Synergies between LHC and EIC for quarkonium physics

- Round table on PDF
- Round table on nPDFs
- Round table on production models :
  - Low vs large pt ?
  - LHC vs HERA/EIC : *pp* vs *ep*
- ?

ELSEVIER

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Inelastic leptoproduction of Jψ as a probe of the small-$_x$ behaviour of the gluon structure function

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Abstract

The differential cross section dσdx for the inelastic photoproduction of Jψ is predicted, via the subprocess $\gamma g \to \psi g$, to be sharply peaked at a small value, x_{peak}, of x and, even more remarkably, the integrated $\gamma N \to \psi X$ cross section is, up to a calculable numerical constant, essentially the proton-gluon distribution $xG(x)$ at $x \simeq x_{peak}$. Cross section measurements at HERA may thus provide a direct determination of $G(x)$ for $x \approx 10^{-3}$. Inelastic Jψ events arising from $b\bar{b}$ production are also studied.

Structure-function analysis and ψ, jet, W, and Z production: Determining the gluon distribution

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ABSTRACT

We perform a next-to-leading-order structure-function analysis of deep-inelastic μN and νN scattering data and find acceptable fits for a range of input gluon distributions. We show three equally acceptable sets of parton distributions which correspond to gluon distributions which are (1) "soft," (2) "hard," and (3) which behave as $xG(x) \sim 1/\sqrt{x}$ at small x. J/ψ and prompt photon hadroproduction data are used to discriminate between the three sets. Set 1, with the "soft"-gluon distribution, is favored. W, Z, and jet production data from the CERN collider are well described but do not distinguish between the sets of structure functions. The precision of the predictions for σ_W and σ_Z allow the collider measurements to yield information on the number of light neutrinos and the mass of the top quark. Finally we discuss how the gluon distribution at very small x may be directly measured at DESY HERA.

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g-g luminosity at charmonium scales

