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## Elastic and Total Cross-Section Measurements by TOTEM

*Tuesday, April 9, 2019 11:45 AM (20 minutes)*

The TOTEM experiment at the LHC has measured proton-proton elastic scattering in dedicated runs at  $\sqrt{s} = 2.76, 7, 8$  and  $13$  TeV centre-of-mass LHC energies. The proton-proton total cross-section has been derived for each energy using a luminosity independent method. TOTEM has excluded a purely exponential differential cross-section for elastic proton-proton scattering with significance greater than  $7\sigma$  in the  $|t|$  range from  $0.027$  to  $0.2$  GeV<sup>2</sup> at  $\sqrt{s} = 8$  TeV. The  $\rho$  parameter has been measured at  $\sqrt{s} = 8$  TeV via the Coulomb-nuclear interference, and was found to be  $\rho = 0.12 \pm 0.03$ . The measurement has been repeated at  $13$  TeV and the result  $\rho = 0.09 \pm 0.01$  probes the existence of a colourless three-gluon bound state. The measured  $2.76$  TeV differential cross-section by TOTEM provides evidence for the colourless 3-gluon bound state, when compared to the D0 experiment ppbar result at  $1.96$  TeV (neglecting the small energy difference between TOTEM and D0).

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