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Limit on the Effective Quark Charge Radius from Inclusive ep Scattering at HERA

Content

The H1 and ZEUS combined measurement of inclusive deep inelastic cross sections in neutral and charged current ep scattering, based on the final data sample corresponding to a luminosity of about 1 fb⁻¹, was used as an input to QCD analyses, providing a set of parton distribution functions HERAPDF2.0. Here the analysis is extended to take into account possible signals from physics beyond SM. Quark form factor model, describing possible effects due to quark substructure or finite spatial distribution of the quark charge, is used as a simple test scenario. The only proper procedure to set limits on the BSM model parameters from the data used to calculate PDFs is to perform the combined analysis, including possible contributions from the BSM processes in the QCD fit to the data. This approach is developed in the presented study using the quark form factor model as a test scenario. Even if the resulting limits on the quark radius seem not to be competitive with the expected LHC limits, these are the first limits set in the strictly correct way. This procedure should also be considered at other experiments, also at LHC, where the PDFs are used to calculate model predictions and set limits on BSM models.

additional information

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