Measurement of the Proton Structure Function F_2 in QED Compton Scattering at HERA

H1 Collaboration

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Abstract

The proton structure function F_2 is measured in QED Compton scattering at HERA using data collected in 1997 by the H1 experiment. QED Compton events give access to the kinematic range of very low Q^2, down to 0.1 GeV^2, and medium Bjorken x — a region which is not covered by inclusive DIS measurements at HERA. The results are in agreement with the measurements from fixed target experiments wherever they overlap.

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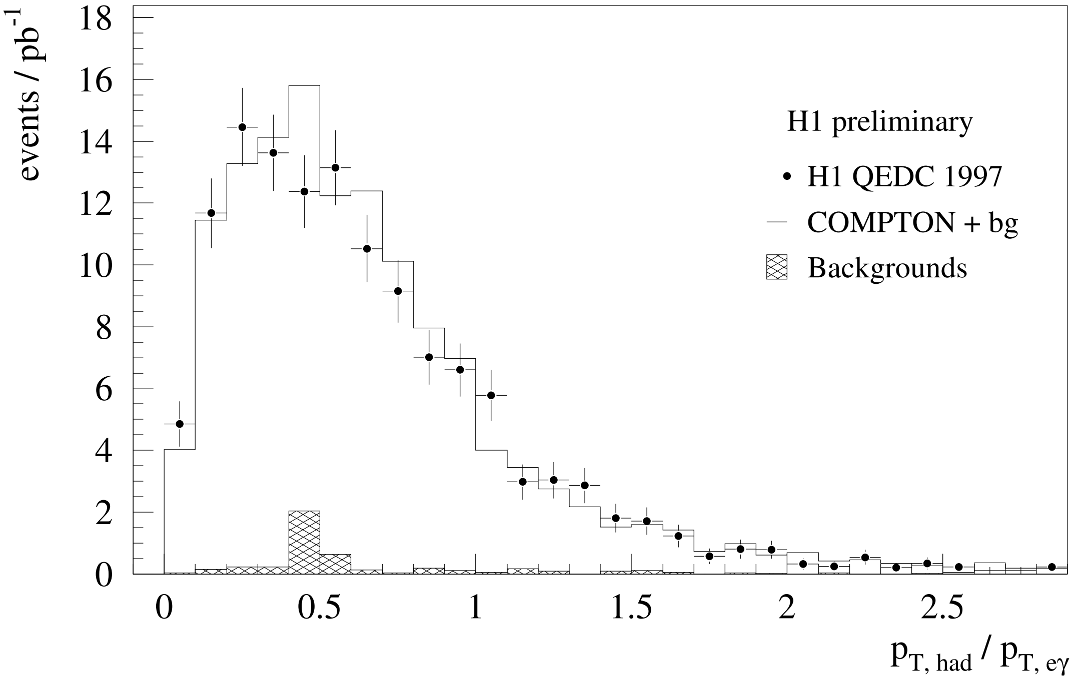

Figure 1: *Ratio of the total measured transverse momentum of hadrons to the total transverse momentum of the $e\gamma$ system. Only events used for the measurement are plotted. H1 data are depicted by the closed circles. The solid histogram represents the sum of COMPTON MC events with all background contributions added. The hatched histogram denotes the sum of all simulated background events*

