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Low-|t| proton-proton data at LHC in the simple Lévy-α stable model

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Content

We analyze the low-|t| elastic differential cross-section data for proton–proton and proton–antiproton scattering from SPS to LHC energies using a simple Lévy α-stable (SL) model. This approach successfully describes the data with a statis- tically significant non-exponential behavior. The energy dependence of the model parameters is determined, showing that the Lévy exponent remains approximately energy-independent with $\alpha = 1.959 \pm 0.002$. We also investigate the tension between the TOTEM and ATLAS measurements of dσpp/dt at 7, 8, and 13 TeV, finding that the discrepancy arises only from normalization differences, not from the shape of the |t|-distribution.

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