Contribution ID: **137**   Type: **Parallel Session Talk**

The Tensor Pomeron and Low-x Deep Inelastic Scattering

Thursday 11 April 2019 10:45 (20 minutes)

The tensor-pomeron model is applied to low-x deep-inelastic lepton-nucleon scattering and photoproduction. We consider c. m. energies in the range 6 - 318 GeV and $Q^2 < 50$ GeV^2. In addition to the soft tensor pomeron, which has proven quite successful for the description of soft hadronic high-energy reactions, we include a hard tensor pomeron. We also include f_2-reggeon exchange which turns out to be particularly relevant for real-photon-proton scattering at c. m. energies in the range up to 30 GeV. The combination of these exchanges permits a description of the absorption cross sections of real and virtual photons on the proton in the same framework. In particular, a detailed comparison of this two-tensor-pomeron model with the latest HERA data for $x < 0.01$ is made. Our model gives a very good description of the transition from the small-Q^2 regime where the real or virtual photon behaves hadron-like to the large-Q^2 regime where hard scattering dominates. Our fit allows us, for instance, a determination of the intercepts of the hard pomeron as $1.3008(^{+73}_{-84})$, of the soft pomeron as $1.0935(^{+76}_{-64})$, and of the f_2 reggeon. We find that in photoproduction the hard pomeron does not contribute within the errors of the fit. We show that assuming a vector instead of a tensor character for the pomeron leads to the conclusion that it must decouple in real photoproduction.

arXiv:1901.08524

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Session Classification: WG2: Small-x and Diffraction

Track Classification: WG2: Low-x and Diffraction