

REMARKS

ON MULTIPARTICLE CORRELATIONS

A. BIALAS

INST. NUCL. PHYS. PAS, KRAKÓW

MULTIPLICITY DISTRIBUTIONS

FORWARD - BACKWARD CORRELATIONS

BALANCE FUNCTIONS

HBT & LEVY STABLE DISTRIBUTIONS

MULTIPLICITY DISTRIBUTION

NEGATIVE BINOMIAL:

$$P(m) = \int F(t) dt e^{-\pi t} \frac{(\bar{n}t)^m}{m!}$$

SUPERPOSITION
OF POISSONS

$\Rightarrow t = (\text{NORMALIZED})$ INTENSITY OF THE "SOURCE"

$$t = t(m)$$

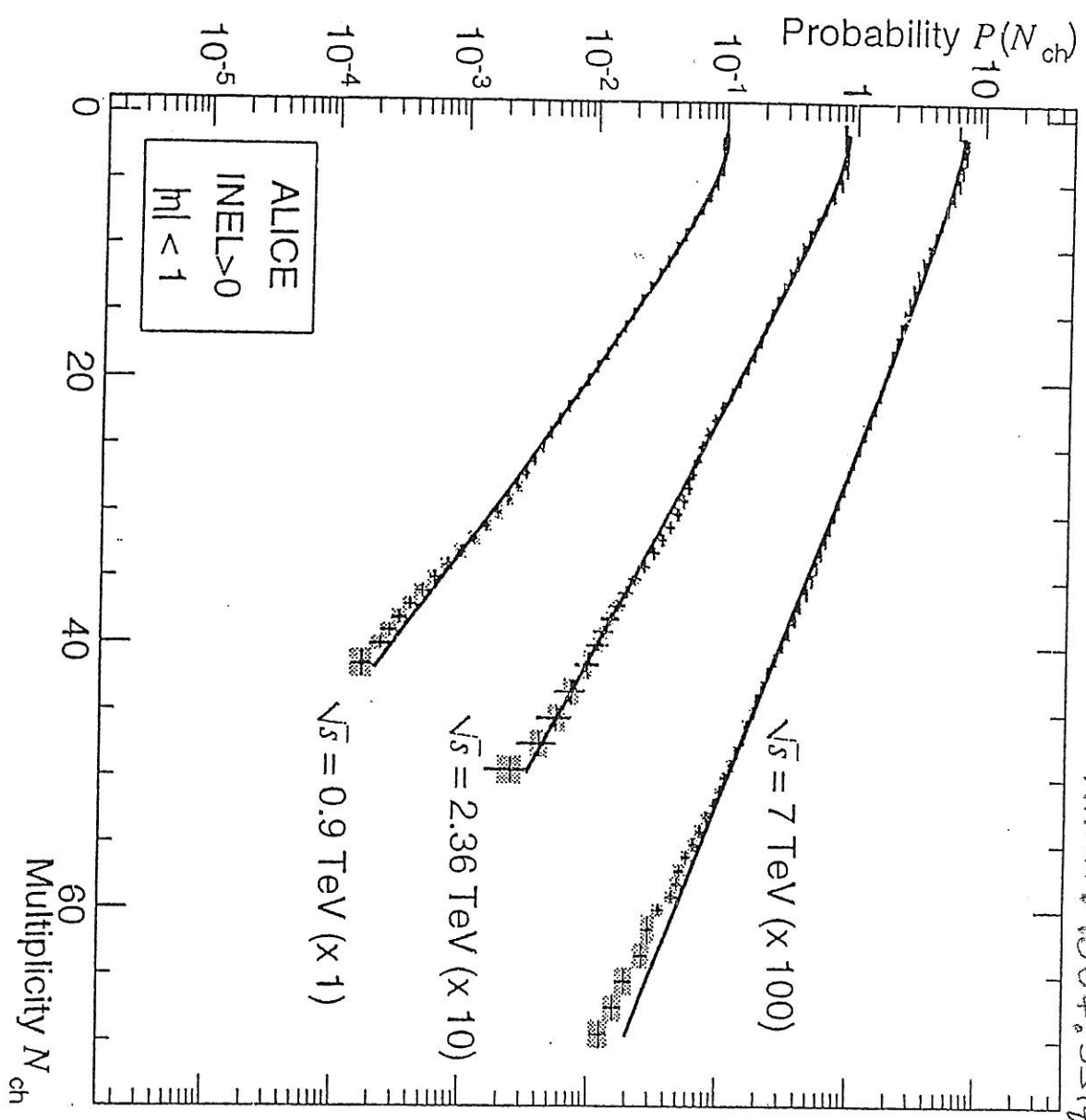
KND: AT LARGE \bar{n} , $F(m/\bar{n}) = \bar{n} P(m)$ *

