Some reminiscenses of Guido Altarelli

*** 12. July , 1941, in Rome, Italy – † 30. September, 2015, in Geneva, Switzerland**

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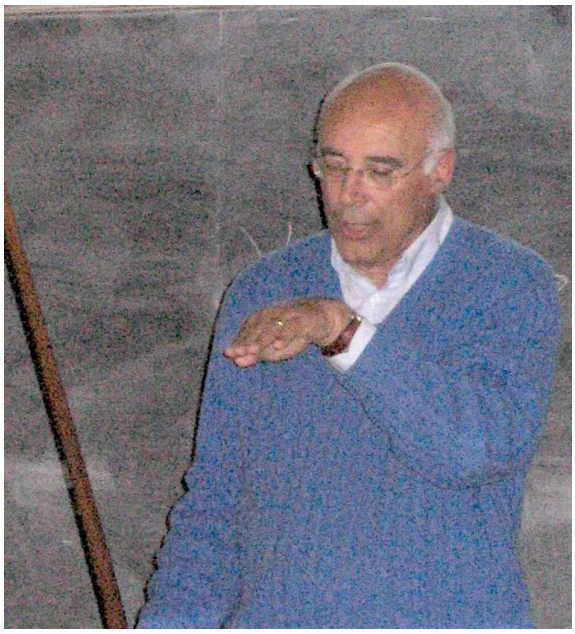

Fig 1 : Il maestro

19. STRUCTURE FUNCTIONS

Updated September 2015 by B. Foster (University of Hamburg/DESY), A.D. Martin (University of Durham), R.S. Thorne (University College London) and M.G. Vincter (Carleton University).

19.1. Deep inelastic scattering

High-energy lepton-nucleon scattering (deep inelastic scattering) plays a key role in determining the partonic structure of the proton. The process $\ell N \to \ell' X$ is illustrated in Fig. 19.1. The filled circle in this figure represents the internal structure of the proton which can be expressed in terms of structure functions.

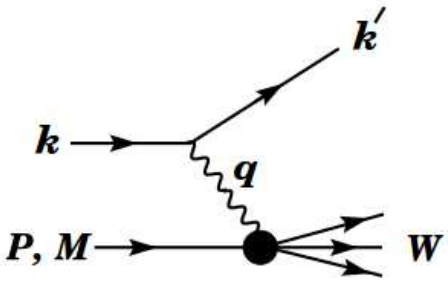

Figure 19.1: Kinematic quantities for the description of deep inelastic scattering. The quantities k and k' are the four-momenta of the incoming and outgoing leptons, P is the four-momentum of a nucleon with mass M, and W is the mass of the recoiling system X. The exchanged particle is a γ, $W^{\pm}$, or Z; it transfers four-momentum $q = k - k'$ to the nucleon.

Fig 2 : Deep inelastic scattering A

A precocious 'scaling' variable

$$x' \;=\; (\,-\, q^{\,2} \;+\; \Delta_{\,1} \,) \;/\; (\,2\,\nu \;+\; \Delta_{\,2} \,) \qquad (1)$$

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Fig 3 : Deep inelastic scattering B

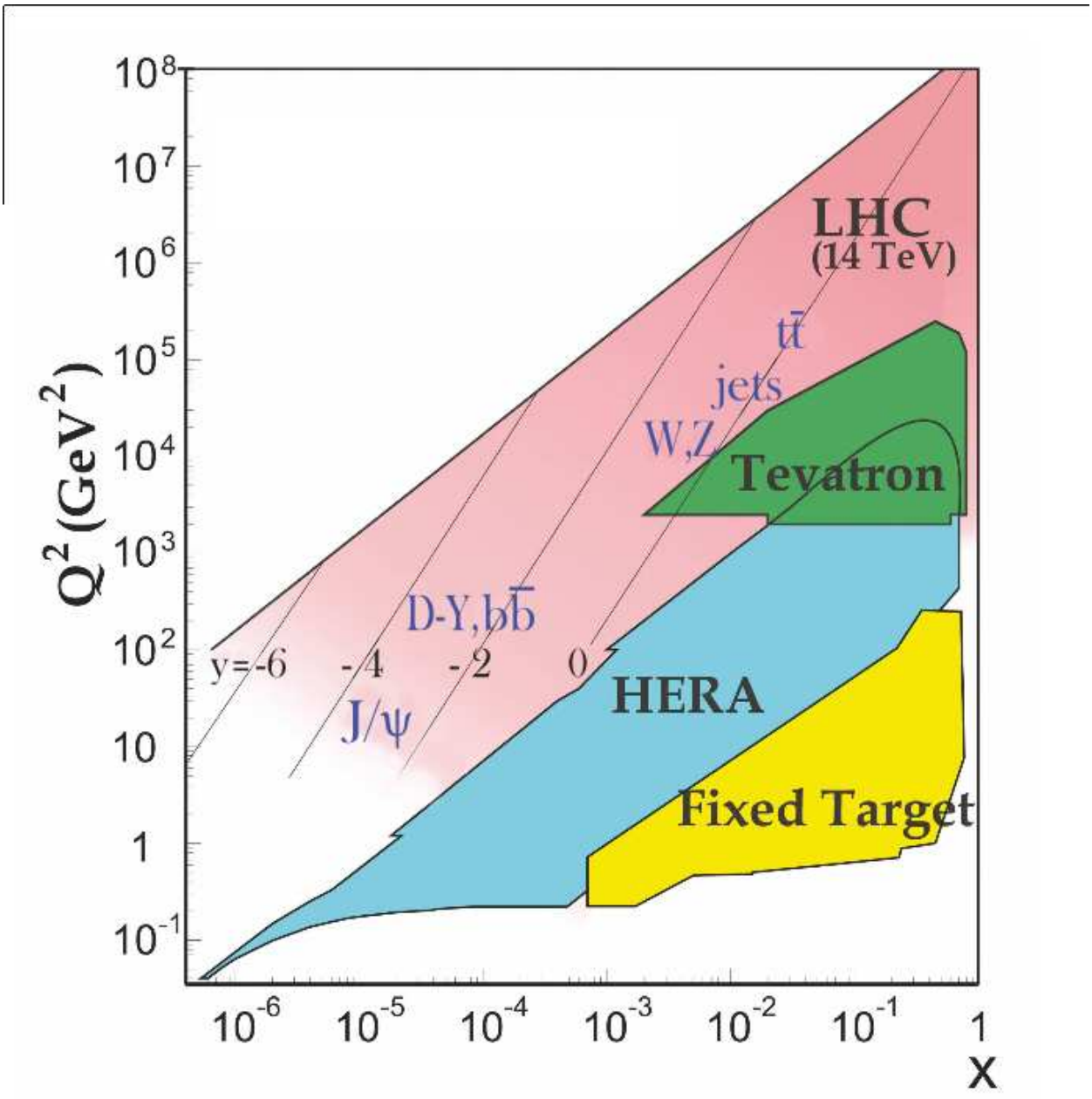

Fig 4 : Deep inelastic scattering tot