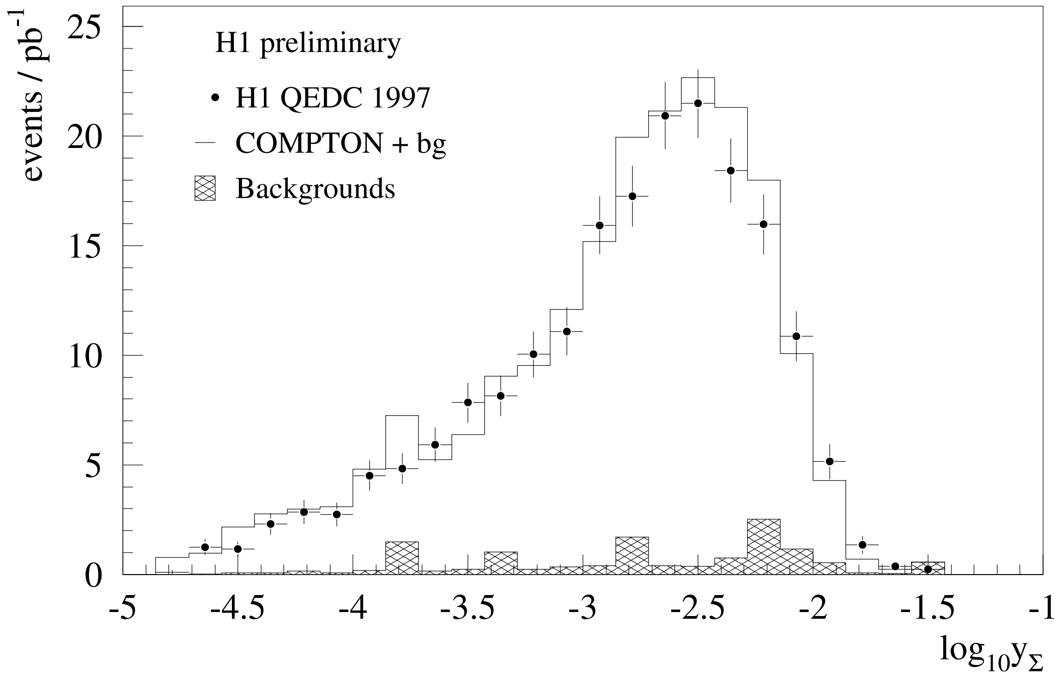

Figure 2: *y_Σ distribution after applying all selection cuts. The solid histogram represents the sum of COMPTON MC events with all background contributions added. The hatched histogram denotes the sum of all simulated background events*

