HIDDEN ASYMMETRY

&

FORWARD-BACKWARD CORRELATIONS

A. BIALAS & K. ZALEWSKI

(1) WOUNDED SOURCES

(2) SYMMETRIC & ASYMMETRIC SOURCES

(3) FORWARD-BACKWARD CORRELATIONS

(4) SUMMARY

WOUNDED SOURCES

"REST" FRAME OF THE PRODUCED PARTICLE: $p_{\parallel} = 0$

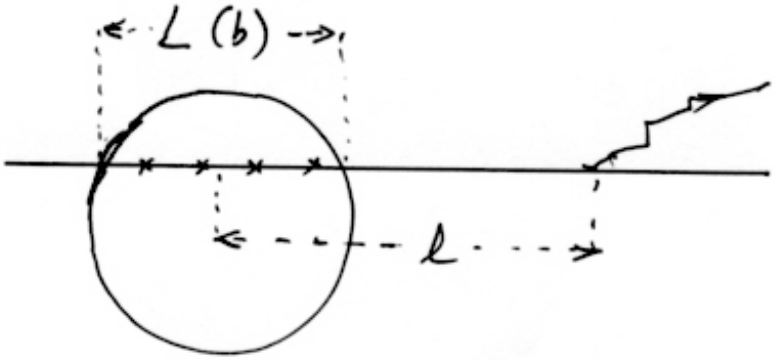
$$\tau_0 \gtrsim \frac{1}{E_0} = \frac{1}{m_\perp}$$

"LAB" FRAME: TARGET AT REST

$$\tau = \gamma \tau_0 = \frac{\gamma}{m_\perp} = \frac{\cosh y}{m_\perp}$$

$$\ell = v\tau = \frac{\sinh y}{m_\perp}$$

IF $\ell > L(b)$ PARTICLE CANNOT RESOLVE # OF COLLISIONS



WOUNDED NUCLEONS

WOUNDED QUARKS & DIQUARKS

BEGINNING (1976): WOUNDED NUCLEONS

W. CZYŻ & AB NPB111 (76) 461

$$N_{pA} = \frac{1+\nu}{2} N_{pp}$$ TOTAL MULTIPLICITIES

RAPIDITY DISTRIBUTIONS:

$$\left.\frac{dN}{dy}\right|_{AB} = W_N(A)\,\rho_N(y) + W_N(B)\,\rho_N(-y)$$

WOUNDED CONSTITUENTS:

