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Measurements of total pp cross sections at 8 TeV and 13 TeV with the ATLAS detector

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The total pp cross section is a fundamental property of the strong interaction which can not be calculated in perturbative QCD but only described based on phenomenological models.

The ATLAS collaboration has recently measured the total inelastic protonproton cross section

and the diffractive part of the inelastic cross section at 13 TeV in special data sets taken with low beam currents and using forward scintillators.

A more precise measurement of the total pp cross section as well as elastic and inelastic contributions can be extracted from a measurement of the differential elastic cross section using the optical theorem. The ATLAS Collaboration has collected 0.5 /nb of elastic data in a dedicated run with high beta* optics at 8 TeV centreofmass

energy with the ALFA Roman Pot

detector in order to perform this measurement. From the extrapolation of the differential elastic cross section to $t=0$, using the optical theorem, the total cross section is extracted with the luminositydependent

method with unprecedented precision. In addition the nuclear slope of the elastic tspectrum

and the total elastic and inelastic cross sections are determined.

Primary author: STENZEL, Hasko (ATLAS)

Presenter: STENZEL, Hasko (ATLAS)

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