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 dσ/dt, followed by a significant diffractive minimum at |t| = (0.53 ± 0.01(stat) ± 0.01(syst)) 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 ± 0.2(stat) ± 1.2(syst) mb [2]. Applying the optical theorem and using the luminosity measurement from CMS, a total proton-proton cross-section of (98.3 ± 0.2(stat) ± 2.8(syst)) mb was deduced. TOTEM also measured the charged particle pseudorapidity density dN/dη in p+p collisions at 7 TeV, in the pseudorapidity range 5.3 < |η| < 6.4 [3]. This measurement extends the analogous measurements performed by the other LHC experiments to the so far unexplored forward η range.

References:
[1] "Proton-proton elastic scattering at the LHC energy of sqrt(s)=7TeV"  
[2] "First measurement of the total proton-proton cross-section at the LHC energy of sqrt(s) = 7 TeV"  
[3] "Measurement of the forward charged particle pseudorapidity density in pp collisions at sqrt(s) = 7 TeV with the TOTEM experiment"  

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