HOWEVER: FOR NEGATIVE BINOMIAL *

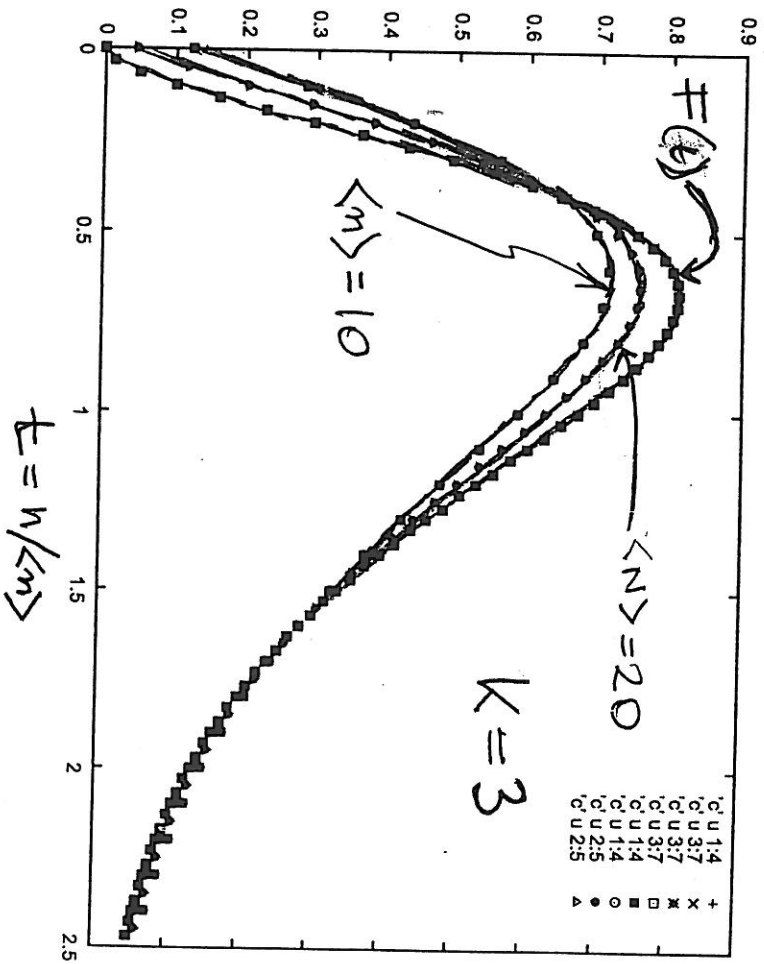
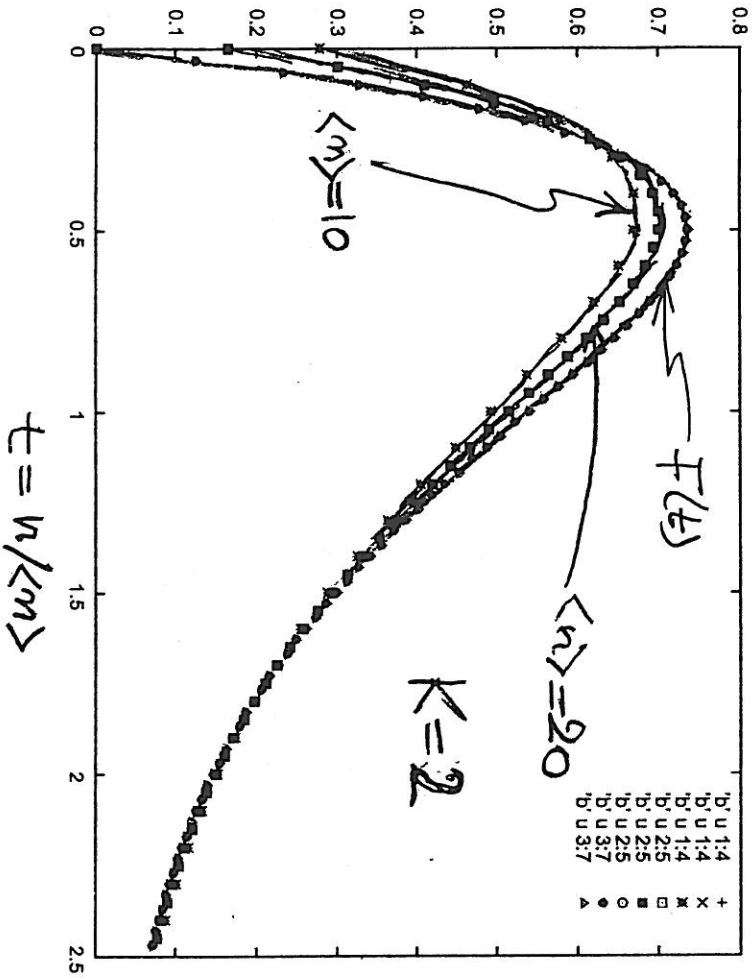
REQUIRES VERY LARGE \bar{n}

NEGATIVE BINOMIAL FITS (AT LHC)

