Baryon spectra in Pt and charge asymmetry in hadroproduction.

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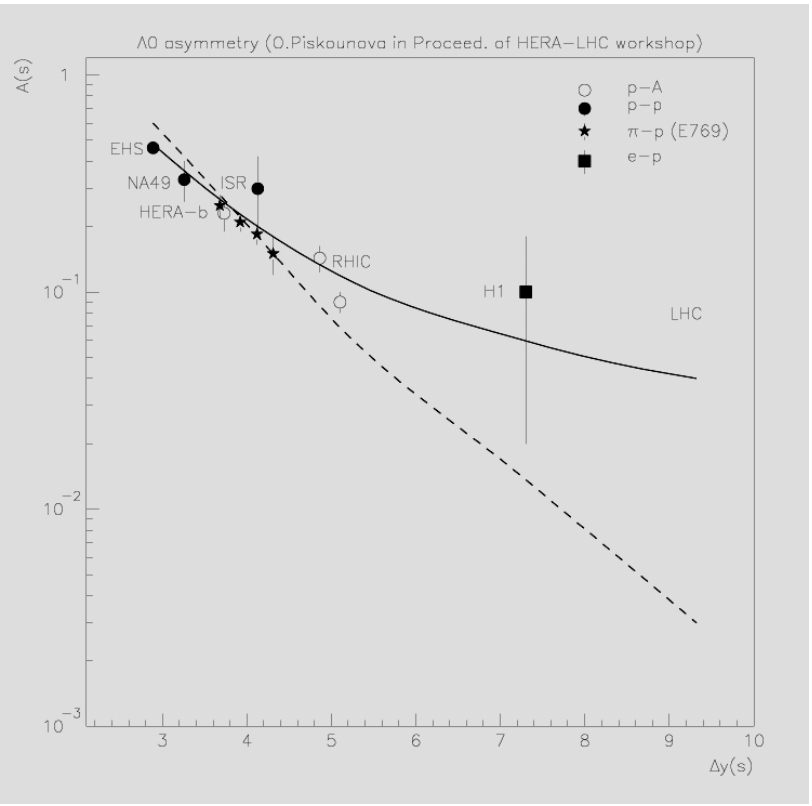
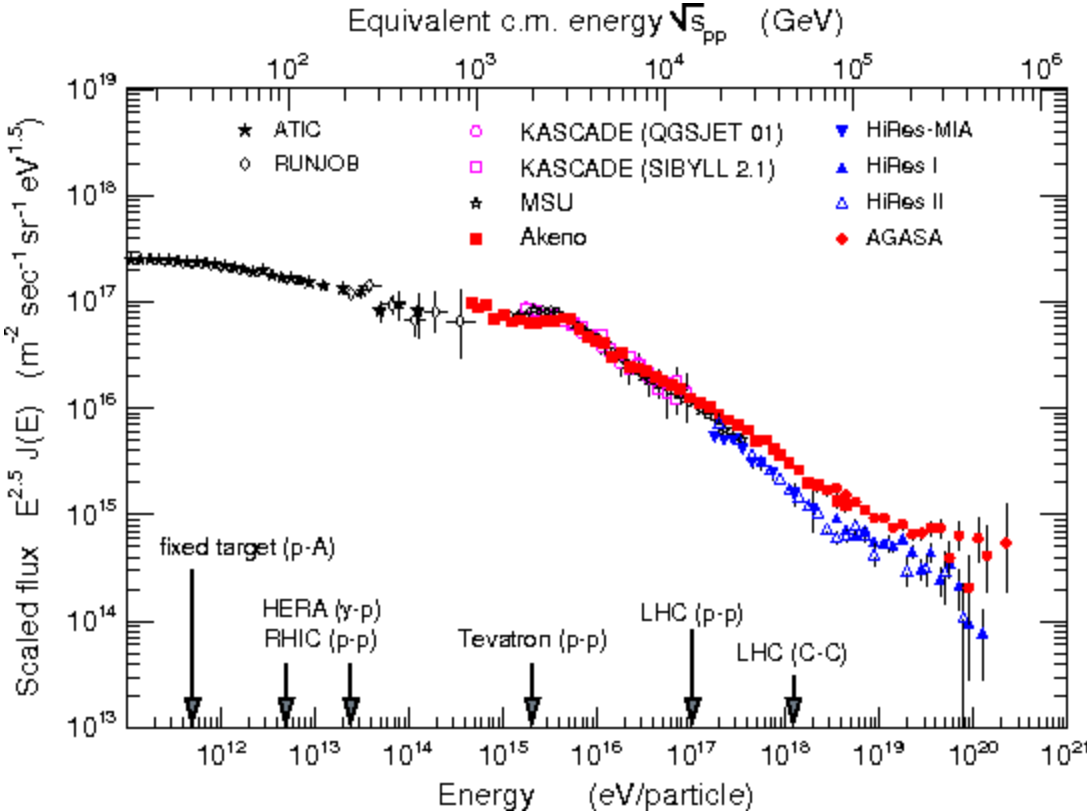
Outline