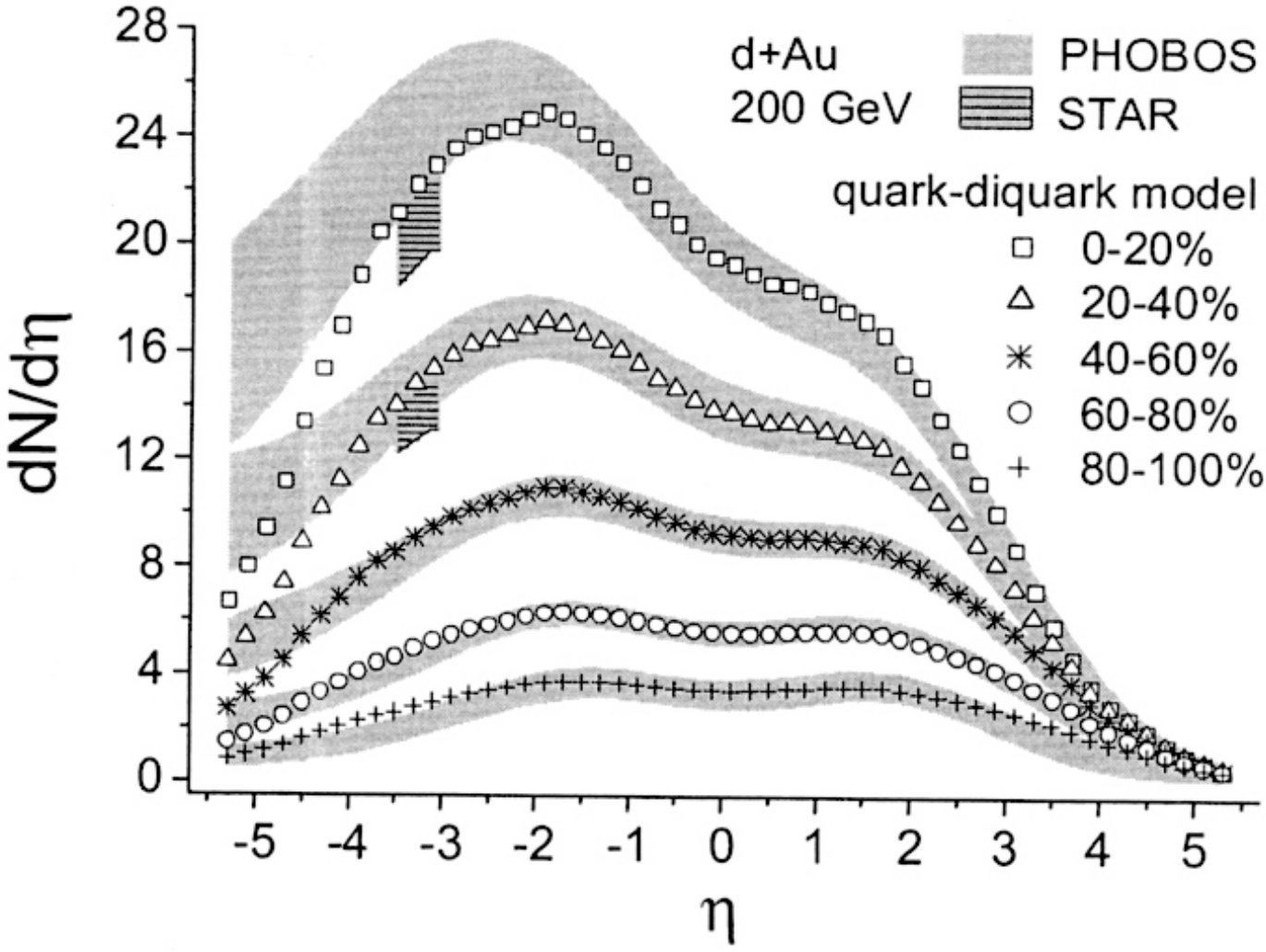
W. CZYŻ, W. FURMAŃSKI & AB ACTA PHYS. POL. B8 (77) 585

