

# Search for a colorless C-odd three-gluon state from comparison of elastic proton proton and proton antiproton scattering

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Elastic scattering is usually described by the  $t$ -channel exchange of a  $C$ -even state (the “Pomeron”) that contributes equally to the  $pp$  and  $p\bar{p}$  cross sections. QCD also predicts the exchange of a sub-dominant  $C$ -odd state (the “Odderon”) that has opposite sign in the  $pp$  and  $p\bar{p}$  amplitudes and that QCD describes as a three-gluon state at leading order. At TeV energies where other exchanges than gluonic are expected to be negligible, a difference between the  $pp$  and  $p\bar{p}$  elastic differential cross sections ( $d\sigma_{el}/dt$ ) would give evidence for  $C$ -odd three-gluon exchange.

The  $pp$  elastic cross sections at 2.76, 7, 8 and 13 TeV measured by TOTEM at the LHC have characteristic diffractive minima (“dips”) and second maxima (“bumps”), whereas the  $p\bar{p}$  cross section at 1.96 TeV measured by D0 at the Tevatron has no dip. We have performed an extrapolation of the  $pp$   $d\sigma_{el}/dt$  from TOTEM to 1.96 TeV and compared it with the D0 data to search for the presence of  $C$ -odd three-gluon exchange.

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