1. **The features of baryon spectra at LHC and in CR**
2. **Spectra in full X range**
3. **Spectra in lab. System**
4. **Comparison of Pt spectra**
5. **Average Pt growing with energy**
6. **Conclusions on various type of charge ratios**

Specific features of baryon spectra



We can study the features of baryon spectra beginning from global CR proton distribution up to delicate measurement results on asymmetry caused by the baryon charge transfer at the collider experiments



Multipomeron Pt distributions in proton-proton collisions (QGS model)

published in A.I. Veselov, O.I. Piskunova, K.A. Ter-Martirosian, Phys.Lett.B158:175,1985.

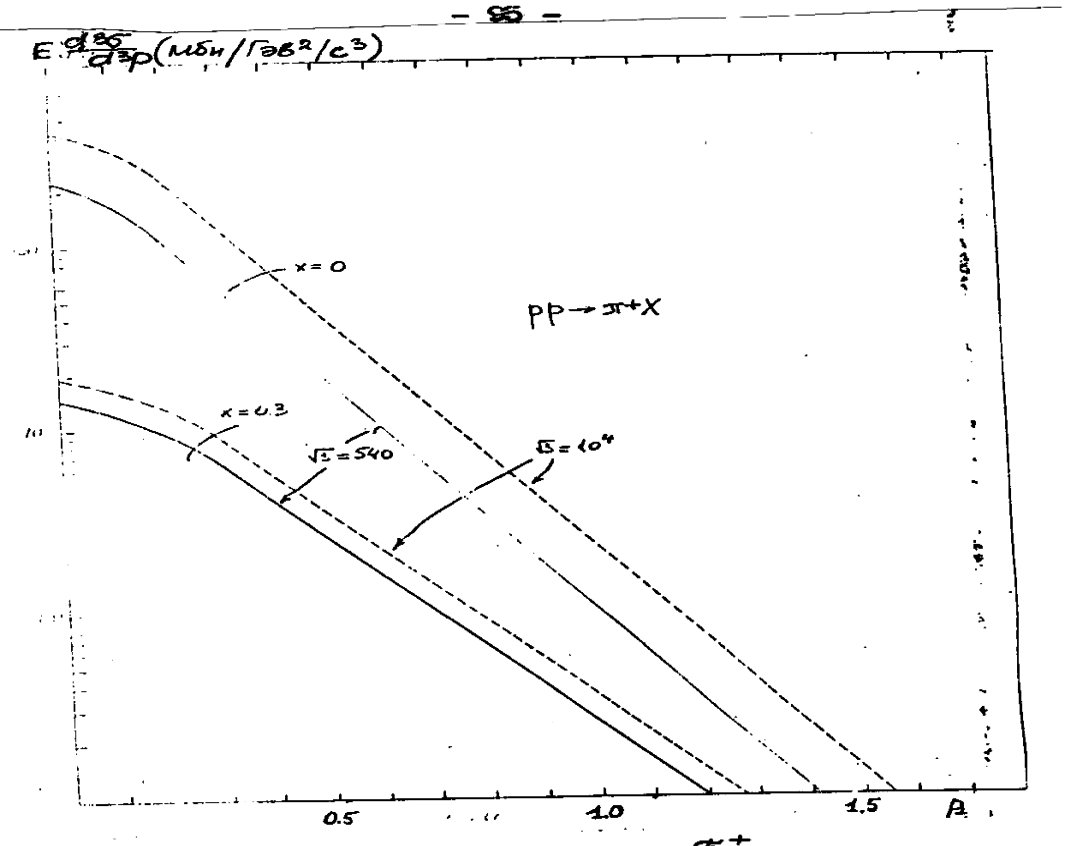
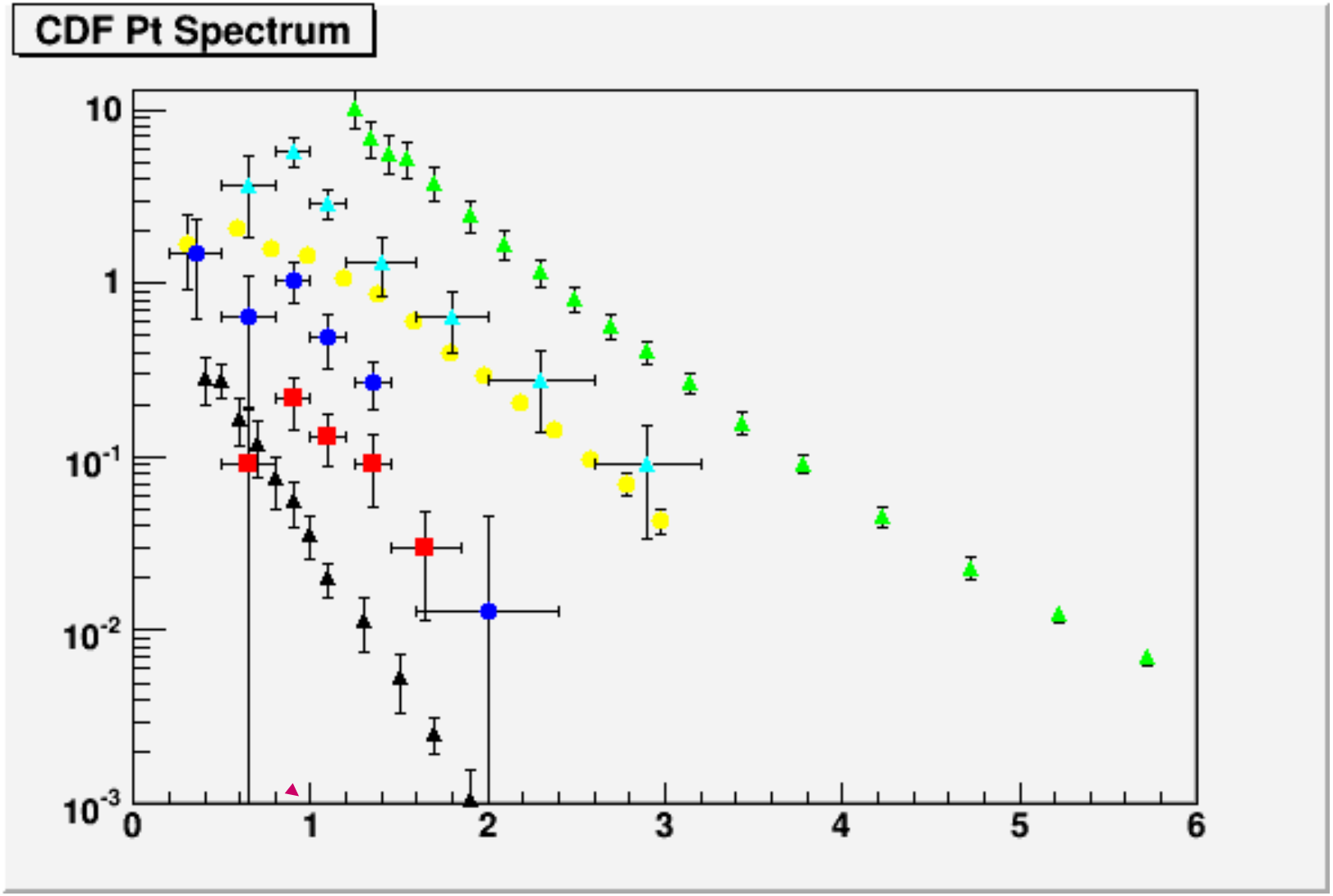