$$\left.\frac{dN}{dy}\right|_{AB} = W_c(A)\,\rho_c(y) + W_c(B)\,\rho_c(-y)$$

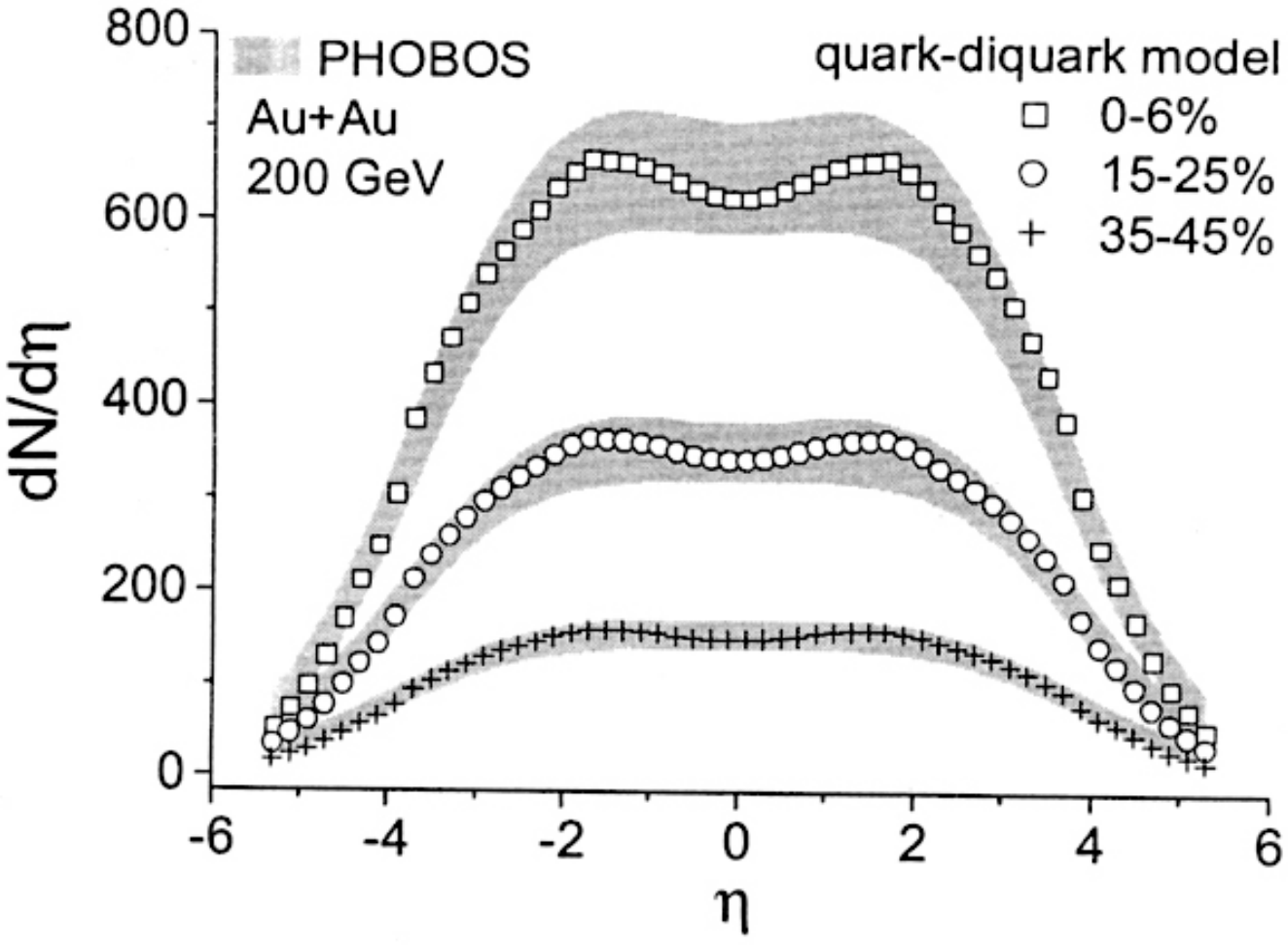
A. BZDAK & AB (PRC 77 (2008) 034908):

