

Evidência de estrutura fractal em hádrons

A dark blue diagonal gradient bar that starts from the bottom left corner and extends towards the top right corner, covering the lower half of the slide.

Colisão proton-antiproton

Partículas: Pi^+ , K^+ , Rho^+ 23-63 Gev \Rightarrow confinamento

3 Passos

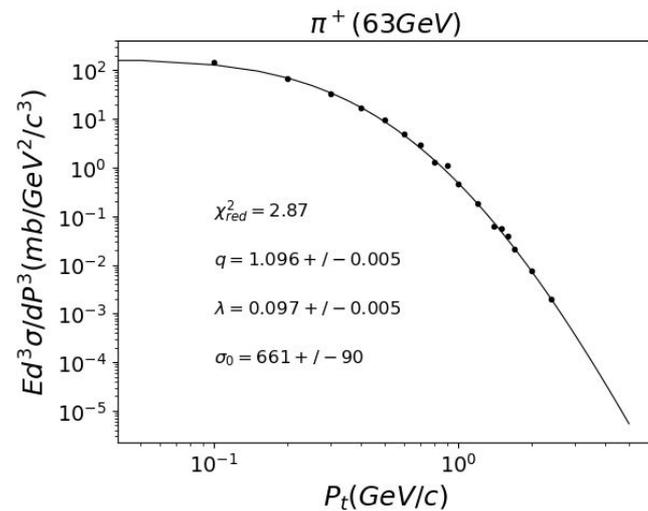
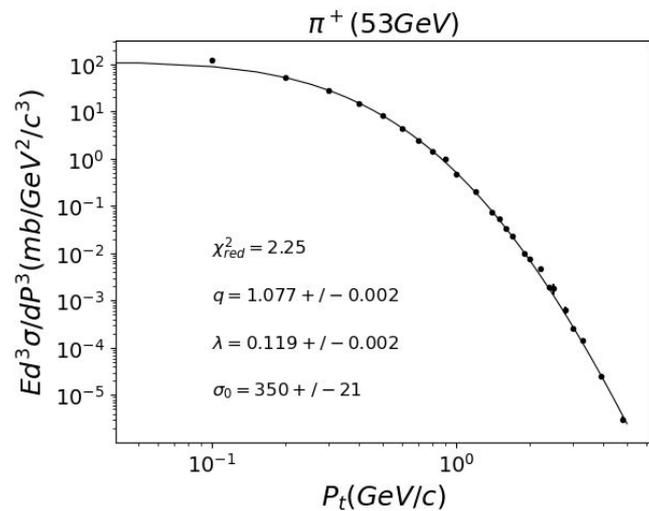
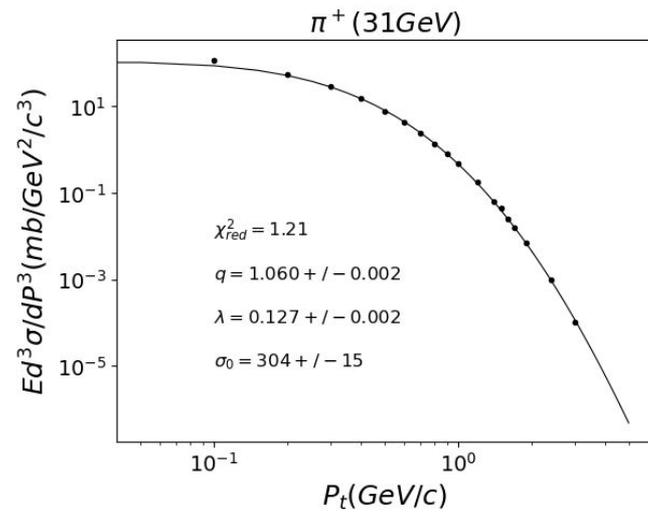
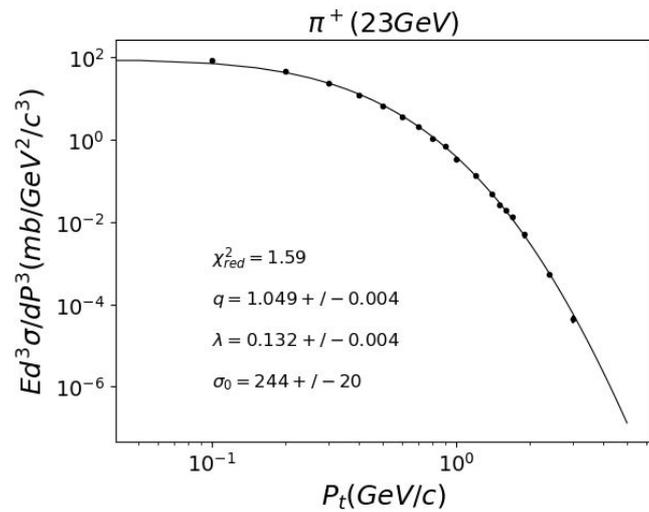
- $E \frac{d\sigma}{dp^3} = \sigma_0 \left(1 + (q-1) \frac{\varepsilon}{\lambda} \right)^{\frac{-1}{q-1}}$
- $E \frac{d\sigma}{dp^3} = \sigma_0 \left(1 + (q-1) \frac{\varepsilon_1}{\Lambda} \right)^{\frac{-q}{q-1}} \left(1 + (q-1) \frac{\varepsilon_2}{\Lambda} \right)^{\frac{-q}{q-1}} \left(1 + (q-1) \frac{\varepsilon}{\lambda} \right)^{\frac{-1}{q-1}} \quad q = 1.14$
- $E \frac{d\sigma}{dp^3} = \sigma_0 \left(1 + (q-1) \frac{\varepsilon_1}{\Lambda} \right)^{\frac{-q}{q-1}} \left(1 + (q-1) \frac{\varepsilon_2}{\Lambda} \right)^{\frac{-q}{q-1}} \left(1 + (q-1) \frac{\varepsilon}{\lambda} \right)^{\frac{-1}{q-1}} \quad \lambda = 0.14 \quad q = 1.14$