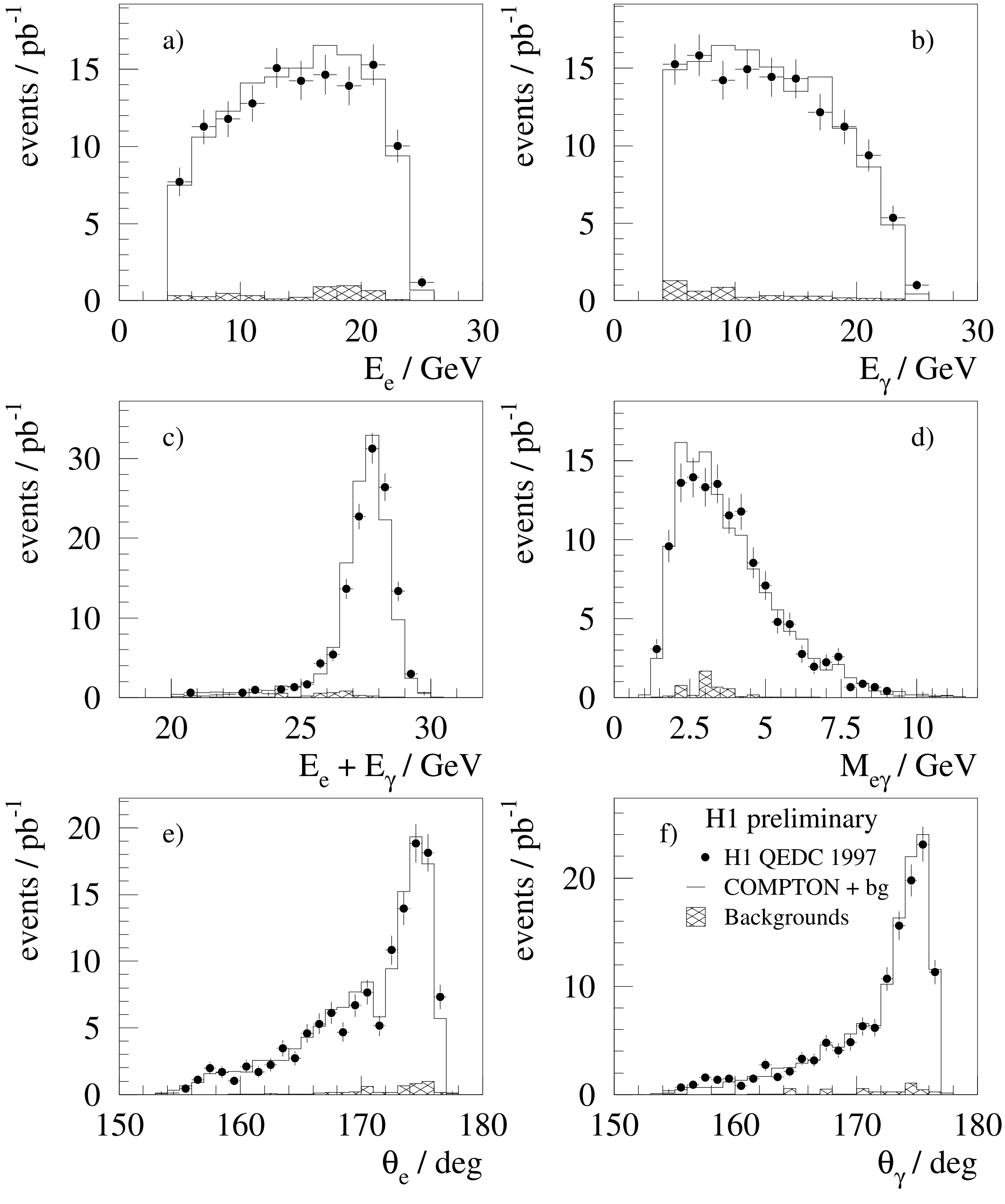

Figure 3: *Control distributions for the measured electron and photon in events used for the measurement. Shown are: a) electron energy, b) photon energy, c) sum of both energies, d) invariant mass of the $e\gamma$ system, e) electron scattering angle, f) photon scattering angle*

