

We thank the referee for their time in reviewing our paper and for their positive appreciation. In the following we reply to each of the comments raised in turn:

1. *1 TeV proton data are mentioned in context of extending the kinematic range, would these not also be useful for the measurement of F_L and hence the gluon PDF—please comment.*

The referee is correct that data taken at $E_p = 1$ TeV provide a further handle to constrain the gluon PDF, as was the case at HERA. We note that we are already including all this information since our pseudo-data for LHeC is expressed in terms of reduced cross-sections and thus sensitive to the appropriate combination of F_2 and F_L at small x .

In the revised version of the paper, we have added a sentence mentioning that the availability of data at different values of E_p allows to disentangle the contributions from F_2 and F_L , and that in addition to providing a further handle on the small- x gluon, this represents an important measure to test departures from the DGLAP regime such as small- x resummation or saturation.

2. *Add to references 31 and 32 a reference to arXIV:1906.01884 on the same topic.*

We have added this reference.

3. *The use of open charm and beauty production and exclusive vector meson production to constrain the low- x gluon is made. The theoretical status of these processes is not on the same level as the cross sections used and I think this should be pointed out.*

This is true, and we have added a sentence clarifying that the theory is not available at the same level of precision in these cases.

4. *On page 15 it becomes a little confusing when it is stated that 'when the LHeC pseudo-data are generated with this more restrictive HERAPDF2.0 parameterisation one is making strong assumptions about the future'. Surely the LHeC pseudo-data are whatever they are independent of whether or not PDF4LHC15 or HERAPDF2.0 are being used for the profiling exercise. The strong assumption is that the HERAPDF parameterisation will be adequate to describe future LHeC data. Can the authors please clarify, or re-phrase?*

The referee is right that the relevant assumption is whether the HERAPDF parameterisation is adequate to describe future LHeC data. The point is just that in the context of these closure test studies (where one always has the same set producing the pseudodata as the theory, which are by construction in agreement), this assumption is reflected in which set you use to generate the pseudodata. If one generates with PDF4LHC one is assuming that the parameterisation underlying this set will be sufficient to describe the future data, and similarly for the case of HERAPDF. We have added a sentence to the start of the second paragraph of section 5 to try and clarify this point a little more.

5. *In Fig 5.5 an attempt is made to separate the role of the input data set and the parameterisation. This is quite interesting but the model and parameterisation variations for the HERAPDF are not used. It would be interesting to see this figure when they are used. However since this is not the most important point of the paper, I do not insist.*

We have made these plots, and added them (Fig. 5.6) to the paper. The message is broadly similar to Fig. 5.5, but with somewhat larger PDF uncertainties in the baseline case in comparison to the experimental uncertainty only HERAPDF set.