WOUNDED QUARK + DIQUARK MODEL WORKS FOR DISTRIBUTIONS INTEGRATED OVER $\phi_\perp$

ASYMMETRIC COLLISION

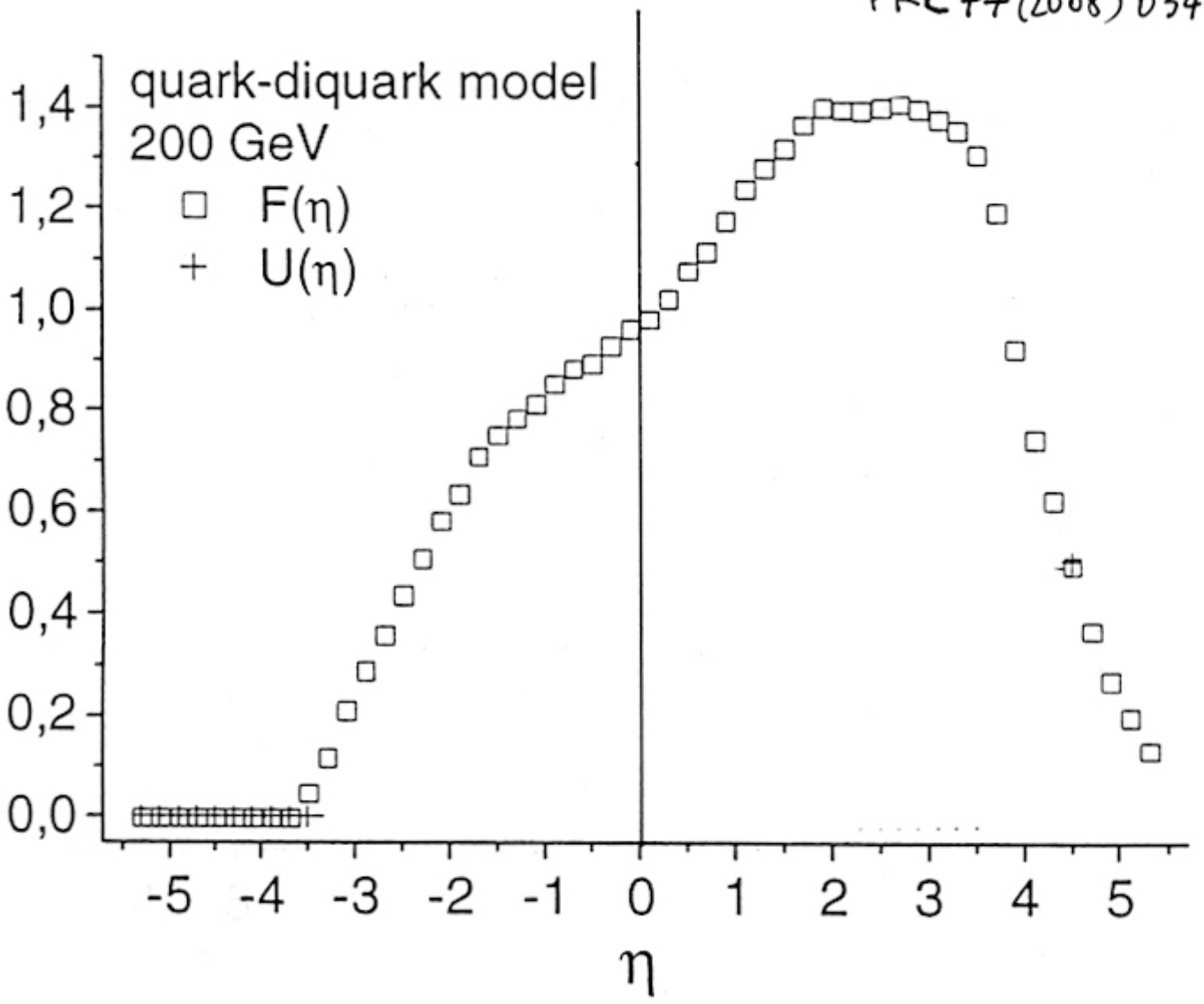


SYMMETRIC COLLISION

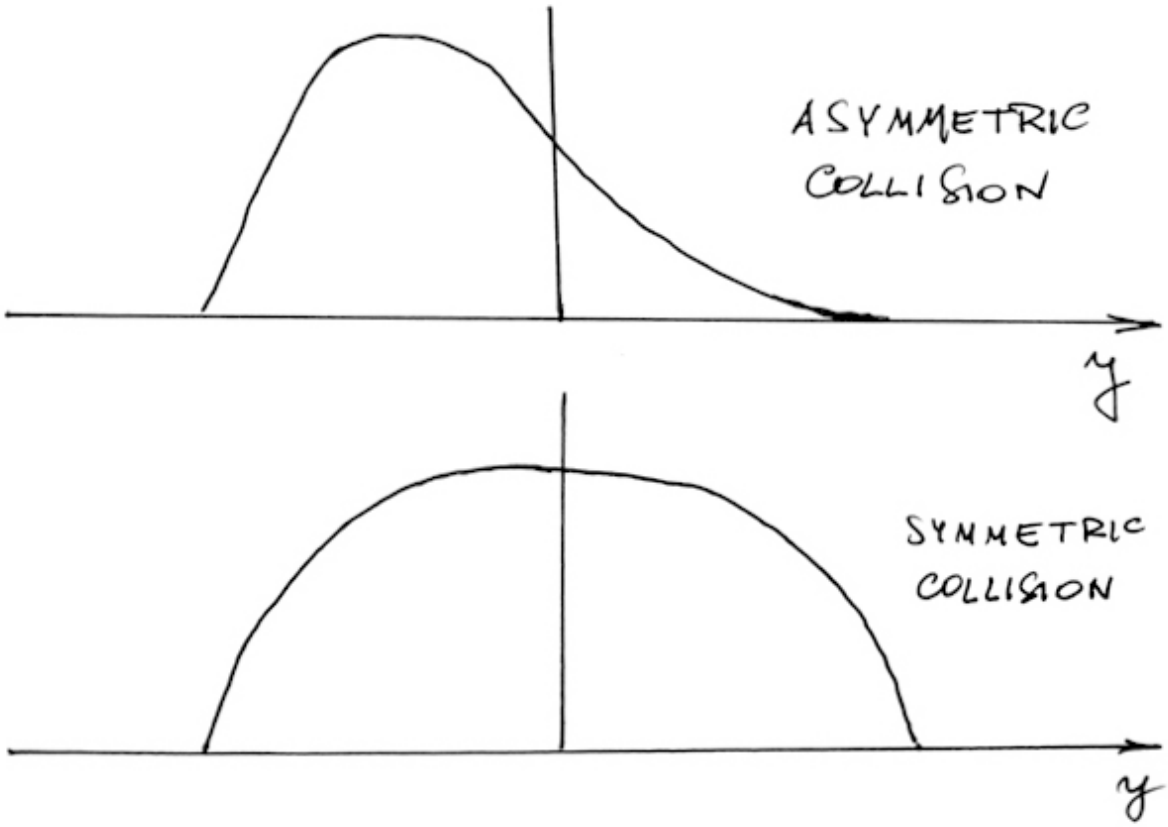


PARTICLE EMISSION FROM ONE WOUNDED CONSTITUENT

