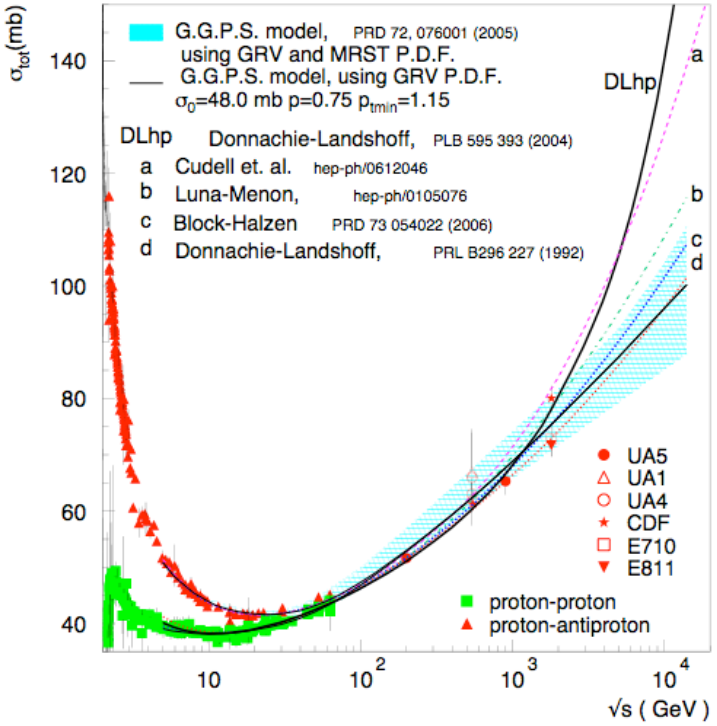
G. Pancheri - january 28, 2009

- Total pp cross-section , Froissart bound and resummation of zero momentum gluons
- Photoproduction cross-sections at Very High Energies
- Review on Total Cross-section and LHC for EPJC
- Final State Radiation and the pion form factor (see Olga S.)
- History study on Bruno Touschek and his contribution to particle physics

The Bloch-Nordsieck model for σ_{total}, Froissart bound and resummation of zero momentum gluo

Eikonal mini-jet model with soft gluon resummation

– A. Corsetti, A. Grau, G. P.,Y.N. Srivastava, PLB382 (1996)
– A. Grau, G.P, Y.N. Srivastava, PRD60 (1999)
- R.M. Godbole, A. Grau, G.P., Y.N. Srivastava, PRD72 (2005)
– A. Achilli, R.M. Godbole, A. Grau, R. Hedge, G.P., Y.N. Srivastava, PLB659 (2008)



Our prediction

$$\sigma_{tot}^{LHC} = 102^{+10}_{-13}\ mb$$

The Bloch-Nordsieck (BN) model

- Eikonal representation for total cross-section

$$\sigma_{tot}(s) = \int d^2b[1 - e^{-\chi(b,s)}]$$

- QCD mini-jets with realistic parton-densities

$$\Im\chi(b,s) = \Im\chi_{soft}(b,s) + 2\ A(b,s)\sigma^{jet}(p_t^{jet} \geq p_{tmin})$$

- Impact parameter distribution of partons from Fourier transform of k_t - resummed soft gluon distribution with k_t ~0

$$A(b,s) = e^{-\int d^3\bar{n}(k)[1-e^{ib\cdot k}{}_\perp]}$$

QCD minijets and the Froissart bound

$$\lim_{s\to\infty} \sigma_{tot} \leq \log^2 s$$

- Minijets grow like s^{ε}

but

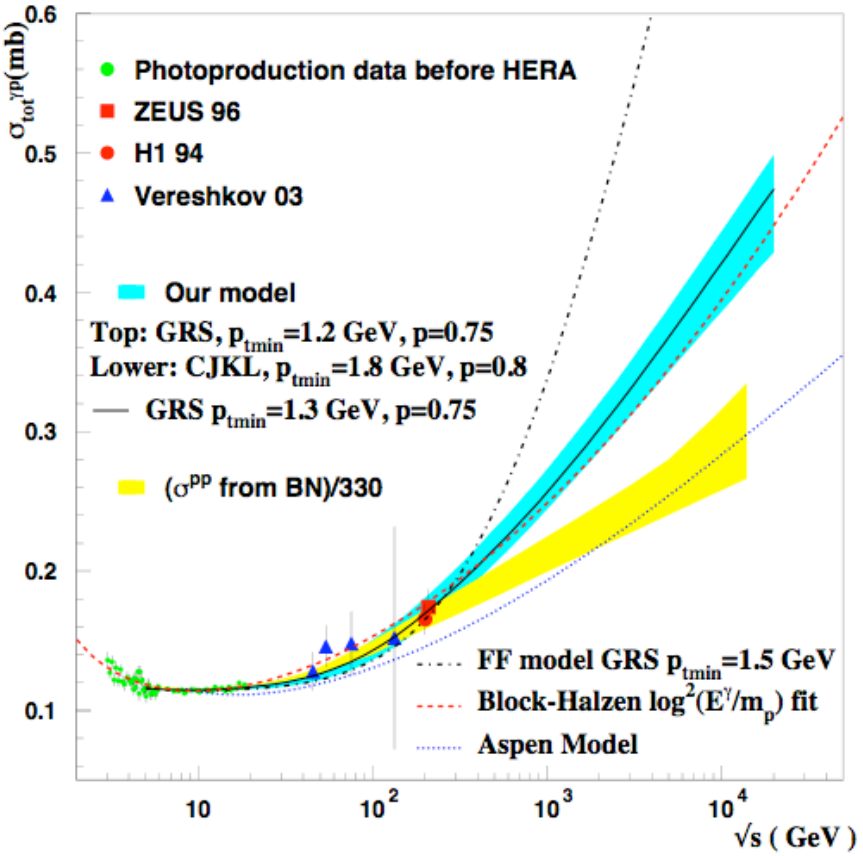
- Soft gluon emission with $\lim_{k_\perp \to 0} \alpha_s(k_\perp) \propto \frac{1}{k_\perp^p} \qquad 1/2 < p < 1$

