeC projects.*

CONCLUSION: *Recall the motivations and give your feelings*

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