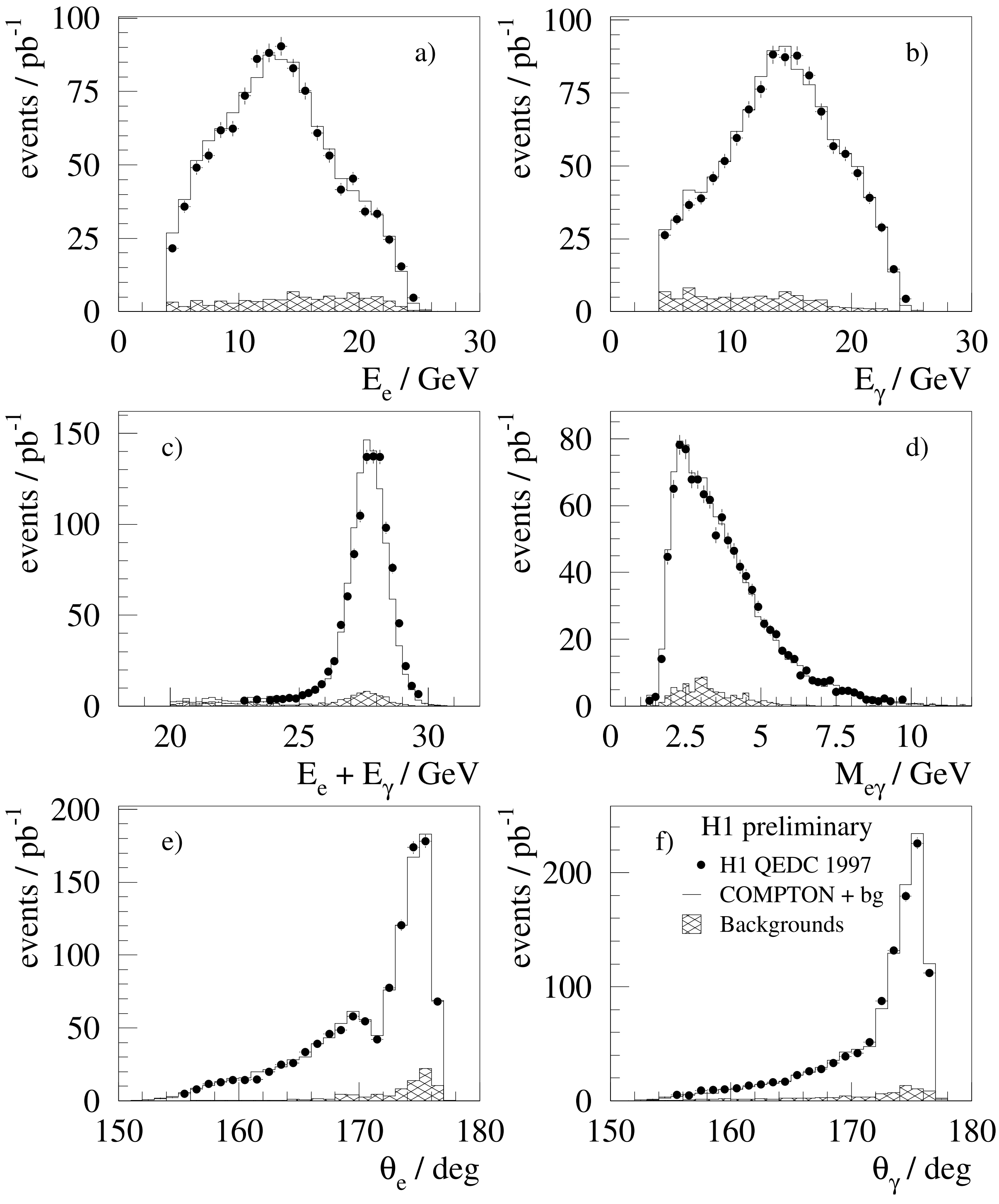

Figure 4: *Control distributions for the measured electron and photon in all (elastic and inelastic) QED Compton events. All selection cuts are applied except those demanding explicitly inelastic events. Shown are: a) electron energy, b) photon energy, c) sum of both energies, d) invariant mass of the $e\gamma$ system, e) electron scattering angle, f) photon scattering angle*