Рисунок 38. Изменение распределений π^+ мезонов поперечному импульсу при переходе от энергии $\sqrt{S}$ = 540 Гэв (сплошная кривая) к $\sqrt{S}$ = 10^4 Гэв (штриховая) при $x=0$. и $x=0.3$.

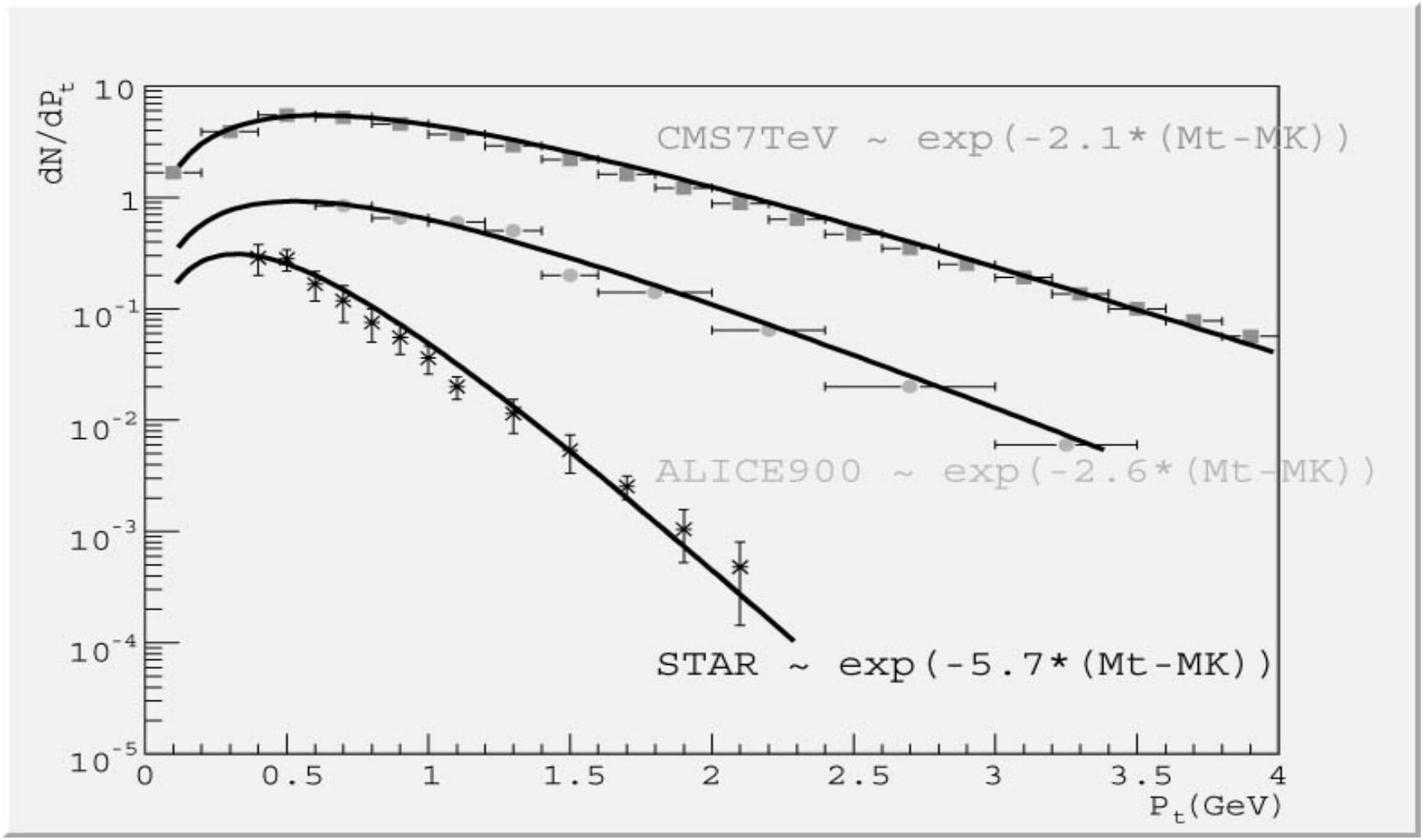
The QGSM approach:
Pt spectra were described with one exponent ~ e-B(m-m0), B~6.0 GeV-1, m= sqrt(m02+<p>**2), up to p+= 1.5 GeV/c. Spectra are growing due to the total cross section. The exponential form is remained. Spectra of pions, kaons, protons and antiprotons have been described in this way.**