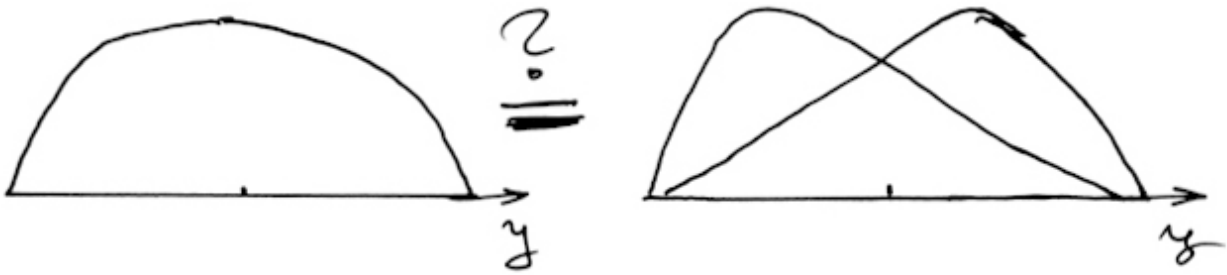
A. BZAK ≈ AB
PRC 77 (2008) 034908



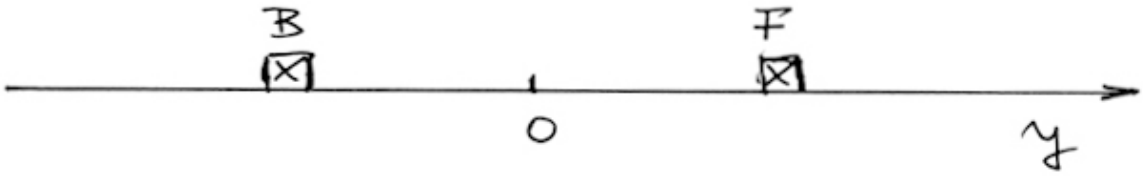
SYMMETRIC & ASYMMETRIC SOURCES



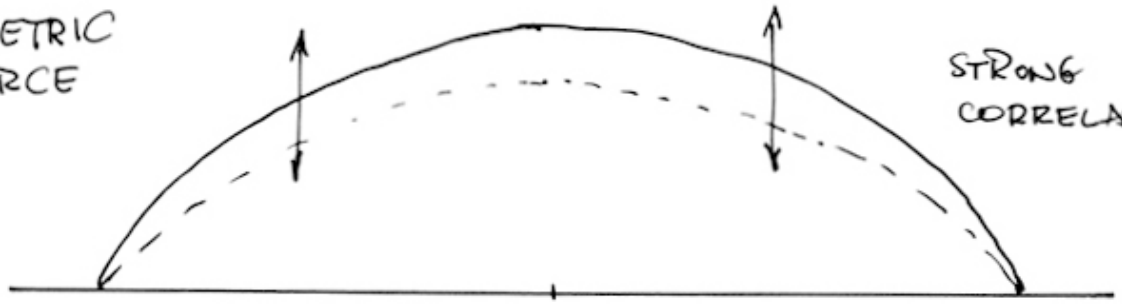
QUESTION (A. BIALAS ACTA PHYS. POL. B41 (2010) 151)