would restore the Froissart bound

Work in progress for a theoretical derivation

Photoproduction cross-sections at Very High Energies with BN model

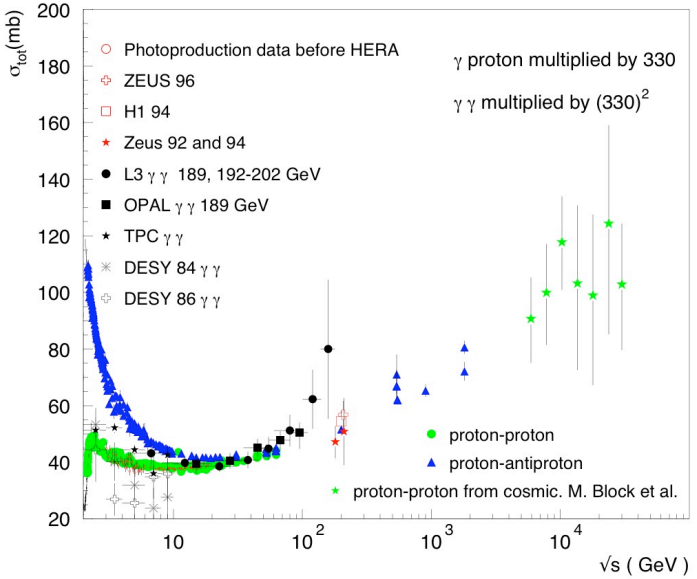
- Relevant for photon content of UHE cosmic ray flux
- Our model predicts results very close to a fit by Bloch and Halzen (red dotted curve) based on FESR at low energies and data at HERA energies
- At 100 TeV expectations are higher than simple pp extrapolations



QCD and total cross-sections: photons and hadrons. R.M. Godbole, A. Grau, G. Pancheri, Y.N. Srivastava . e-Print: arXiv:0812.4705. EPJC submittted

In progress :
A Review on data and models for the total Cross-section at LHC and beyond :
for EPJC

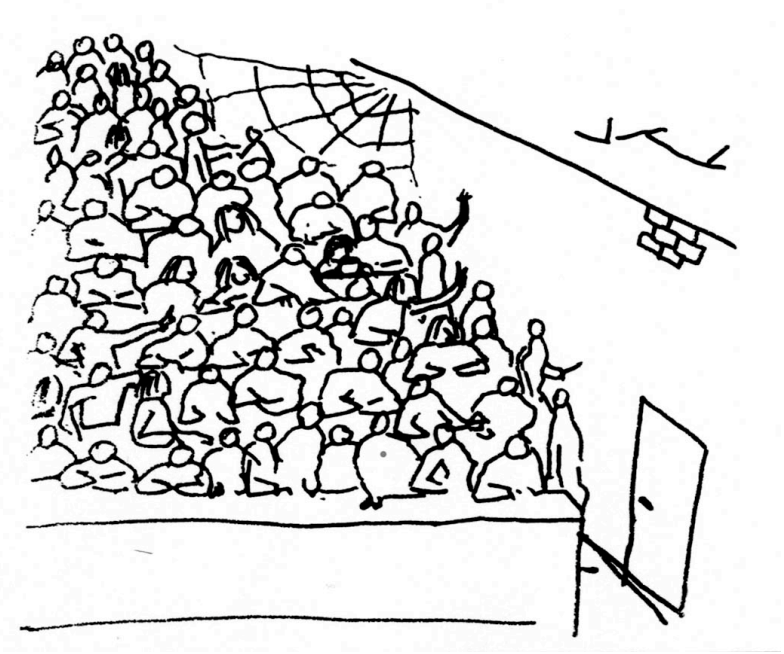
Comparing data for total cross-sections $pp, \bar{p}p, \gamma p, \gamma\gamma$



History study on Bruno Touschek and his contribution to particle physics

With Luisa Bonolis

- Publication of the complete set of Touschek's drawings with new look at his life story (2009)
- Preparation of book on Touschek's life



Drawing by Bruno Touschek ~ 1968