The data of UA5

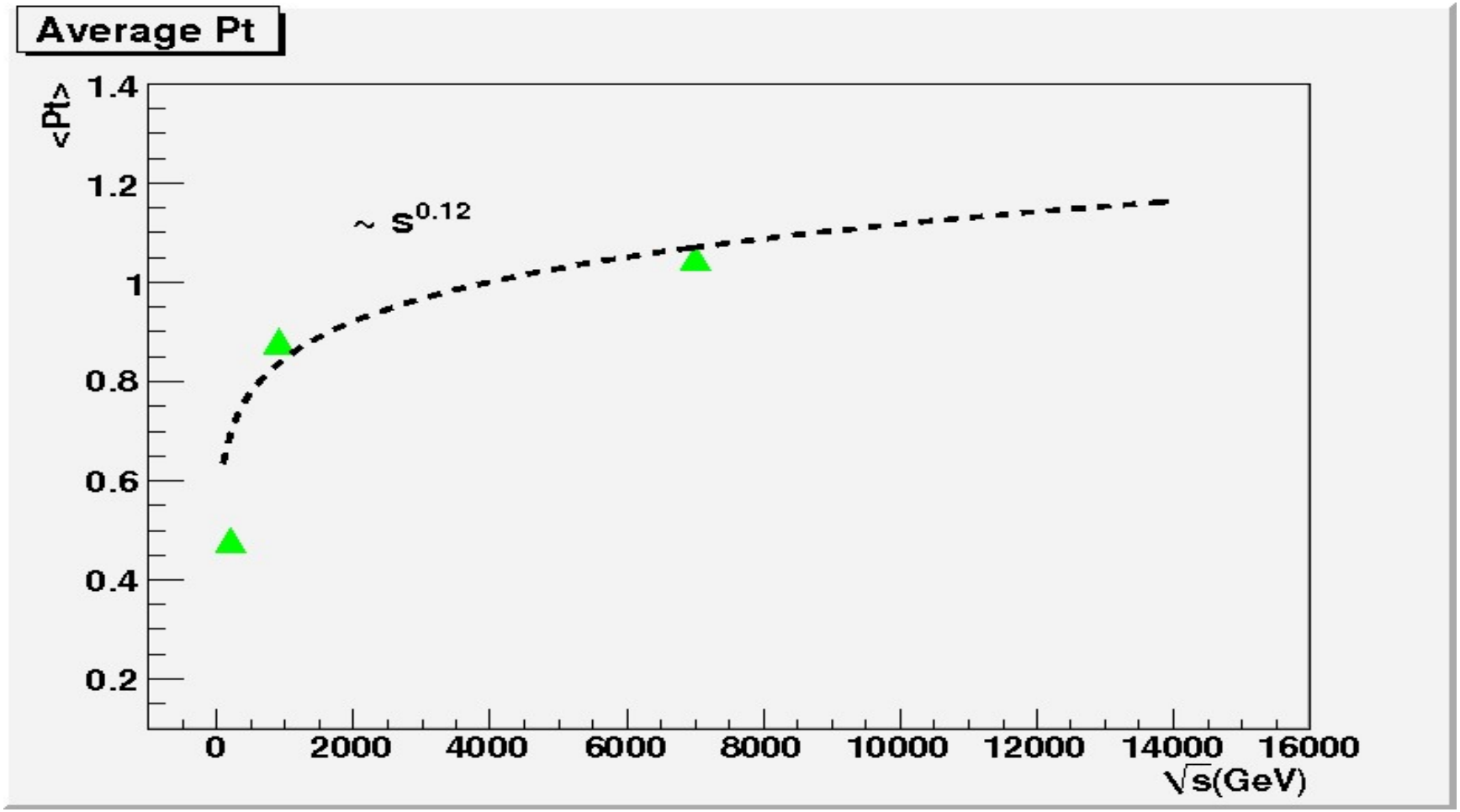


Data are from STAR(black); UA5 energies: sqrt(s) = 200 GeV(red), 546GeV(blue), 900GeV(aqua); UA1 630GeV(yellow) and CDF(green).

