



Contribution ID: 655

Type: Oral contribution

## The TOTEM experiment at LHC for proton-proton cross section measurements.

*Thursday 30 July 2015 11:15 (15 minutes)*

The precise knowledge of the proton-proton cross section is extremely important to model the development, in the atmosphere, of the showers induced by the interaction of ultra high energy cosmic rays.

The TOTEM (TOTAl cross section, Elastic scattering and diffraction dissociation Measurement at the LHC) experiment at LHC, has been designed to measure the total proton-proton cross-section with a luminosity independent method, based on the optical theorem, and study the elastic and diffractive scattering at the LHC energy. This method relies on the capability of the simultaneous measurements of inelastic and elastic rates; in the TOTEM experiment this is possible thanks to two forward inelastic telescopes, covering the pseudorapidity range  $3.1 < \|\eta\| < 6.5$ , and Roman Pot detectors, that can be inserted down to few hundred microns to the beam centre.

Thanks to dedicated runs, taken between 2011 and 2012, with special beam optics, TOTEM experiment was able to measure the elastic, inelastic and total cross-section at  $\sqrt{s} = 7 TeV$  and  $8 TeV$ , using the luminosity independent method, along with the pseudorapidity distribution of charged particles.

In this contribution the latest results of the TOTEM experiment will be described along with its performance and the future physics program for the LHC run 2.

### Collaboration

TOTEM

### Registration number following "ICRC2015-I/"

575

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