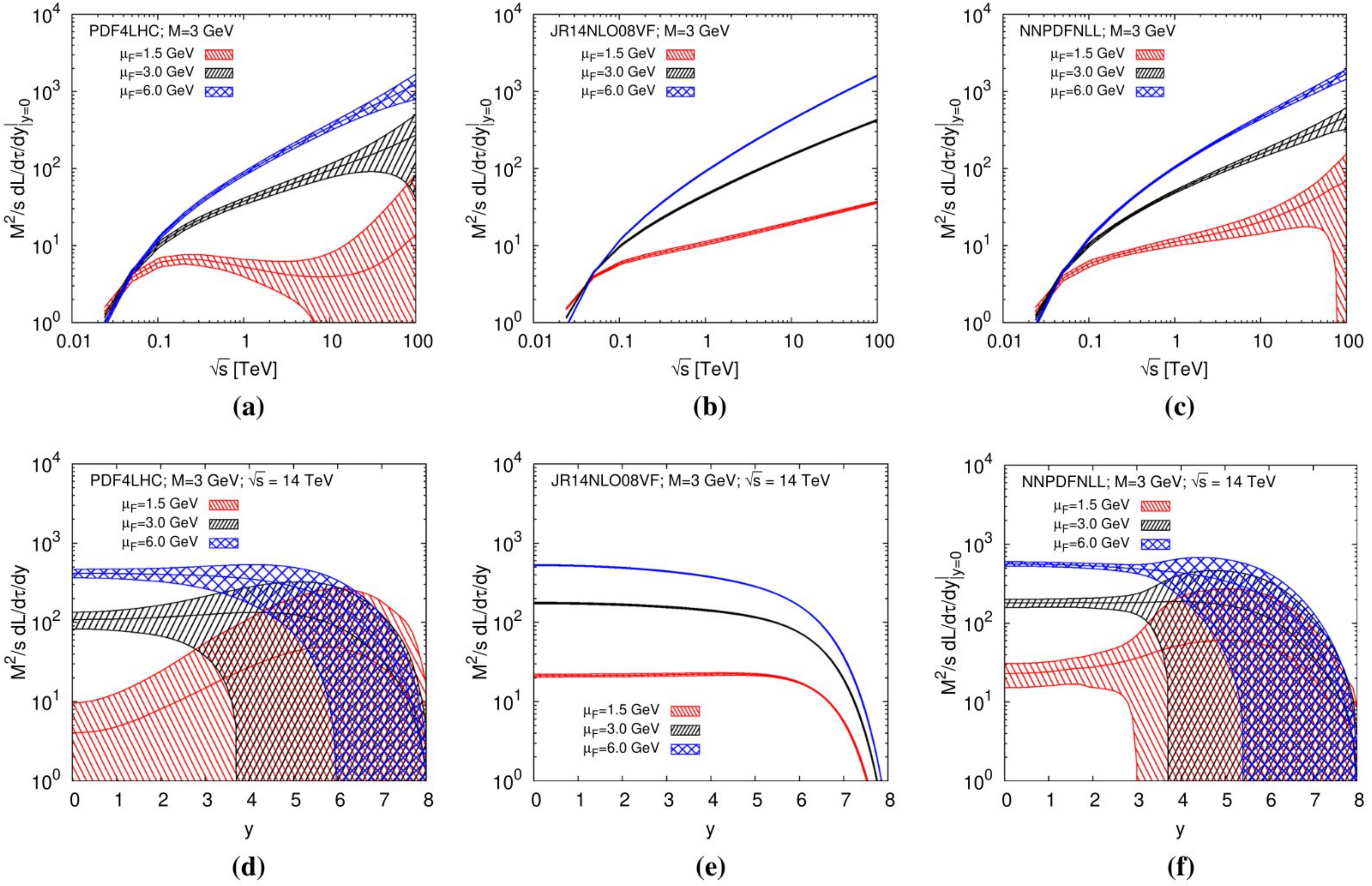


Fig. 5 $\tau_0 \frac{\partial \mathcal{L}}{\partial \tau \partial y}$ as a function of energy $\sqrt{s}$ and at $y = 0$ (top) and $\tau_0 \frac{\partial \mathcal{L}}{\partial \tau \partial y}$ as a function of y at $\sqrt{s} = 14$ TeV (bottom) for $M = 3$ GeV (for PDF4LHC15_nlo_30 (left), JR14NLO08VF (middle) and NNPDF31sx_nlonllx_as_0118 (right)) for 3 μ_F values ($0.5M$, M and $2M$)