The changes in the slope of Pt- spectrum

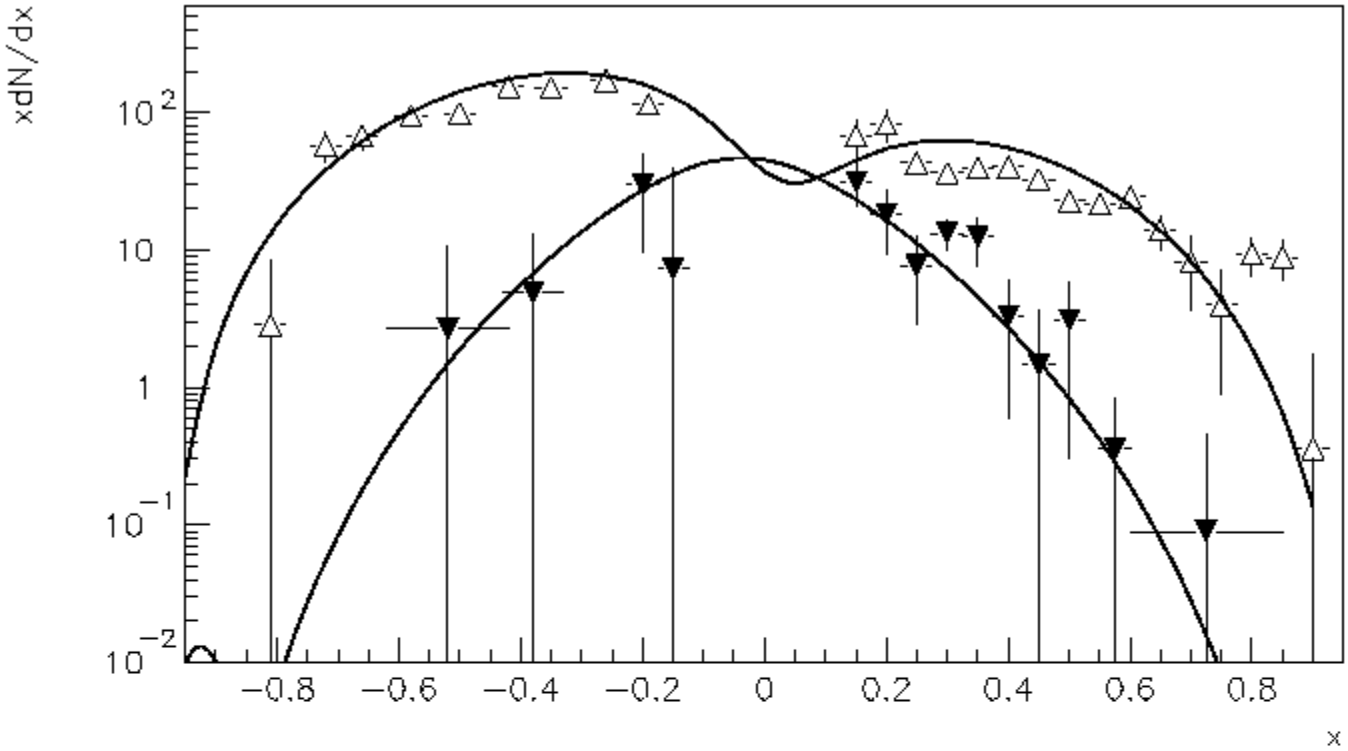


<Pt> at LHC energies



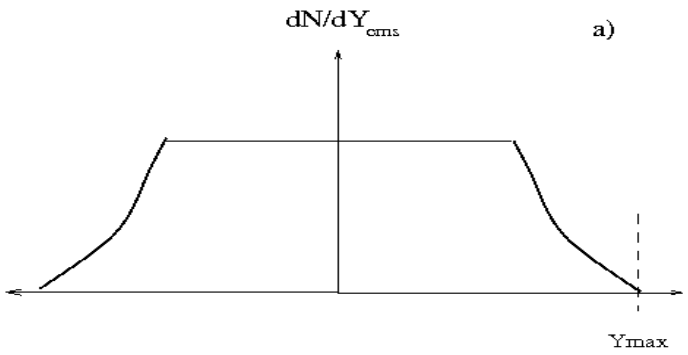
Specifics of baryon spectra, leading fragmentation

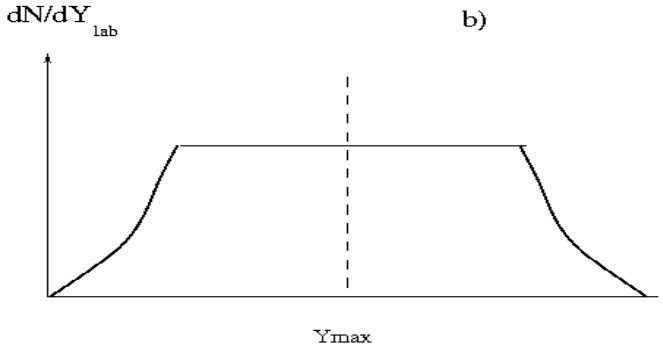
Spectra of baryons have specific leading behavior



