

# Introduction (PDFs for precision DY measurements at the LHC)

- **Welcome to everyone for our first meeting on this topic since quite some time!**
- **For various reasons, among which the most prominent is the workload of most of the key participants in the concrete work required to measure the correlations between the global PDFs, there has been little progress since last fall on this important topic in our working group.**
- **There is no need to remind ourselves each time of the importance of this issue which only increases as the relevance of the LHC measurements to the global electroweak fit becomes more important. It is expected that the full run-2 weak mixing angle measurement combined among ATLAS/CMS/LHCb and the forthcoming measurements of the W boson mass in CMS and ATLAS (plus possibly in CDF/D0 at the TeVatron) will have a real impact on the global electroweak fit.**
- **It is therefore extremely important that a more rigorous treatment of PDF uncertainties be in place before this happens.**

# Introduction (PDFs for precision DY measurements at the LHC)

- Many discussions plus a significant amount of work have taken place from end of 2018 to summer 2019 to put in place what is required to achieve this goal.
- The ambitious initial documented goal of producing  $\sim 10000$  toys of all data used by all global PDFs (ABM, CT, MMHT, NNPDF will eventually all hopefully participate in this exercise so that our community learns as much as is feasible from it) to a very much descoped minimal goal.
- This goal is to produce  $\sim 1000$  toys for a minimal set of data which hopefully satisfy the following criteria:
  - a) these data should be among the most critically relevant to DY measurements at the LHC
  - b) the amount of data used should be sufficient to provide a proper convergence of the global PDF fits
- We have agreed in previous discussions in our working group that if such a goal can be achieved by  $\sim$  end of this year and if what we learn from the exercise is clear enough, then we would have achieved real progress towards the longer term goal and hopefully could publish the results since this would be the first time such correlation measurements would have been performed.

# Introduction (PDFs for precision DY measurements at the LHC)

- The framework to produce these correlation measurements has been put in place and developed steadily last year:
  - a) xFitter is used to produce and validate the toys. Internally, the procedure has been shown to work well and efficiently.
  - b) the students who have done most of this work under the supervision of Sasha and Simone have also worked in collaboration with ATLAS/CMS colleagues and global PDF experts to adapt the output of the toys to a format suitable for global fits. This was shown to be operational for CT for HERA data, and should be close to operational for MMHT and ABM although this has not been shown clearly yet.
  - c) the participation of NNPDF in this exercise will hopefully come when the other three global PDF sets are operational and first correlation measurements between them are available. Since the NNPDF collaboration is quite strong, it is hoped that, despite the heavier computing load required to produce NNPDF replicas from the toys, the medium-term goal of producing a larger set of toys with all four global PDF sets could still be achieved.
- **Today's agenda:**
  - **status of toys (Sergey and Valiantsin)**
  - **proposed minimal set of data for toys and update on MMHT (Robert)**
  - **photon-induced processes and the use of QED PDFs (Alessandro)**