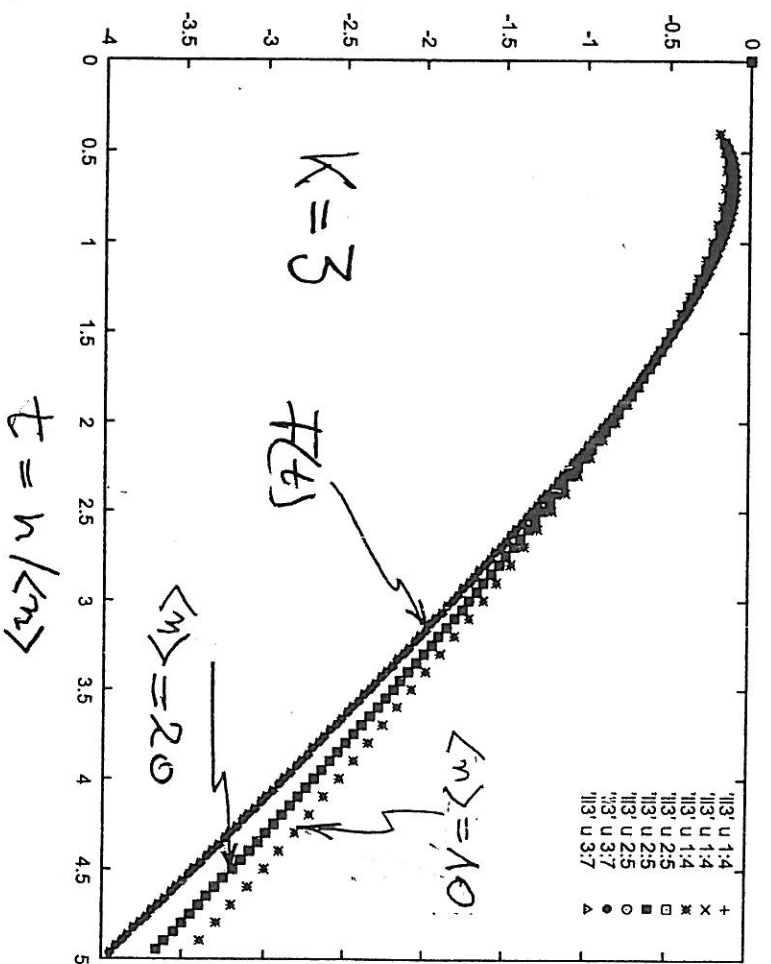
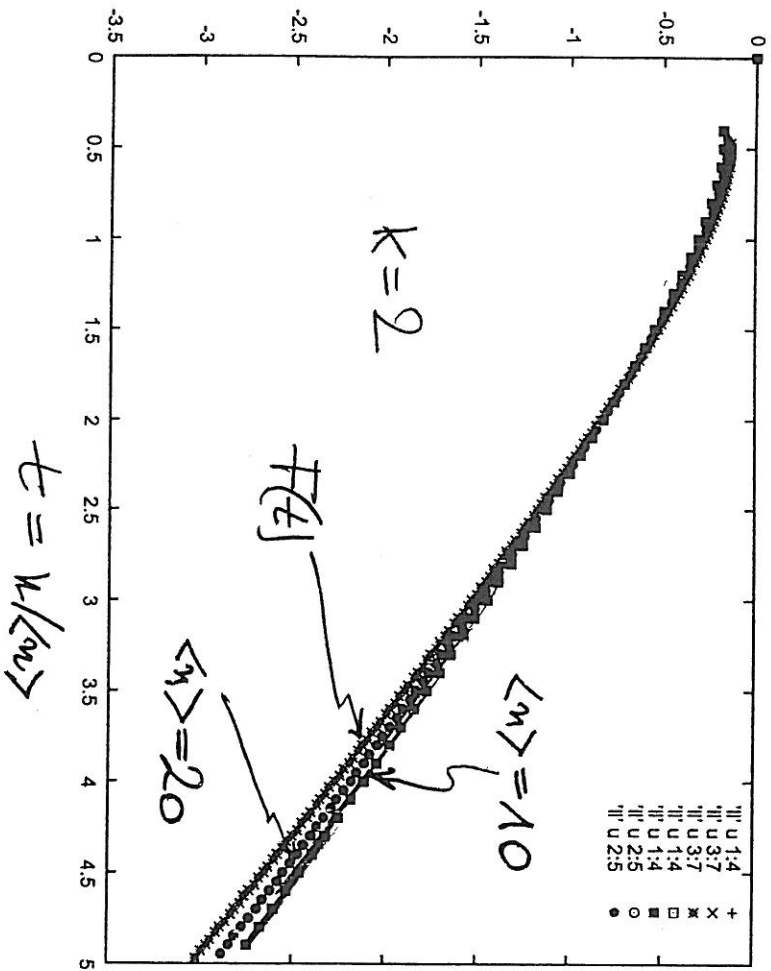
ARXIV: 1004.3514



