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Measurement of the inelastic pp cross-section at a centre-of-mass energy of $\sqrt{s}=7$

The paper is available here [↗](#).

arXiv: 14012.2500 , LHCb-PAPER-2014-057, JHEP 02 (2015) 129, DOI: 10.1007/JHEP02(2015)129

More detailed information [LHCb-ANA-2013-021 ↗](#)

Abstract

Abstract The cross-section for inelastic proton-proton collisions, with at least one prompt long-lived charged particle of transverse momentum $p_T > 0.2$ GeV/c in the pseudorapidity range $2.0 < \eta < 4.5$, is measured by the LHCb experiment at a centre-of-mass energy of $\sqrt{s} = 7$ TeV. The cross-section in this kinematic range is determined to be $\sigma_{\text{acc}} = 55.0 \pm 2.4$ mb with an experimental uncertainty that is dominated by systematic contributions. Extrapolation to the full phase space, using Pythia 6, yields $\sigma_{\text{inel}} = 66.9 \pm 2.9 \pm 4.4$ mb, where the first uncertainty is experimental and the second is due to the extrapolation.

Figures

(Note, pdf and eps versions are available under attachments).

Caption	Figure
<p>Figure 1: Normalized track multiplicity distributions with $n \geq 1$ tracks in the fiducial region for the field-down configuration and tight cut settings in data and simulation. The superimposed function is an exponential with the same average as the simulation. The right hand plot with a linear scale shows a zoom of the low-multiplicity region. The vertical error bars are smaller than the symbol sizes.</p>	
<p>Figure 2: Inelastic cross-section measured by LHCb compared to the existing data on the total [26] and inelastic cross-sections [27] in pp and pp collisions as a function to the centre-of-mass energy. The full (dashed) line is a phenomenological fit [28] of the energy dependence of the inelastic (total) cross-section. The main plot only shows the LHCb measurement. The inset is a zoom, comparing all inelastic cross-section measurements by</p>	

the LHC experiments ALICE [7], ATLAS [8, 9], CMS [10] and TOTEM [11, 12]. The horizontal line represents the value of the phenomenological fit at $\sqrt{s} = 7$ TeV. The error bars give the total uncertainties of the measurements. When an inner error bar is shown, it represents the experimental uncertainties added in quadrature, while the full error bar also covers an extrapolation uncertainty.

Figure 3: Extrapolation factors and fractions for the different interaction types obtained from the Monte Carlo approach for the determination of the uncertainty of the extrapolation factor. The interaction type fractions are shown for non-diffractive (ND), single-diffractive (SD) and double-diffractive (DD) interactions.

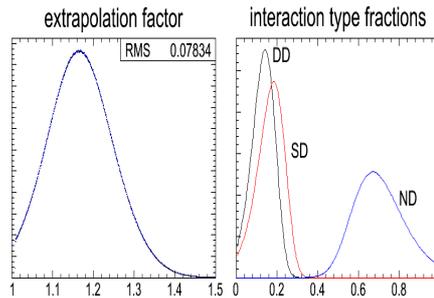
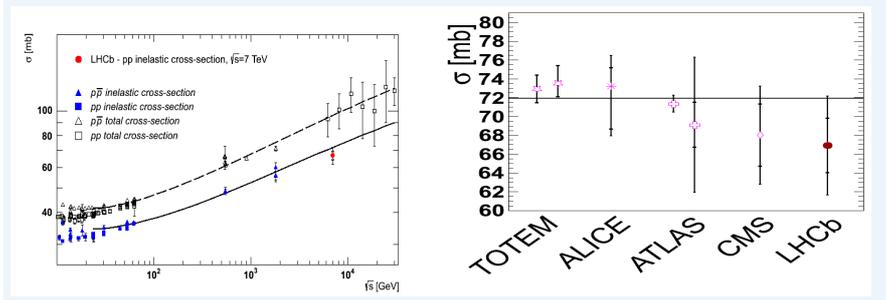


Figure 4: (top) Energy dependence of the total and inelastic cross-section with the LHCb measurement, and (bottom) comparison of the pp cross-section measurements at $\sqrt{s} = 7$ TeV by the LHC experiments.



-- KatharinaMueller - 2015-01-05

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