Z-Scaling

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Z scaling:

Modelo fenomenológico baseado em princípios de auto similaridade e fractalidade da estrutura hadrônica - Seção de choque diferencial em relação à variável z segue uma curva universal Ψ(z)

Solução exata para z

$$\frac{1}{1+(q-1)z}\frac{\partial z}{\partial x_1}\frac{\partial z}{\partial x_2} = C\frac{\partial^2 z}{\partial x_1 \partial x_2} \qquad \xi = z + \frac{1}{q-1}$$

$$\frac{1}{\xi}\frac{\partial \xi}{\partial x_1}\frac{\partial \xi}{\partial x_2} = (q-1)C\frac{\partial^2 \xi}{\partial x_1 \partial x_2} \quad \Rightarrow \quad \xi(x_1,x_2) = f(x_1)f(x_2) \quad \Rightarrow \quad z(x_1,x_2) = f(x_1)f(x_2) - \frac{1}{q-1}$$

Uma solução possível

$$z = z_o(1-x_1)^{\delta_1}(1-x_2)^{\delta_2} - \frac{1}{q-1}$$

$$z_o = \sqrt{x_1 x_2 s}/Q$$

$$x_1 = (1/\sqrt{s})(E+k_z) \qquad E = \sqrt{m^2+k_z^2+k_t^2}$$

$$x_2 = (1/\sqrt{s})(E-k_z) \qquad k_z = k_t sinh(\eta)$$

Dados

$$E\frac{d^3\sigma}{dP^3} = E\frac{d^2\sigma}{2\pi k_t dk_t\, dk_z} \qquad k_t \qquad k_z$$

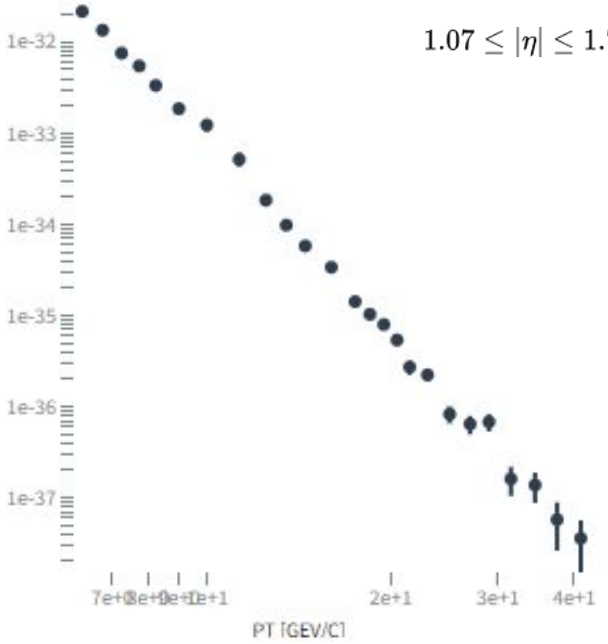
Ajuste

$$\psi(z) = \sigma_0(1+(q-1)\frac{z}{\lambda})^{\frac{-q}{q-1}}$$

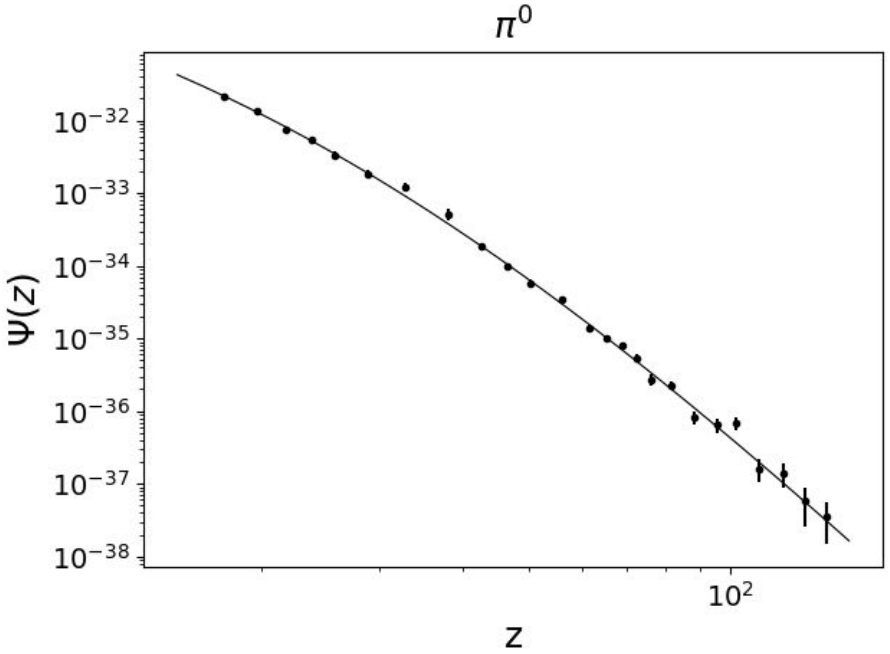
Inclusive Particle Production in the Transverse Momentum Range Between 0.25 and 40 GeV/c at the CERN $Sp\bar{p}S$ Collider