KNO SCALING FOR NEGATIVE BINOMIAL



KNO SCALING FOR NEGATIVE BINOMIAL

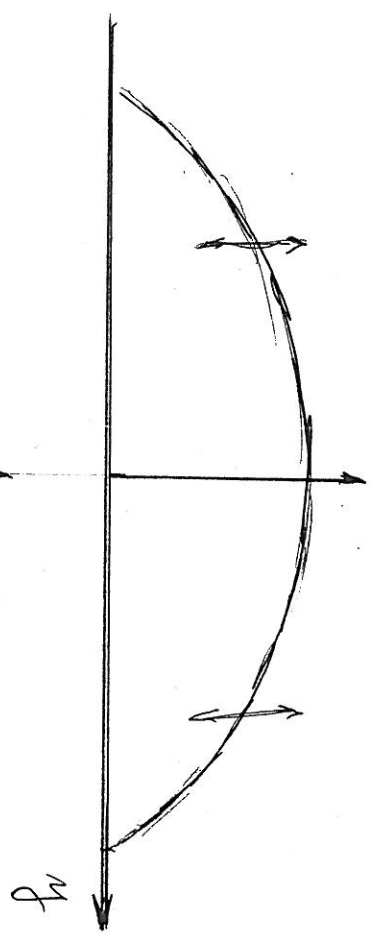


FORWARD-BACKWARD CORRELATIONS

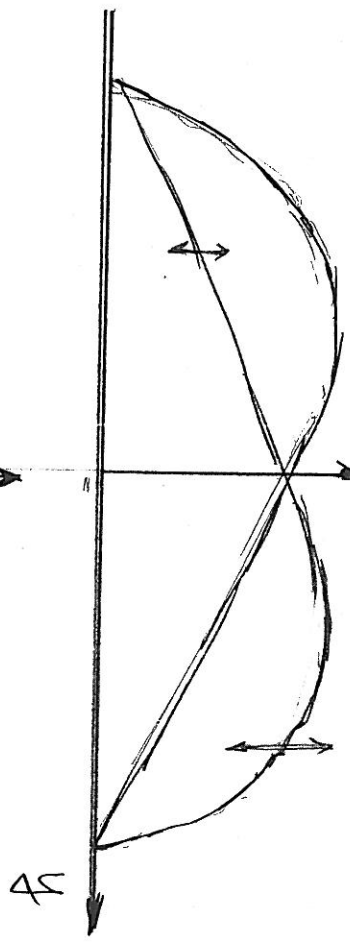
SYMMETRIC & ASYMMETRIC SOURCES

A. BZDAR 171841(2019)151
K. ZALEWSKI & AB

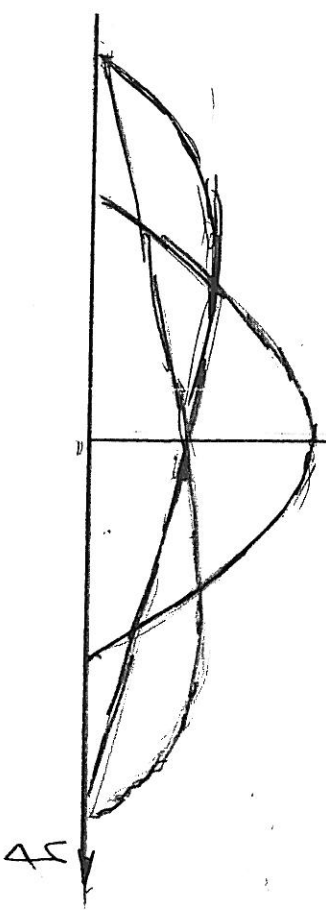