Inclusive eta(c) yield energy dependence

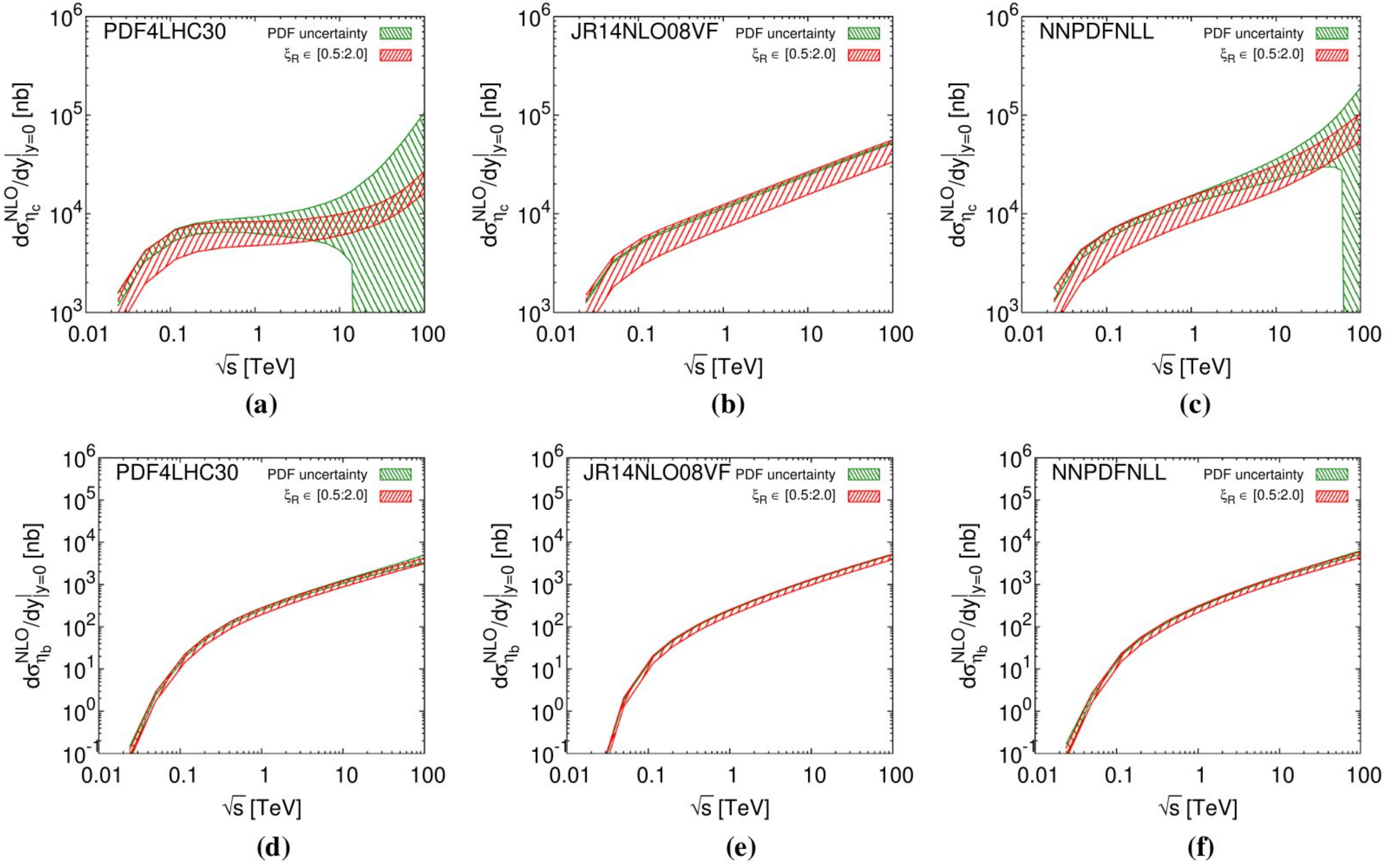
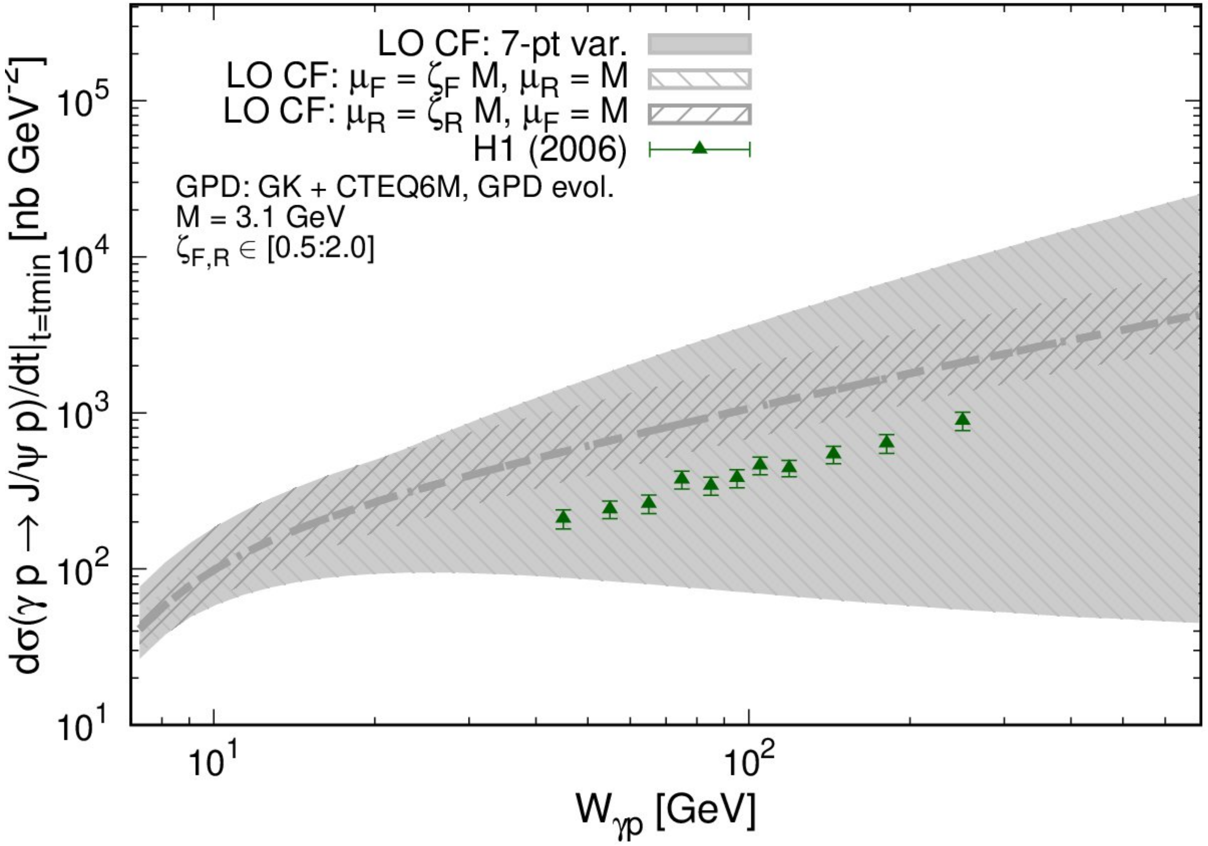


Fig. 9 $\frac{d\sigma^{NLO}}{dy}|_{y=0}$ for η_c (top) and η_b (bottom) (for PDF4LHC (left), JR14NLO08VF (middle), NNPDFsxNLONLL (right)) as a function of $\sqrt{s}$ for our $\hat{\mu}_f$ scale. The green bands indicate the PDF uncertainty (for $\mu_R = \mu_F$) and the red band, the μ_R uncertainty (for $\xi_R \in [0.5 : 2]$)

Exclusive J/psi at LO :'PDF squared'

CTEQ6M : local maximum



JR14 : monotonous