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Evidence for Non-Exponential Elastic Proton-Proton Differential Cross-Section at Low |t| and sqrt(s) = 8 TeV by TOTEM

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The TOTEM experiment has made a precise measurement of the elastic proton-proton differential cross-section at the centre-of-mass energy sqrt(s) = 8 TeV based on a high-statistics data sample obtained with the beta* = 90 optics. Both the statistical and systematic uncertainties remain below 1%, except for the t-independent contribution from the overall normalisation. This unprecedented precision allows to exclude a purely exponential differential cross-section in the range of four-momentum transfer squared 0.027 < |t| < 0.2 GeV^2 with a significance greater than 7 sigma. Two extended parametrisations, with quadratic and cubic polynomials in the exponent, are shown to be well compatible with the data.
In this invited talk, presented for the TOTEM Collaboration, I will also overview the present status, the recent preliminary results and the upgrade plans of the TOTEM experiment at CERN LHC.

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