(a) LANDAU HYDRO



(b) WOUNDED NUCLEONS



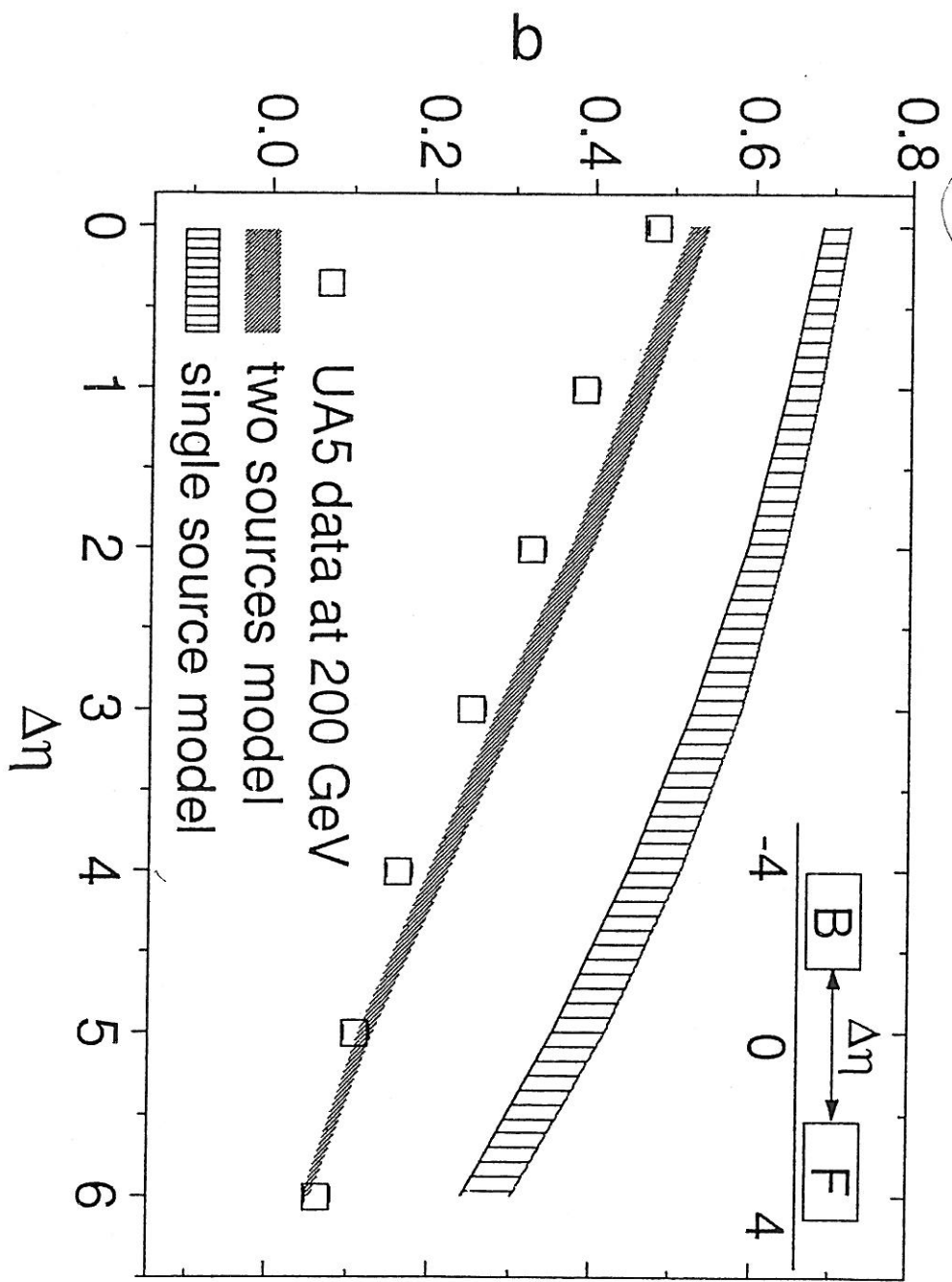
(c) DUAL PARTON MODEL



p-p COLLISIONS

FROM A. BZDZIK ArXiv 0906.2858

TBP ACETA PHYSICA POLONICA B



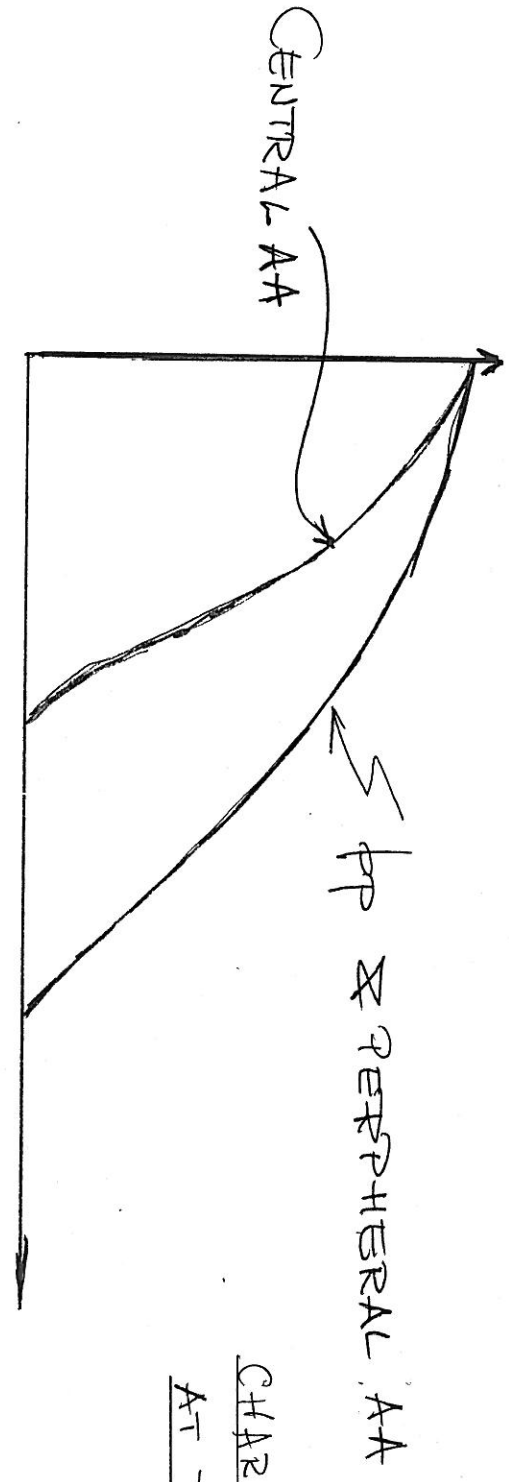
BALANCE FUNCTIONS

MEASURE DISTANCE AT WHICH CHARGES COMPENSATE

