



New measurements of forward physics in the TOTEM experiment at the LHC

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The TOTEM experiment recently measured the elastic proton rates dN/dt down to $-t=0.02 \text{ GeV}^2$ at the LHC energy of $\sqrt{s} = 7 \text{ TeV}$. In addition, the accompanying inelastic rates were recorded with the forward telescopes for $5.3 < |\eta| < 6.4$. The optical theorem allowed for first luminosity independent total cross-section measurement at $\sqrt{s} = 7 \text{ TeV}$ energy. Moreover, the total pp cross-section was obtained in two additional ways, as a quantity dependent on the CMS luminosity. It was calculated with optical theorem solely from the differential elastic cross-section as well as expressed as a direct sum of the elastic and inelastic contributions.

Finally, the estimates of total cross-section obtained from data with small and large bunch populations were compared. The different methods agree very well within their errors. Attempts are made to identify the individual components of the inelastic cross-section.

Moreover, TOTEM measured the very forward charged particle distributions dN/d_η for $5.3 < |\eta| < 6.4$, which significantly extend the measurements of the other LHC experiments. The obtained results disagree with the key Monte Carlo generators.

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