Benchmarking PDFs and $p_T^{W/Z}$

- **Many thanks to Lucian, Stefano, Pavel and Sergey for their presentations and input to our WG. We believe that based on this first round of discussions we should be able to define precisely a benchmarking exercise for PDF sets in time for the December meeting with the PDF4LHC forum (see next slides)**

- **Many thanks to Luca, Stefano, Josh and Frank for their presentations on resummed pTW/Z calculations. The various approaches are now advanced enough that here also we could hopefully define a benchmarking exercise with several steps (see next slides)**

- **Later today, we will see that we are also close to have three different calculations of QED/EW higher-order corrections relevant for the weak mixing angle interpretation of asymmetry measurements at the Z pole. Here the benchmarking exercise is more or less defined.**

Benchmarking PDFs

- Feedback on performing a new benchmarking exercise with the global PDF set experts has been rather positive, and there has already been direct feedback from CTEQ for example on the impact on CT14 from the ATLAS s2w preliminary result.
- Some specific points were raised concerning certain presentations:
- Most importantly, precision of run-1 DY measurements is already so high that many imperfections/missing features in PDF theory limit the interpretation one can make of such measurements (purely perturbative calculation clearly insufficient, theory uncertainties are really needed as an integral part of PDF fits, eigenvalue-based uncertainties without ability to drill back tp real sources of uncertainty may hide important messages).
- Tolerances put in place by CTEQ and MMHT have a wide spread of values and basically double the uncertainty before applying such criteria. They might reflect tension between different data or between certain data and the underlying theory. It was suggested that one might apply these tolerances in a more source-oriented way (source may be region of phase space, specific dataset, theory itself which has no uncertainties still today)
- Fitted charm from NNPDF should be also included in other sets if really needed
- PDF4LHC15 will probably not bring a deeper understanding of PDF uncertainties and of their correlations between different groups.
- ABM analysis of strangeness un-suppression seen by ATLAS should be revised based on presentation made by Mandy Cooper-Sarkar in the morning session of Tuesday
- Further discussion needed about reasons for ABM being so much an outlier in eg plots shown by A. Glazov for sigma(ttbar) versus sigma(Z)

Benchmarking $p_T^{W/Z}$

- For resummation calculations, which do not need ab initio to produce exactly the same result for a specific point in phase space of the observable of interest, a first level of benchmarking would be eg for Z production alone, for m_ll = m_Z, y_ll = 0, and without decay. Several such points should be probed with their uncertainties

- The second level of benchmarking could be a point of intersection between MC generators and calculations, eg over a wider range of m_ll and y_ll, and with both options considered, namely full phase space of decay leptons and fiducial phase space typically that already defined in experimental talks from ATLAS/CMS/LHCb.

- The participation of MC tools requires very detailed documentation of their configuration, which ideally could be one used by several experiments.

Back-up slides