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Measurement of the Inclusive ep Scattering Cross Section at Low and Medium Q^2 at HERA

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Measurements of the inclusive ep scattering cross section are presented in the region of low to medium momentum transfers, 0.2 GeV^2 < Q^2 < 150 GeV^2, and Bjorken x, 5x10^-6 < x < 0.1. The results are based on data sets collected by the H1 Collaboration at HERA at positron beam energies of 27.6 GeV and proton beam energies of 820 or 920 GeV. A combination with data previously published by H1 leads to a cross section measurement of a few percent accuracy at low Q^2 and 1.3-2% at medium Q^2. A kinematic reconstruction method exploiting radiative ep events extends the measurement to lower Q^2 and larger x. The low Q^2 data are compared with theoretical models which apply to the transition region from photoproduction to deep inelastic scattering. A next-to-leading order QCD analysis is performed on the data with sufficiently high Q^2 to determine the parton distributions in the proton.

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