

# QCD@LHC2022

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## Parton Distributions and New Physics Searches: the Drell-Yan Forward-Backward Asymmetry as a case study

*Friday 2 December 2022 10:00 (15 minutes)*

We discuss the sensitivity of theoretical predictions for observables used in searches for new physics to current knowledge, or lack thereof, of parton distribution functions (PDFs) at large momentum fractions. We specifically consider the neutral-current Drell-Yan production of gauge bosons with invariant masses in the TeV range. We study the forward-backward asymmetry of charged leptons from the decay of the gauge boson in its rest frame, a traditional probe of new physics: we demonstrate that its qualitative behavior strongly depends on the behavior of the PDFs. We discuss and compare the large- $x$  behavior of different PDF sets, and find that they differ significantly. Specifically, the behavior observed at lower invariant masses, common to all PDF sets, is not necessarily reproduced at large masses if unbiased PDFs are used. It follows that deviations from it cannot be taken as an indication of new physics. We show that forward-backward asymmetry measurements could help in pinning down the PDF uncertainty at large momentum fractions and discuss the accuracy that would be required in order to enable searches for new physics that rely on knowledge of PDFs in this region.

(Abstract submitted on behalf of the NNPDF Collaboration, speaker will be indicated at a later stage)

### Declaration

I certify that I have checked that I am authorised to submit the abstract with the listed co-authors with their current affiliations

### Change of Speaker

I understand that change of speaker is allowed provided that no participant gives more than one talk. Otherwise, we will ask the speaker to choose between one or the other abstract to be presented.

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**Session Classification:** Parallel B - WG8: 1

**Track Classification:** WG8: QCD for BSM studies