STAR: CHARGE COMPENSATION

BASS, DANILEWICZ & PRATT
PRL 85(2000) 2689

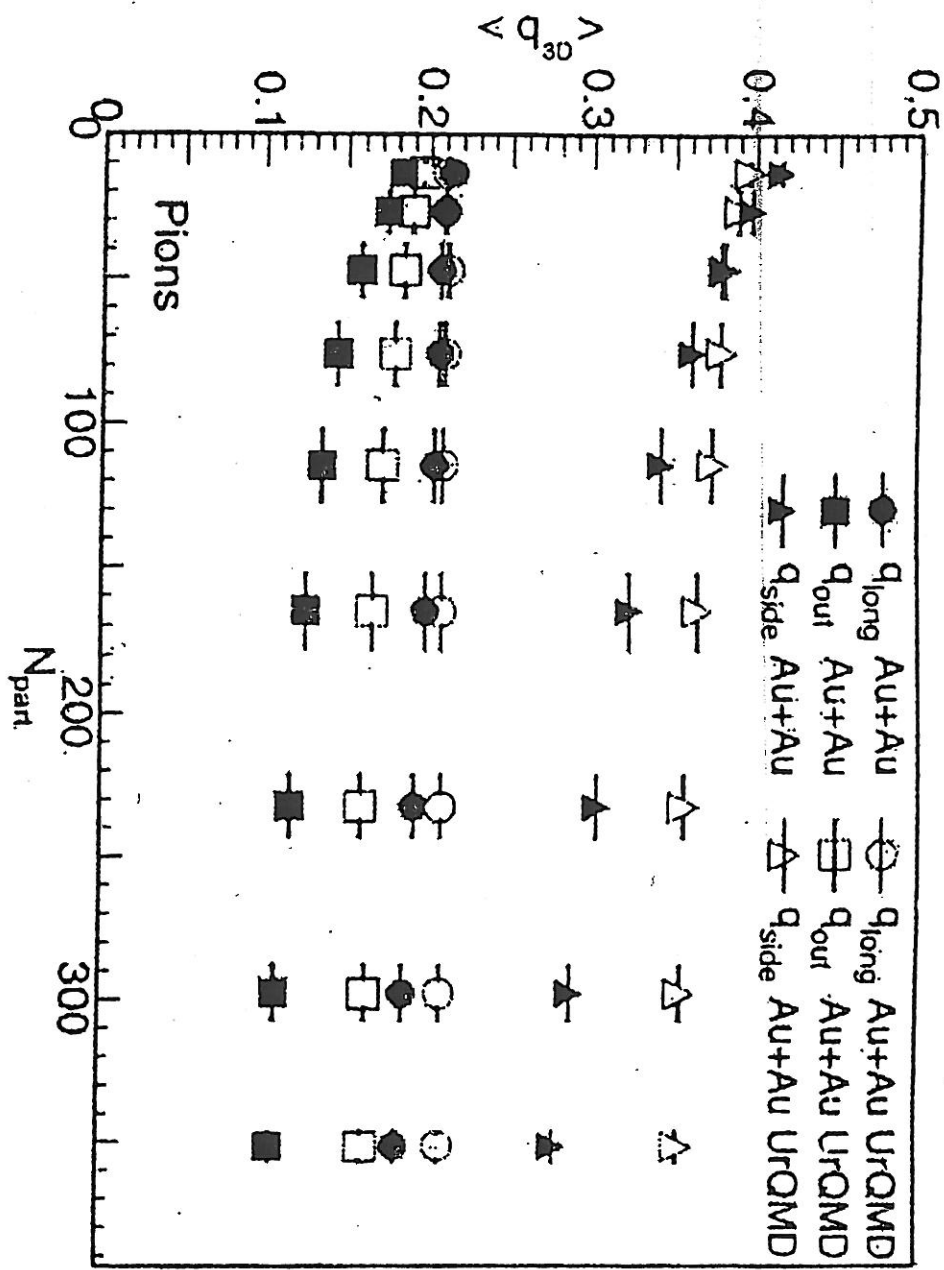
MORE EFFECTIVE AT HIGH DENSITY



⇒ CORRELATIONS IN PLASMA

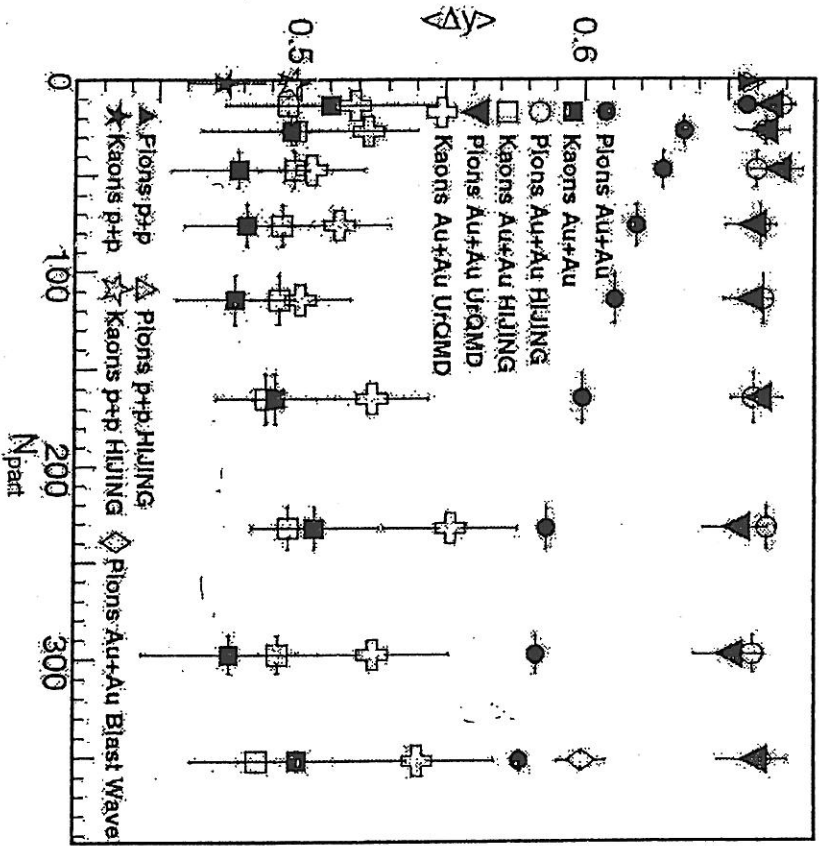
• 2

WIDTH OF BALANCE FUNCTIONS IN ΔQ

