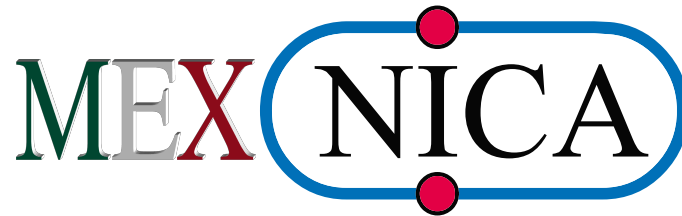


Hadron production at MPD-NICA

Marco A. Ayala Torres

2nd Computing/Analysis Workshop of the MexNICA Collaboration,

1-3 July 2020



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Outline

- QCD master formula
- Moment transverse
- Average particle multiplicities $p+p$
 - Pythia8
 - UrQMD



QCD master formula

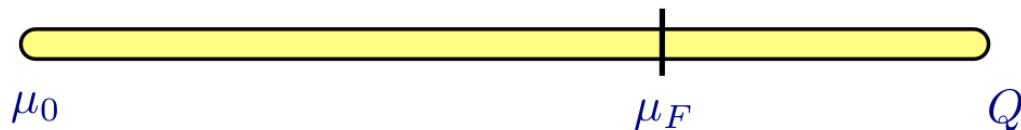
$$\sigma(pp \rightarrow t\bar{t}) = \sum_{ab} \int dx_1 dx_2 f_a(x_1, \mu_F) f_b(x_2, \mu_F) \times \hat{\sigma}(ab \rightarrow t\bar{t})$$

$$F_2^{cor}(x, Q^2) = \sum_q e_q^2 x \frac{\alpha_s}{2\pi} \underbrace{\log\left(\frac{Q^2}{\mu_0^2}\right)}_{\text{soft (and divergent) to PDF}} \int_x^1 \frac{dy}{y} P_{qq}(y) q\left(\frac{x}{y}\right) + \text{finite}$$

$$\log\left(\frac{Q^2}{\mu_0^2}\right) = \log\left(\frac{\mu_F^2}{\mu_0^2}\right) + \log\left(\frac{Q^2}{\mu_F^2}\right)$$

soft (and divergent) to PDF

Hard (and finite)

