

# 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 **unique 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)**