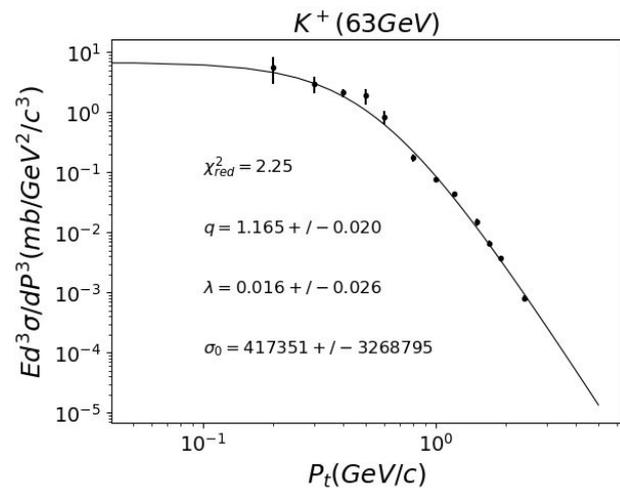
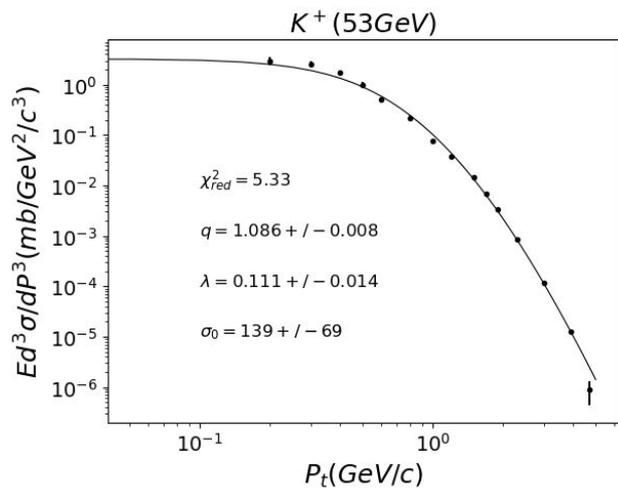
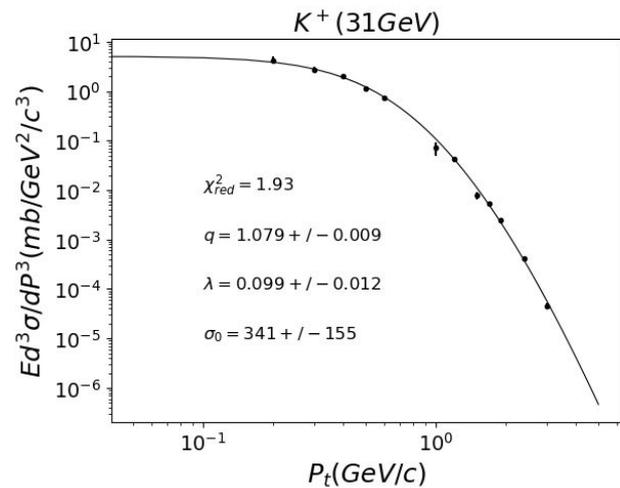
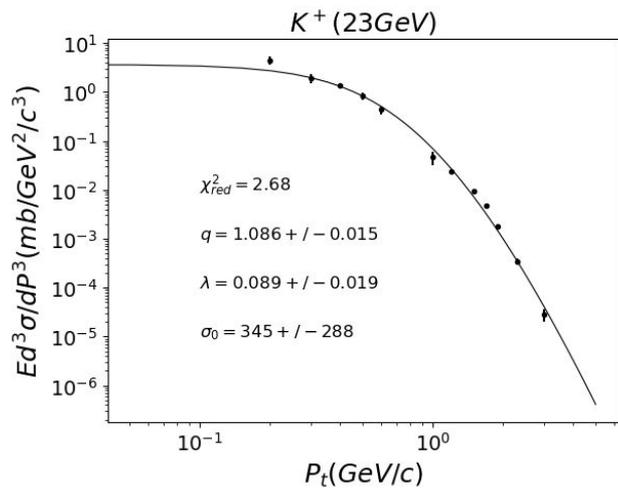
Passo 1