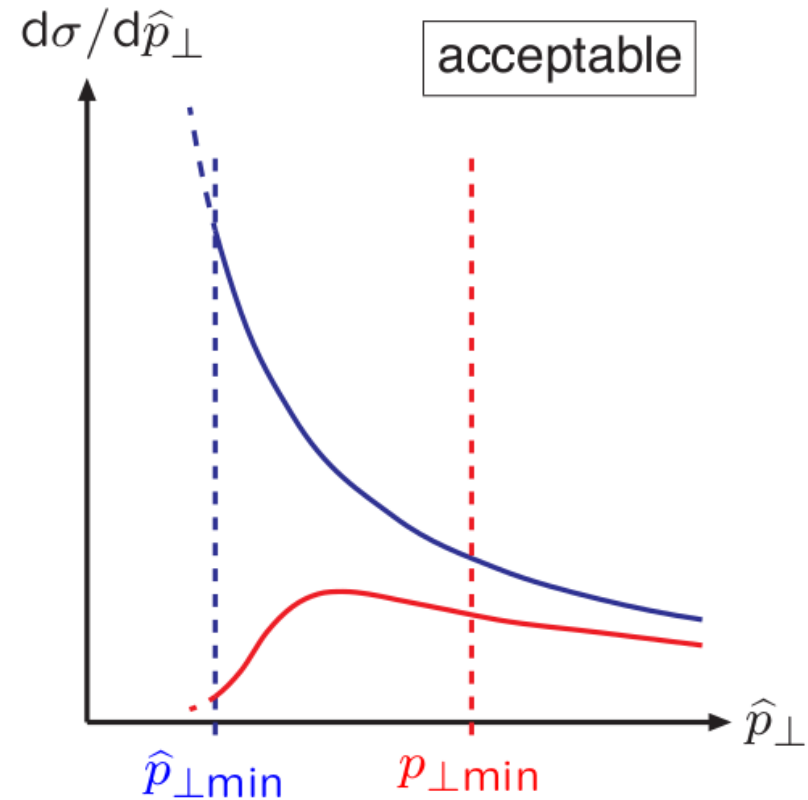
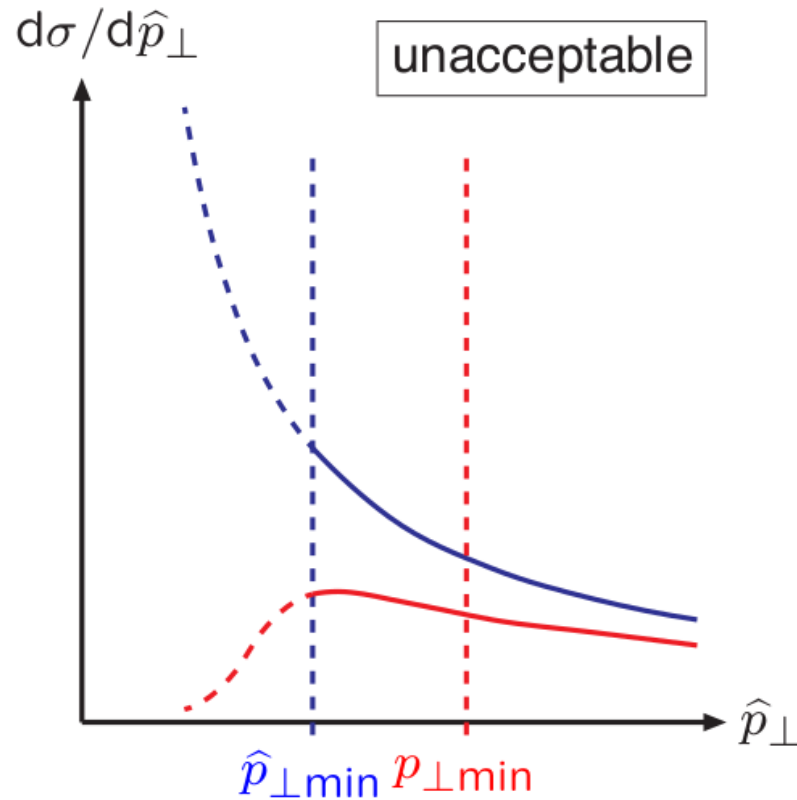