$\sqrt{s} = 540Gev \qquad < |\eta| >= 1.4$

$1.07 \leq |\eta| \leq 1.75$



$$\psi(z) = \sigma_0(1 + (q-1)\frac{z}{\lambda})^{\frac{-q}{q-1}}$$



q=1.12

Q=0.5

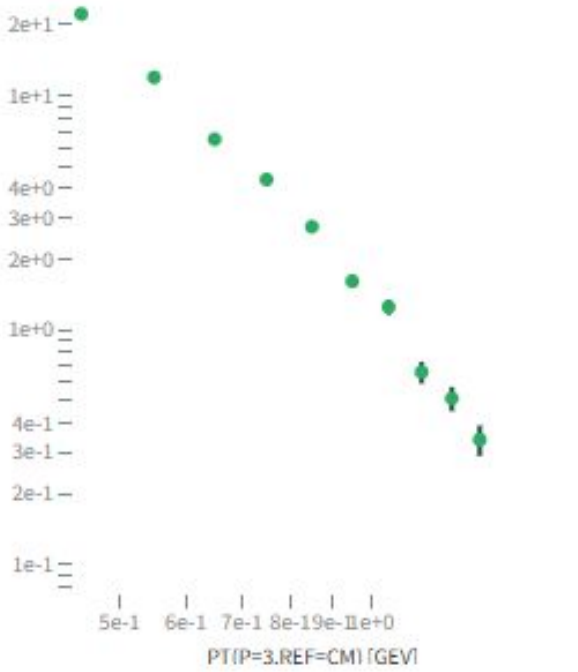
Chi^2=1.03

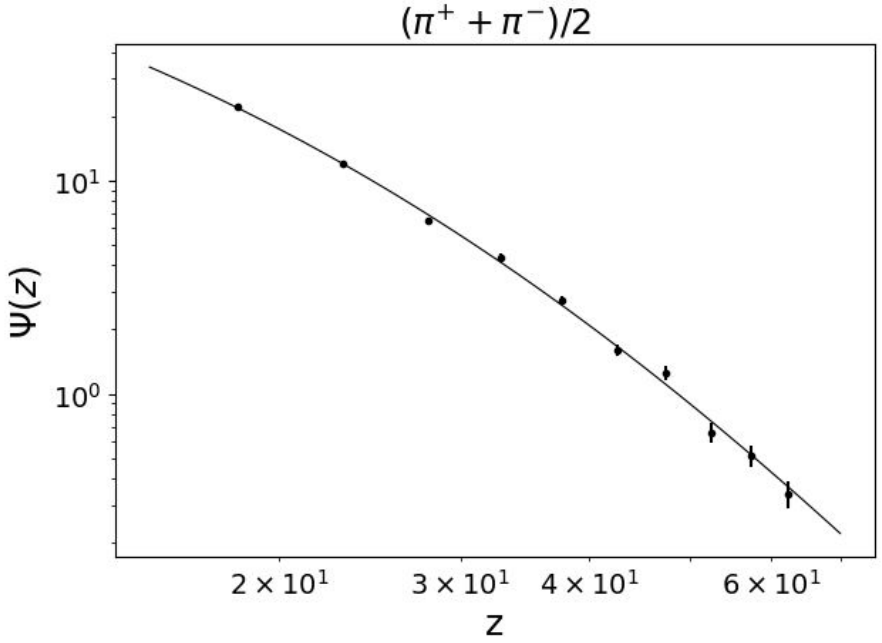
λ=2.39(4)