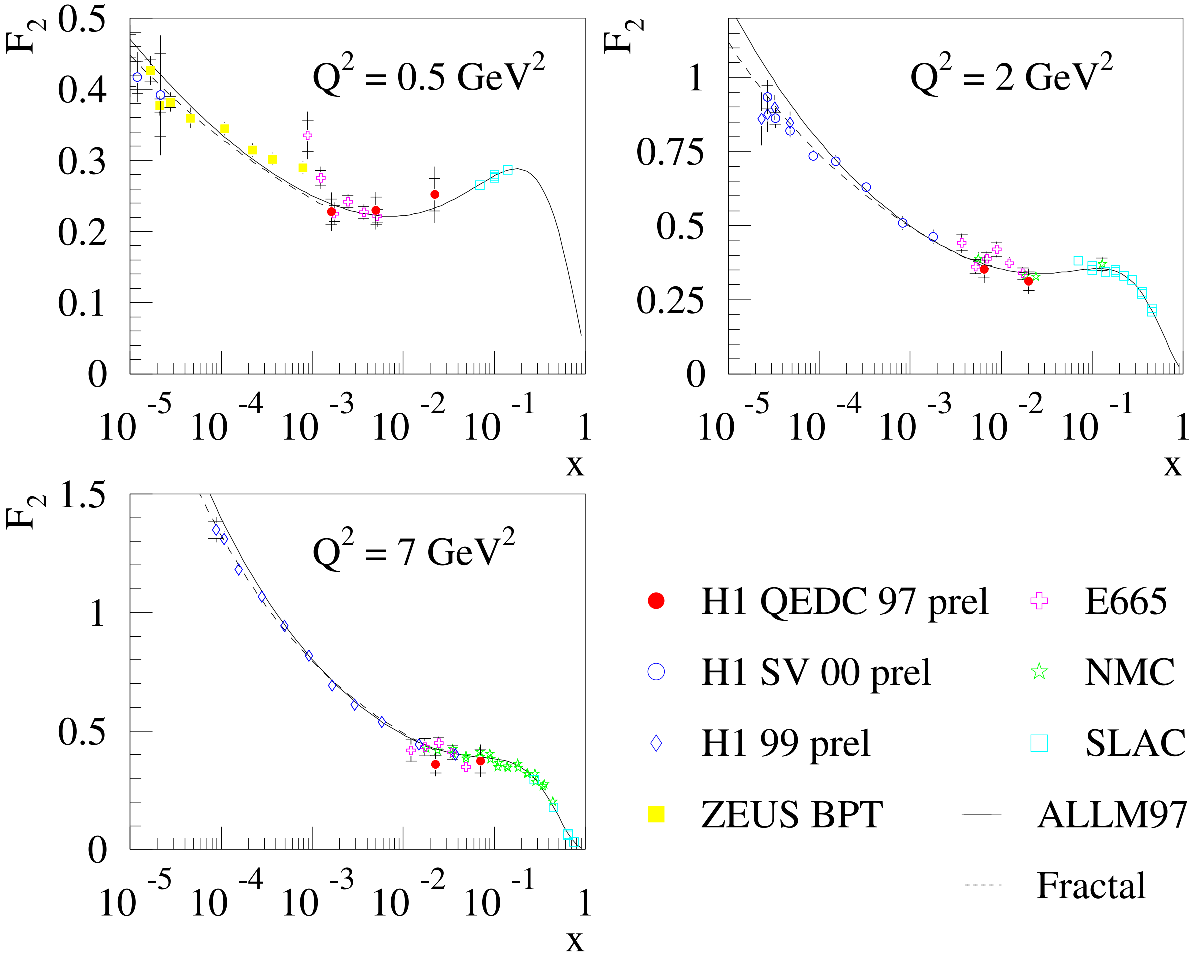

Figure 5: *Results of F_2 measurement in QED Compton scattering compared with other measurements at HERA and fixed target experimets*

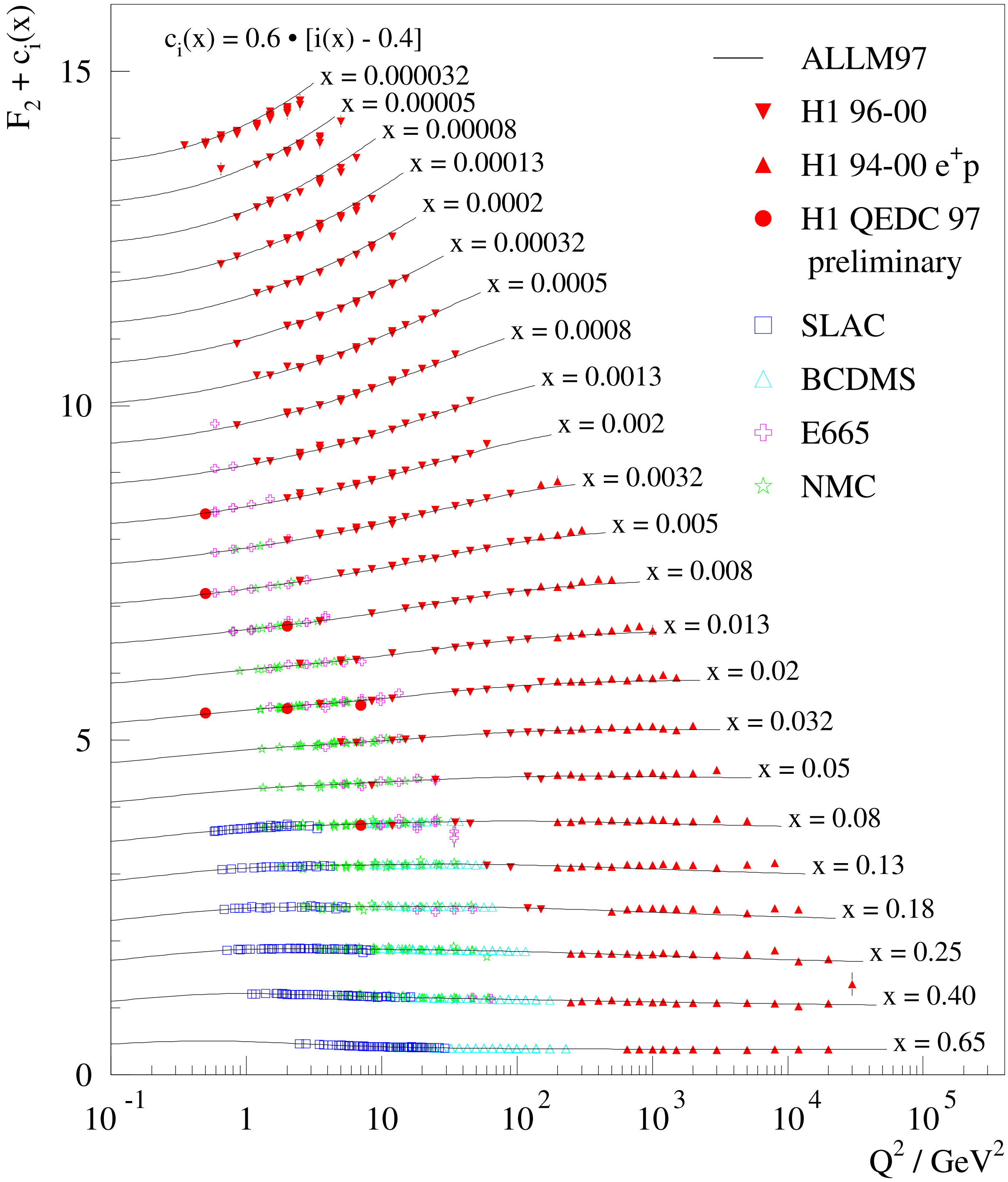

Figure 6: *Summary plot of all F_2 measurements at HERA and fixed target experiments*

