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## Elastic scattering, total cross-section and charged particle pseudorapidity density in 7 TeV pp reactions measured by the TOTEM Experiment at the LHC

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The TOTEM experiment at LHC measured the differential cross-section of elastic p+p scattering at 7 TeV, with the help of Roman Pot detectors placed as close as seven times the transverse beam size from the outgoing beams [1]. Results indicate an initial exponential decrease of  $d\sigma/dt$ , followed by a significant diffractive minimum at  $|t| = (0.53 \pm 0.01(\text{stat}) \pm 0.01(\text{syst})) \text{ GeV}^2$ . For large  $|t|$  values, the cross-section exhibits a power law behavior.

By extrapolation of measured elastic p+p cross sections to  $|t| = 0$ , TOTEM obtained a total elastic scattering cross-section of  $24.8 \pm 0.2(\text{stat}) \pm 1.2(\text{syst}) \text{ mb}$  [2]. Applying the optical theorem and using the luminosity measurement from CMS, a total proton-proton cross-section of  $(98.3 \pm 0.2(\text{stat}) \pm 2.8(\text{syst})) \text{ mb}$  was deduced. TOTEM also measured the charged particle pseudorapidity density  $dN/d\eta$  in p+p collisions at 7 TeV, in the pseudorapidity range  $5.3 < |\eta| < 6.4$  [3]. This measurement extends the analogous measurements performed by the other LHC experiments to the so far unexplored forward  $\eta$  range.

### References:

- [1] "Proton-proton elastic scattering at the LHC energy of  $\sqrt{s}=7\text{TeV}$ "  
The TOTEM Collaboration (G. Antchev et al.), Europhys. Lett., 95 (2011) 41001
- [2] "First measurement of the total proton-proton cross-section at the LHC energy of  $\sqrt{s} = 7 \text{ TeV}$ "  
The TOTEM Collaboration (G. Antchev et al.), Europhys. Lett., 96 (2011) 21002
- [3] "Measurement of the forward charged particle pseudorapidity density in pp collisions at  $\sqrt{s} = 7 \text{ TeV}$  with the TOTEM experiment"  
The TOTEM Collaboration (G. Antchev et al.), CERN-PH-EP-2012-106

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