Factorization scale unphysical, typically chosen as $\mu_F = \mu_R = Q$

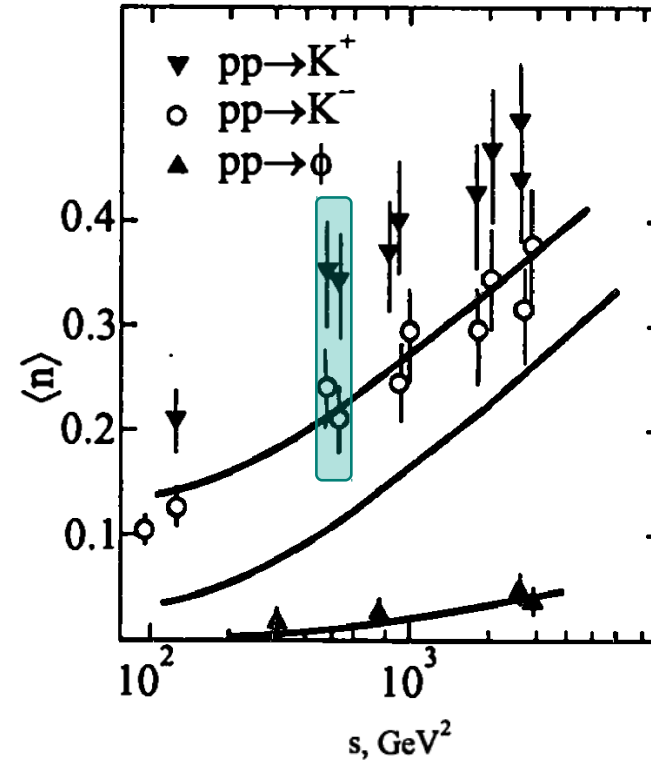
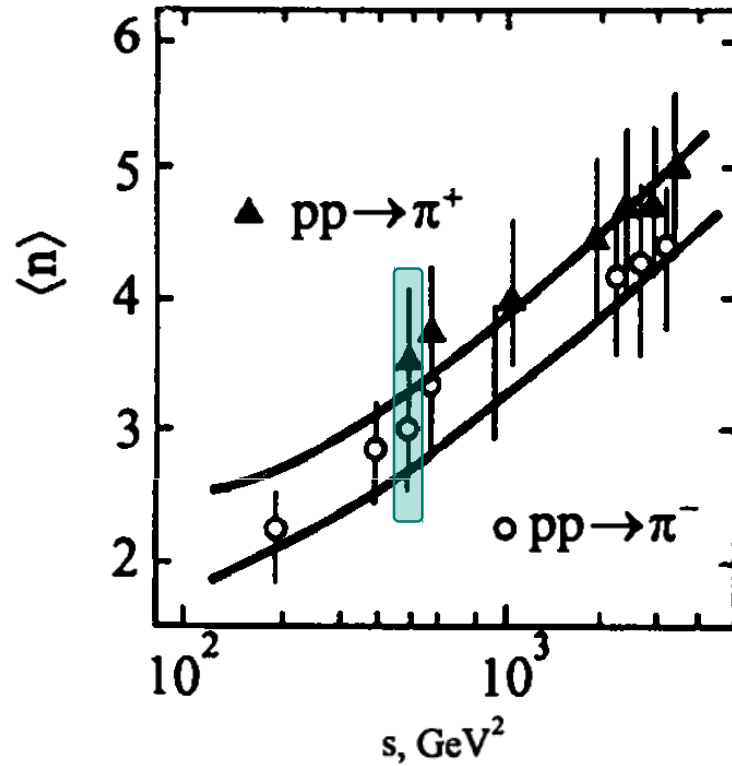
fixed order calculation shows “spurious” factorization scale dependence