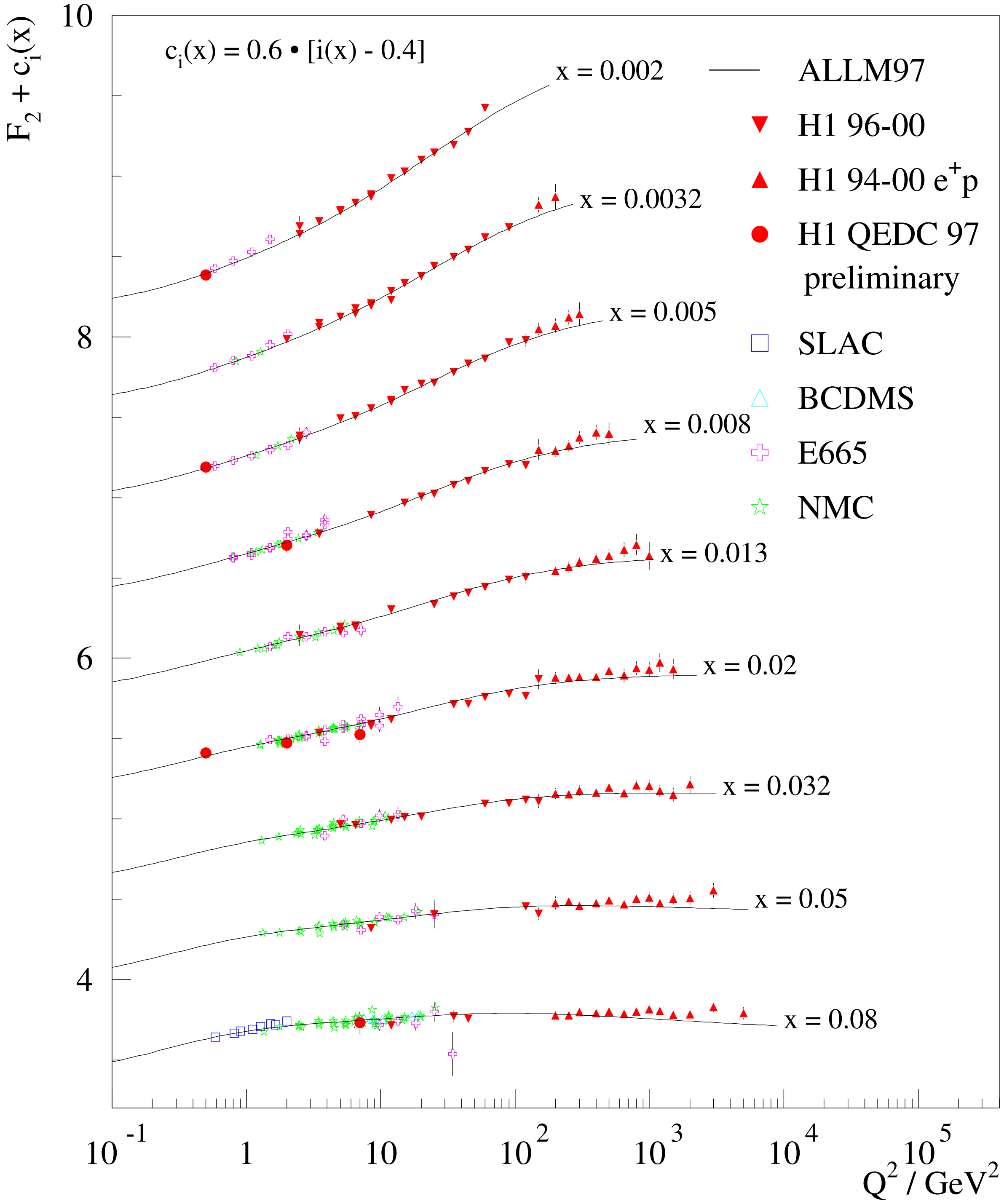

Figure 7: *Zoom view of the plot in fig. 6*