FORWARD - BACKWARD CORRELATIONS

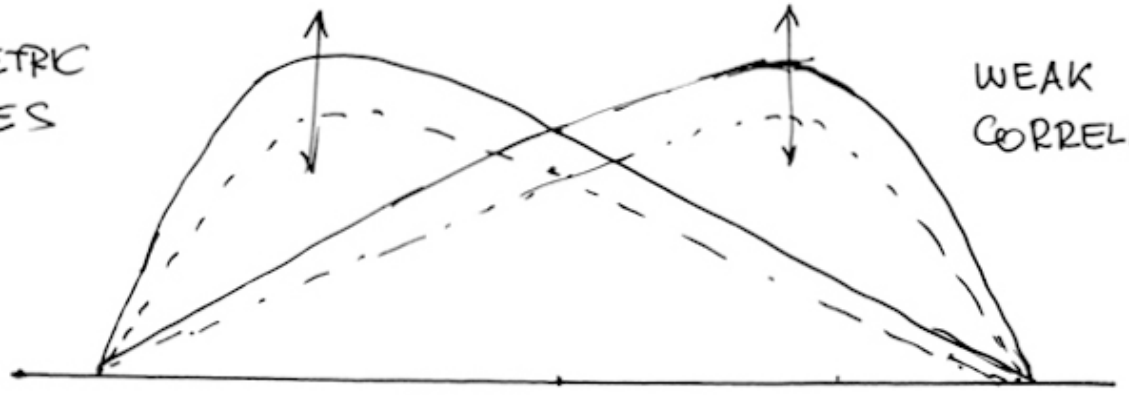


SYMMETRIC SOURCE



STRONG CORRELATION

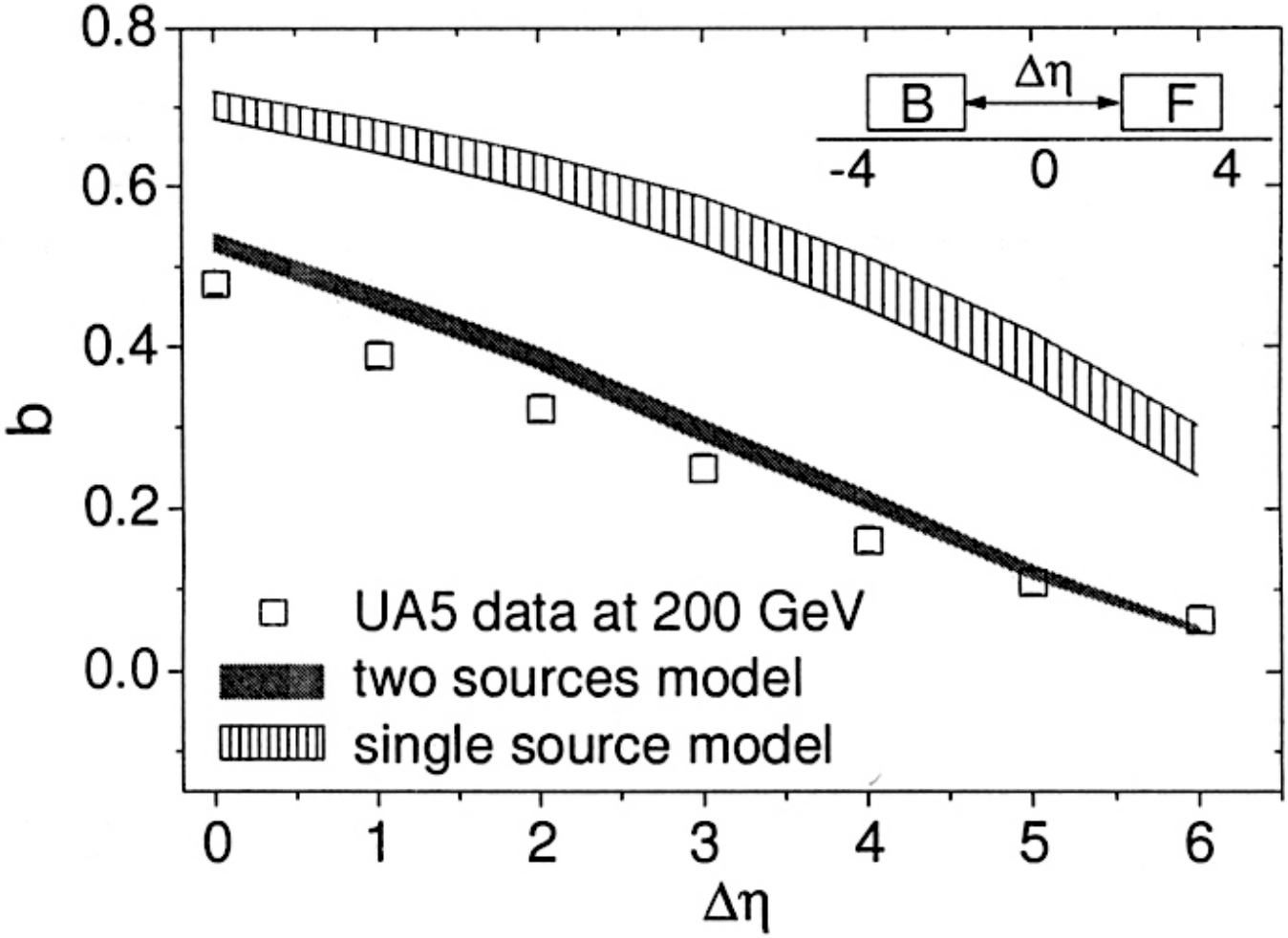
ASYMMETRIC SOURCES



WEAK CORRELATION

p-p COLLISIONS

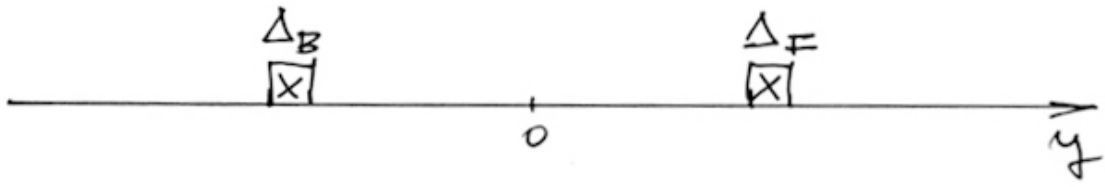
FROM A. BZDAK ArXiv 0906.2858



FORWARD-BACKWARD CORRELATIONS IN SYMMETRIC PROCESSES

GENERAL TREATMENT

K. ZALEWSKI 2.18



(1) ALL INFORMATION IS CONTAINED IN JOINT FACTORIAL MOMENTS $[\Delta_B, \Delta_F]$

$$F_{ke} = \langle n_B(n_B-1)\cdots(n_B-k+1)\, n_F(n_F-1)\cdots(n_F-l+1)\rangle$$

(2) RELATIONS WERE DERIVED BETWEEN F_{ke} & FACTORIAL MOMENTS IN $[\Delta_B+\Delta_F]$:

$$F_m = \langle (n_B+n_F)(n_B+n_F-1)\cdots(n_B+n_F-m+1)\rangle$$

(3) THESE RELATIONS ALLOW TO <u>UNCOVER</u> PRESENCE OF ASYMMETRIC COMPONENT & TO <u>DECODE</u> ITS SHAPE IN RAPIDITY

SUMMARY

(1) MANY MODELS OF PARTICLE PRODUCTION SUGGEST PRESENCE OF ASYMMETRIC SOURCES, EVEN IN SYMMETRIC PROCESSES.

(2) A MODEL-INDEPENDENT METHOD TO VERIFY THIS PREDICTION BY STUDYING THE FORWARD-BACKWARD CORRELATIONS IN RAPIDITY IS DEVELOPPED.

(3) THE METHOD CAN BE APPLIED TO OTHER VARIABLES, INCLUDING TRANSVERSE MOMENTUM.