Kinematical cuts

Plot **generated** and **accepted** events



Average particle multiplicities p+p



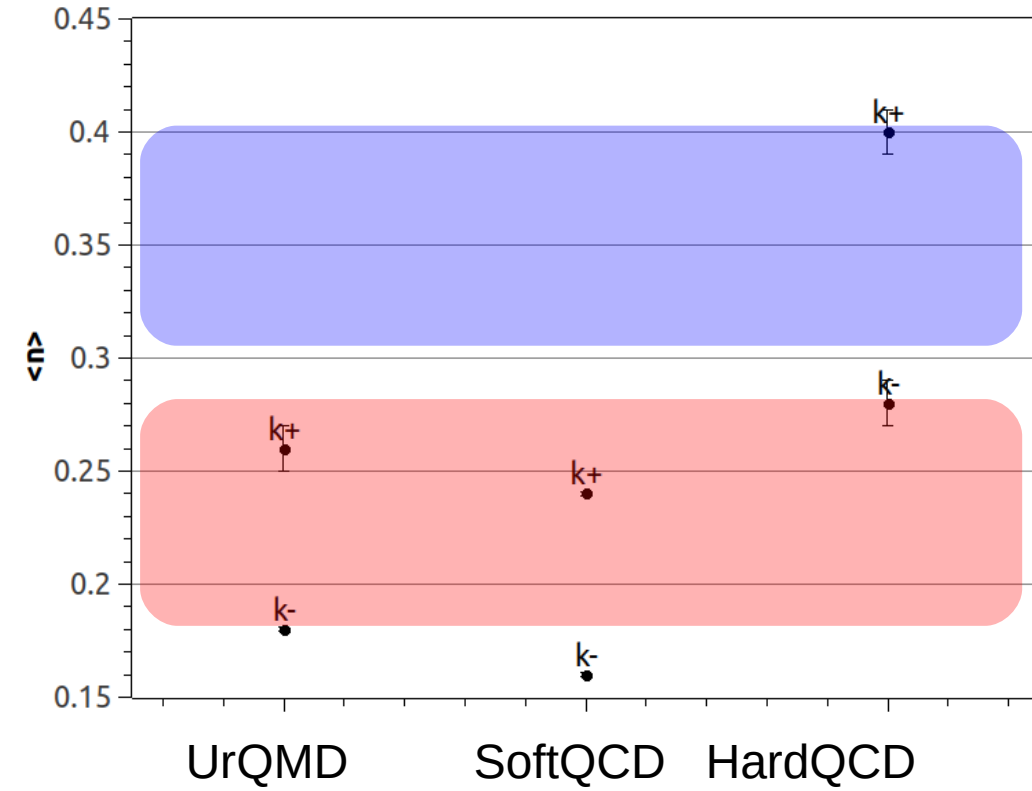
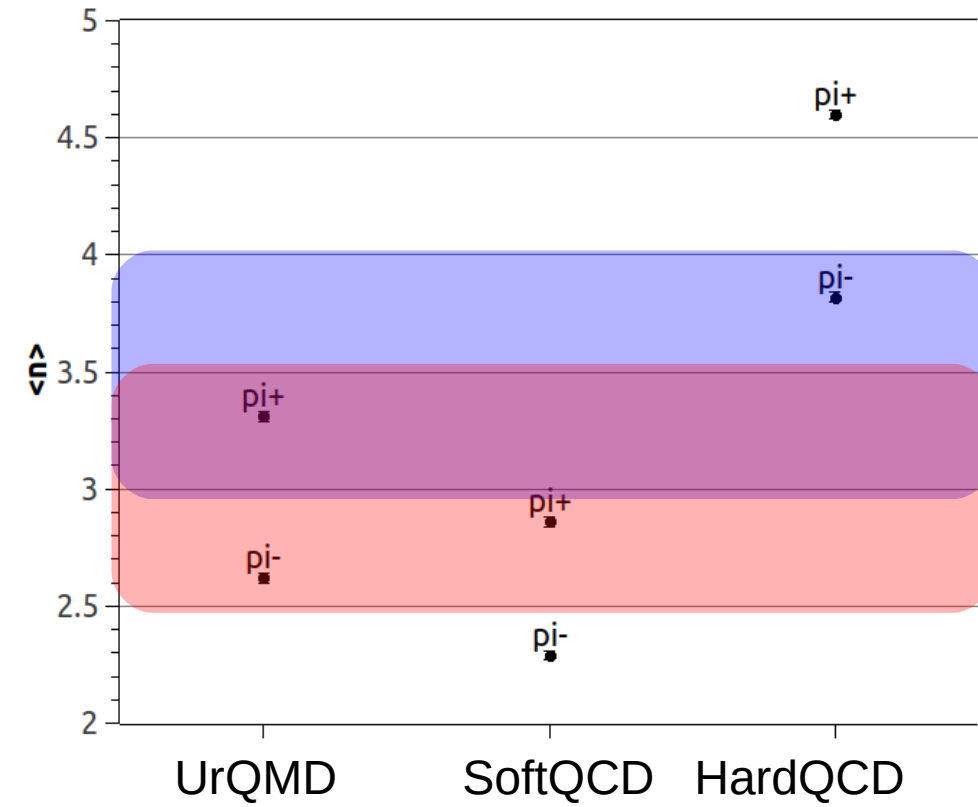
V.V. Anisovich, M.N. Kobrinsky, and J. Nyiri, LNPI-982 (1984)

Generators

- Pythia8
 - SoftQCD
 - HardQCD (pQCD)
 - Electroweak
 - BSM, SUSY, Leptoquarks, etc ...
- UrQMD
- Equation of State for the calculation.
 - CASCADE mode (EoS=0)
 - Hard Skyrme (EoS=1) incident beam-energies below 4.0GeV/nucleon.
 - CTO options

$$p+p$$
$$s=(20\text{GeV})^2$$

p+p
s=(20GeV)²



Thank you!

