

# Implications of LHCb measurements and future prospects

## Forward Electroweak Physics & LHCb potential for pA and AA physics Introduction to the session

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# Forward electroweak and QCD physics in pp

- ✿ LHCb: unique kinematical coverage offers excellent opportunities to constrain the parton distributions (PDFs) in a range complementary to that of ATLAS and CMS and to provide high-precision tests of the Standard Model
  
- ✿ Inclusive W and Z production at large rapidities allows to pin down quark flavor separation
- ✿ Low-mass Drell-Yan production constrains low-x quarks as well as the photon PDF  $\gamma(x,Q)$   
Farry (exp), Ubiali (th)
  
- ✿ Charm and beauty meson production and charmonium/bottomonium production allows to access the poorly known small-x gluon PDF in a region without direct information from other experiments  
Johnson (exp), Teubner (th)
  
- ✿ Top quark pair production at LHCb can provide information on the large-x gluon, and top quark asymmetries can be used a window to new physics Beyond the Standard Model  
Coco (exp), Gauld (th+exp)
  
- ✿ Forward soft and semi-hard QCD measurements at LHCb can be used to tune Monte Carlo event generators in a region complementary to the ATLAS/CMS coverage: unique information on Underlying Event and Minimum Bias physics  
Ilten (th+exp)

# LHCb potential for pA and AA measurements

💡 The **LHCb** kinematical coverage becomes even more important for **pA** and **AA** collisions: available fixed-target pA data restricted to **Bjorken  $x>0.01$** . ATLAS and CMS pA program now exploring smaller  $x$ , but LHCb only experiment able to access the low  $x$  and  $Q^2$  region

💡 pA measurements provide an essential baseline for the LHC AA program, in particular with studies of the nuclear modifications of PDFs and of cold nuclear matter. Nuclear PDFs much poorly known than proton PDF: excellent potential for high impact with **LHCb measurements**

Schmelling (exp), Armesto (th)

💡 AA measurements on **LHCb** can provide unique information for the characterization of the hot and dense medium created in heavy ion collisions, the quark gluon plasma

💡 These measurements should be based on soft probes, like multiplicities and flows but also, depending on the statistics, for hard probes like identified hadrons, jets, photons and open heavy quarks

Robbe (exp), Armesto (th)