## Initial studies of N3LO fits

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## **INTRODUCTION:**

- 1. Installed xFitter master N3LO branch
- 2. Added Apfelxx v4.8.0 and Apfel v3.0.6
- Using Apfelxx for N3LO and N2LO parametrization
- 3. Added Hoppet v1.3.0
- Comparison of Hoppet's performance with Apfel

- Change parameterization in N2LO and N3LO (add and delete some parameters) for optimisation
- Use only D (Duv, Ddv, Dubar, Ddbar, Dg)

 $\chi^2$  NNLO = 1452.82  $\chi^2$  NNNLO = 1493.63

- Use D and E (Duv, Ddv, Dubar, Ddbar, Dg, Euv, Edv, Eubar, Edbar, Eg)

 $\chi^2$  NNLO = 1440.18  $\chi^2$  NNNLO = 1450.27

Functional Forms for PDF Parametrisation  $xfi(x) = (Ai^{*}(x^Bi)^{*}(1-x)^Ci)^{*}(1+Di^{*}x+Ei^{*}x^2+Fi^{*}ln(x)+Gi^{*}ln(x)^2)$ 









Selected distributions which have largest differences

N3LO

(<sub>2</sub>0'х)0.25  $Q^2 = 1.9 \text{ GeV}^2$ xFitter temp/N3LO\_D+E/output/ temp/N3LOjustD/output/ 0.2 0.15 0. 0.05 -0.05 10-3 10-4 10-2 10-1 1 x xg(x,Q<sup>2</sup>)  $Q^2 = 1.9 \text{ GeV}^2$ xFitter 25 - temp/N3LO\_D+E/output/ - temp/N3LOjustD/output/ "justD" vs "D+E" 0.5 10<sup>-3</sup> 10<sup>-2</sup> 10-4 10<sup>-1</sup> x 1







Try to use the Hoppet evolution. Branch "hoppet". Comparison Hoppet with Apfel

Based on "examples/ploughshare",

ATLAS 7 TeV W+ production data

 $\chi^2$  Hoppet = 88

 $\chi^2$  Apfel = 116

xg(x,Q²)

3⊢

2.5

2

1.5

0.5



 $\rightarrow$  some differences for the gluon WIP

V

## Thank you for you attention

## 1) Use the same parameters for N2LO parametrization with APFEL and APFEL++

N2LO  $\chi^2 = 1317.42$  APFEL++

N2LO  $\chi^2 = 1283.49$  APFEL