σ_0=8(1)e-30

Inclusive Charged Particle Production at the CERN anti-p p Collider

$\sqrt{s} = 540Gev$ THETA=90 DEG





q=1.19

Q=0.01

Chi^2=1.54

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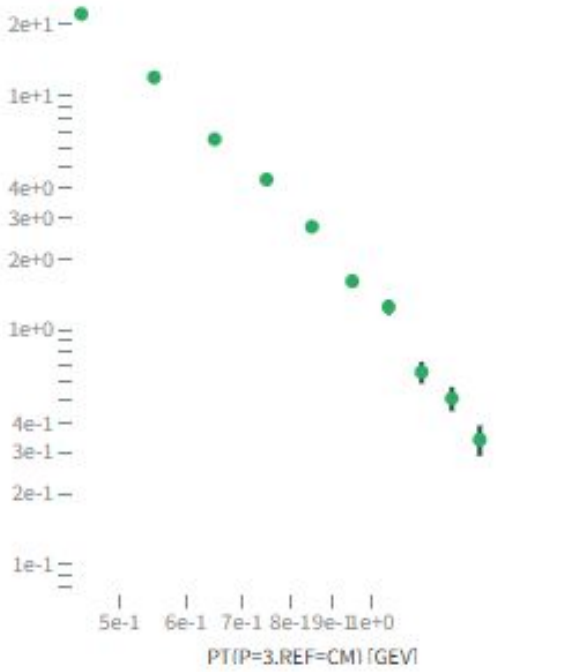

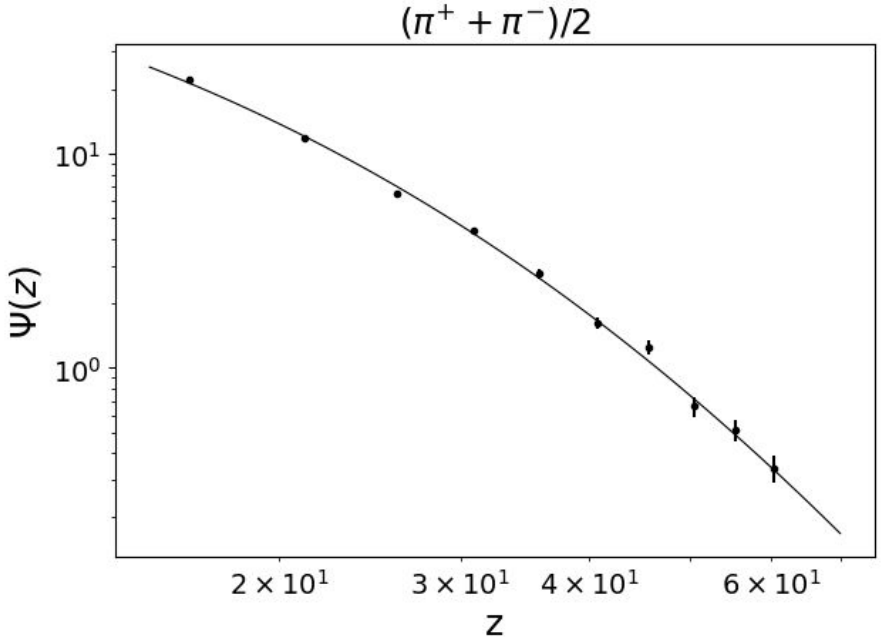

q=1.14

Q=0.01

Chi^2=1.88

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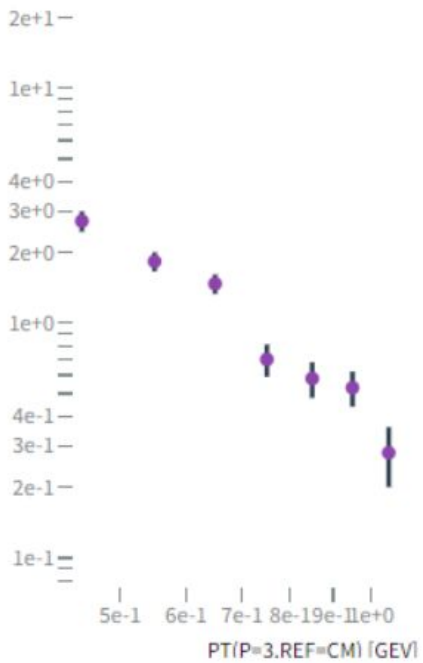
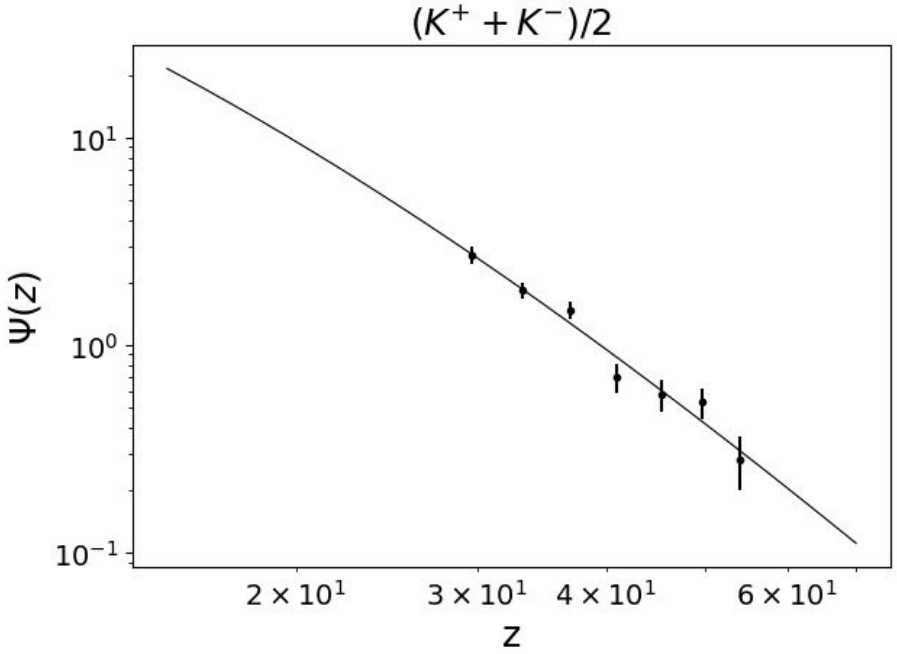
$\sqrt{s} = 540Gev$ THETA=90 DEG