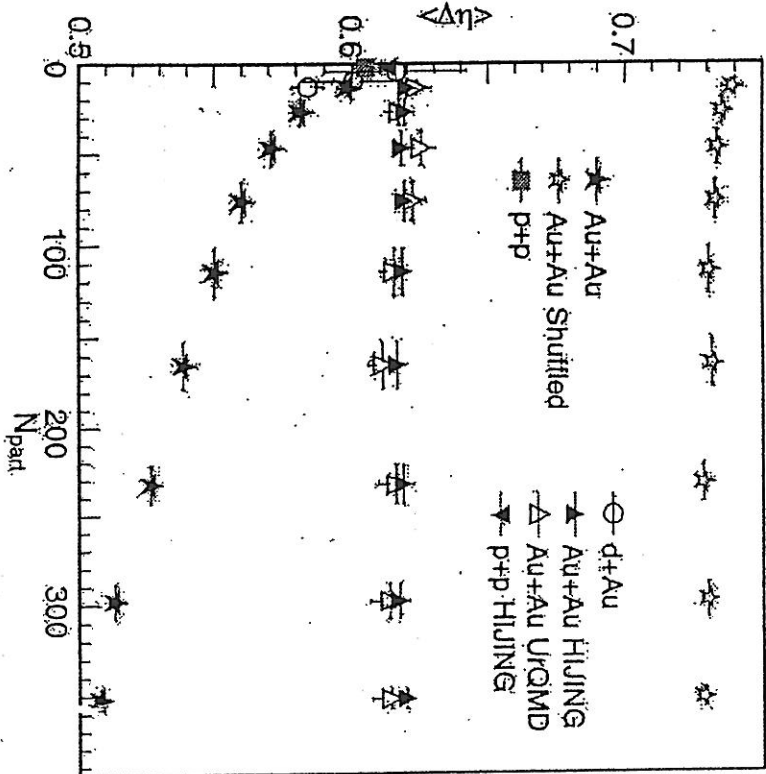


WIDTH OF BALANCE FUNCTIONS

Δy



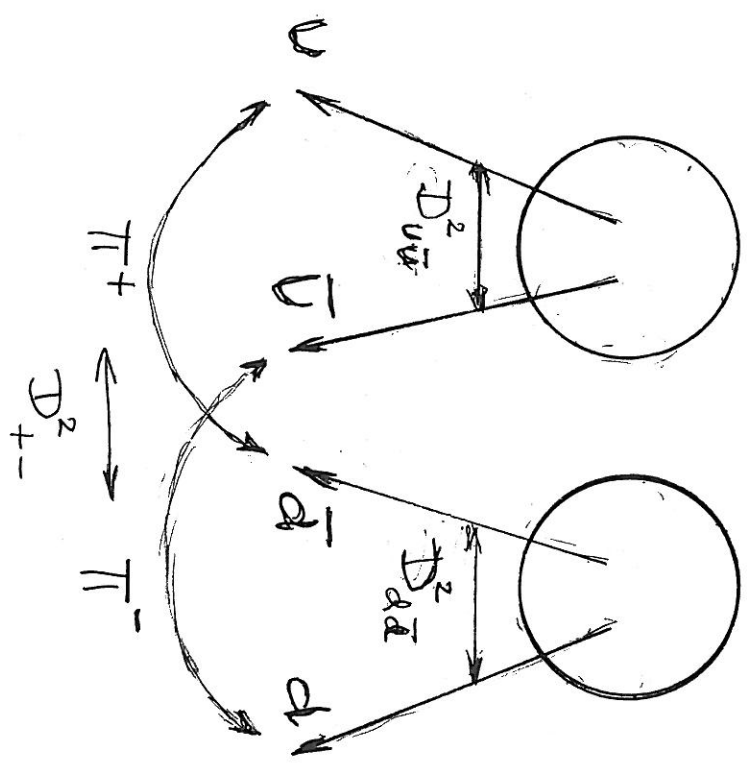
$\Delta \eta$



COALESCENCE MODEL

- (1) A SOUP OF UNCORRELATED q 's & \bar{q} 's \Rightarrow
 \Rightarrow CORRELATIONS INDUCED BY RESONANCES \Rightarrow
 \Rightarrow BROAD BALANCE FUNCTIONS