$\Sigma^+ p \rightarrow \Lambda^0 (\bar{\Lambda}^0)$

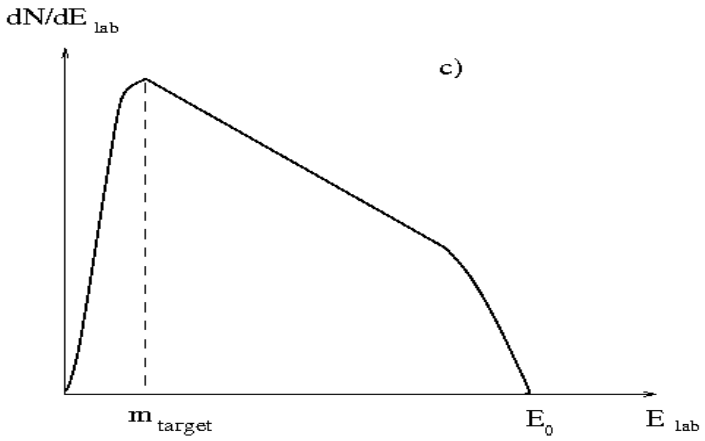
The spectra in lab. system



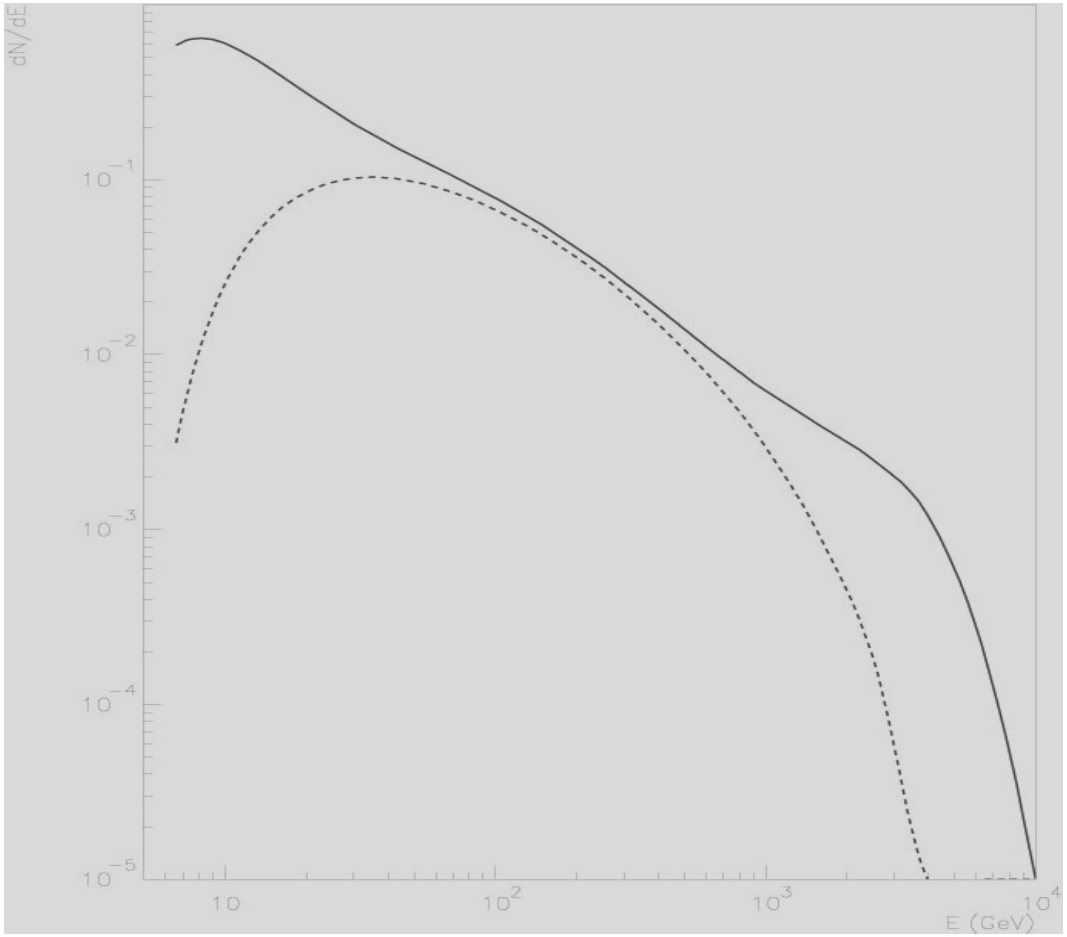


$dN/dY = xdN/dx = EdN/dE$

$dN/dE = 1/E^* dN/dY\text{lab}$



Baryon/antibaryon spectra in lab. system



The difference in baryon/antibaryon production spectra in lab.system is the reason of charge asymmetries in the spectra of particles in cosmic rays

Conclusions

The change in the slopes of strange baryon Pt spectra from STAR(200GeV) to LHC (900GeV and more) may be caused by heavy pair production of new quarks or squarks.

Average Pt grows because of heavy quark pair production up to ~ 900 GeV.

Leading phenomena in baryon spectra, that we have explained in QGSM, are the reason of charge asymmetries in the secondary particles produced in cosmic rays.

The ratio of antiparticle/particle grows with energy due to production cross section as $s^{0.12}$ or becomes asymptotically constant, if antiparticle and particle spectra are both secondary.