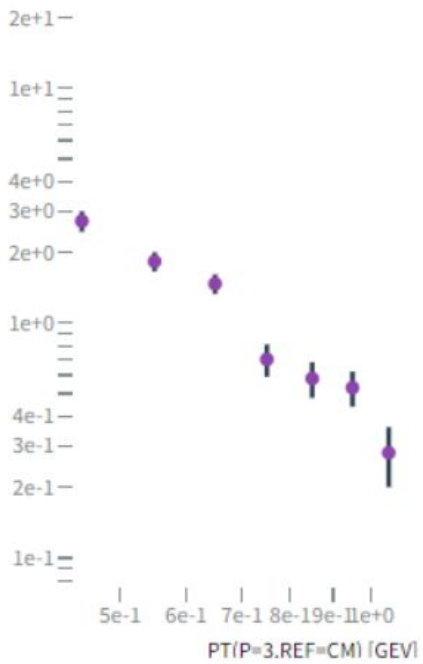
q=1.27

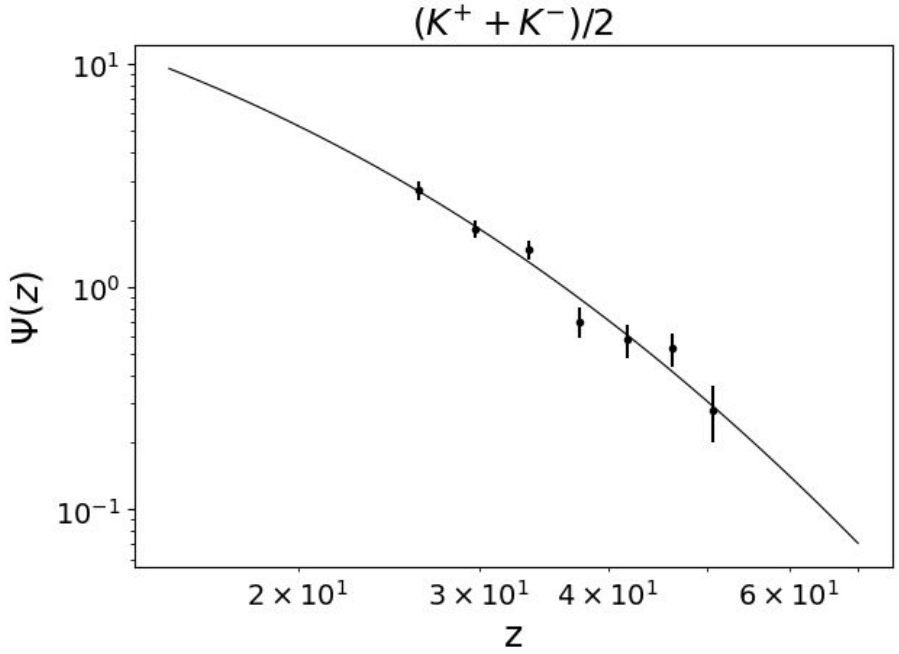
Q=0.01

Chi^2=1.19

Inclusive Charged Particle Production at the CERN anti-p p Collider

$\sqrt{s} = 540Gev$ THETA=90 DEG





q=1.14

Q=0.01

Chi^2=1.22