(2) DROPLETS OF GLUE ?



$$D_{+-}^2 = D_{u\bar{u}}^2 + D_{d\bar{d}}^2$$

If $D_{u\bar{u}}^2$ & $D_{d\bar{d}}^2$ SMALL \Rightarrow
 $\Rightarrow D_{+-}^2$ SMALL

HBT & LEVY STABLE DISTRIBUTIONS

CSORGO, HEGYI, NOVAK, ZAJC

APPB 36 (2005) 329

LUND COLOUR DIPOLE PICTURE IMPLIES:

$$\textcircled{*} \quad C(Q) = |1 + e^{-(QR)^{\alpha}}|^{-1} \quad 0 < \alpha \leq 2$$

X-DISTRIBUTION: LONG TAIL $|X|^{-1-\alpha}$

POWER LAW BREAKS FOR $|x| \lesssim R$

α - RELATED TO ANOMALOUS DIMENSION OF QCD

COMMENT: FLUCTUATIONS OF R CAN MODIFY $\textcircled{*}$

TWO EXAMPLES:

$$C(Q) \rightarrow |1 + e^{-(QR)^{\alpha/k}}|^{-1} \quad ; \quad C(Q) \rightarrow \left[1 + \frac{(QR)^{\alpha}}{\beta}\right]^{-\beta}$$

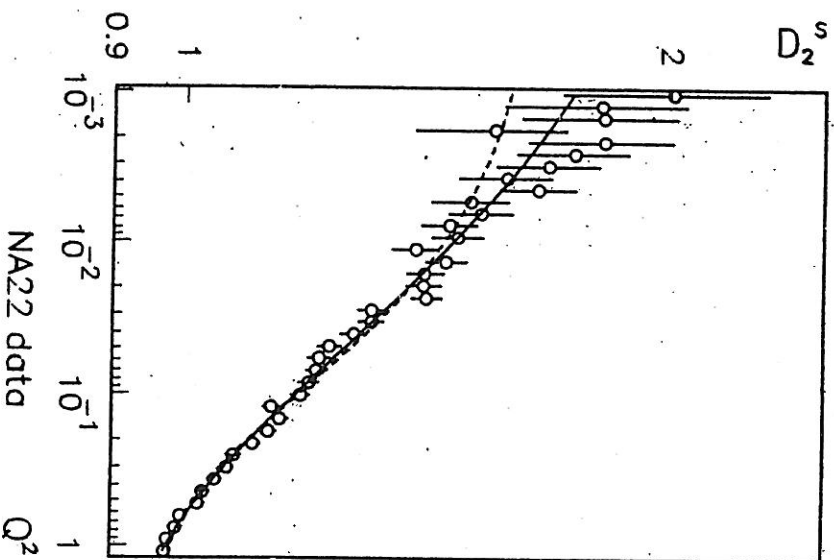
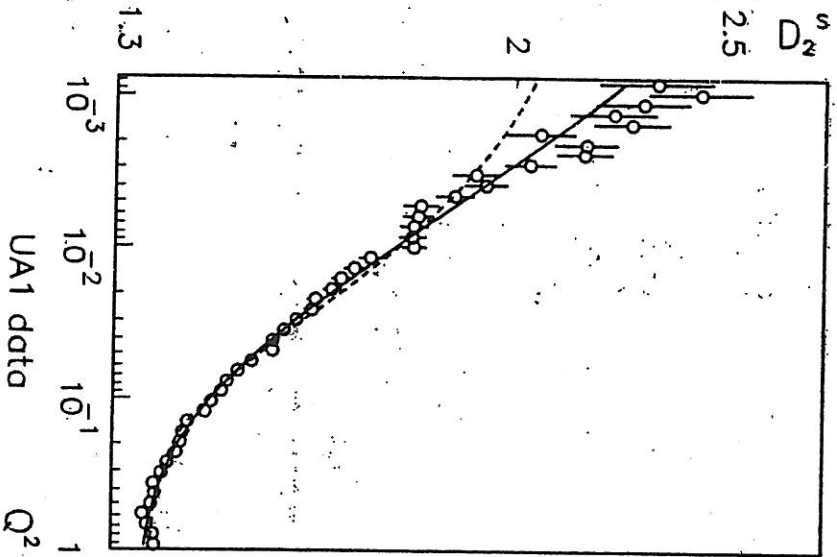
BUT: CONNECTION BETWEEN α AND β

SMALL & LARGE Q^2 MAINTAINED

CSORGO, HEGYI & ZAJC

EUR. PHYS. J. C 36 (2004) 67

Stretched exponential fit



TWO-PARTICLE CORRELATIONS