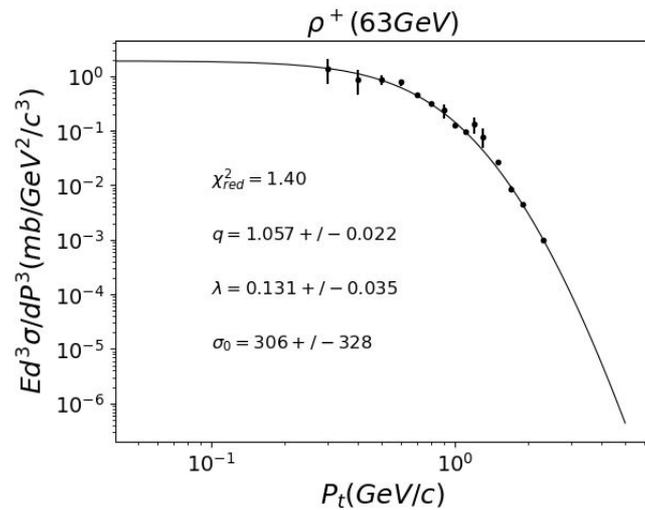
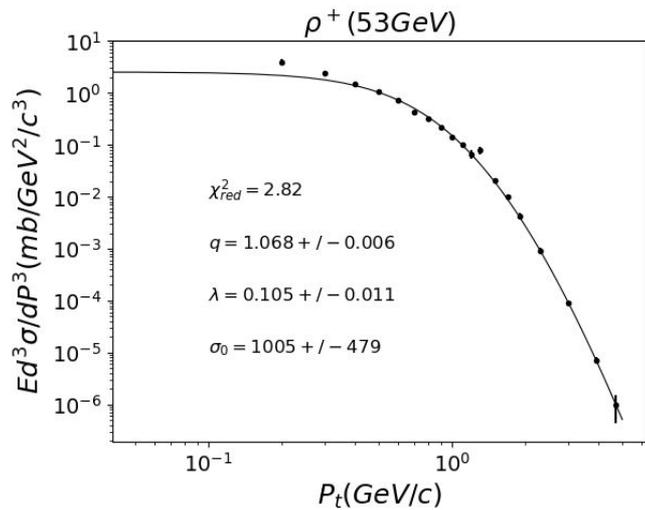
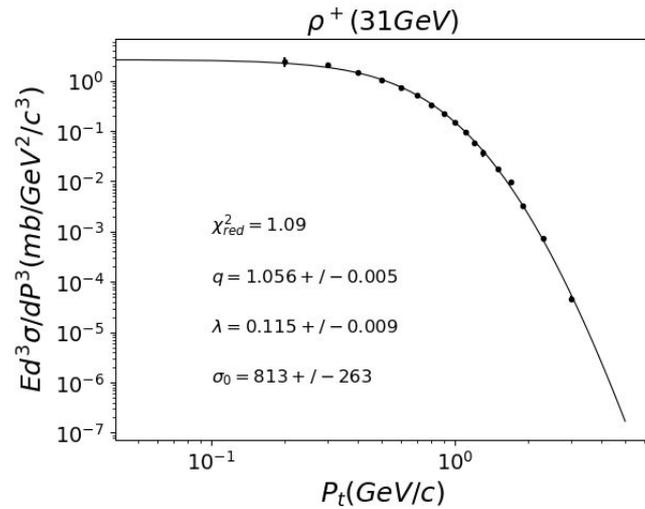
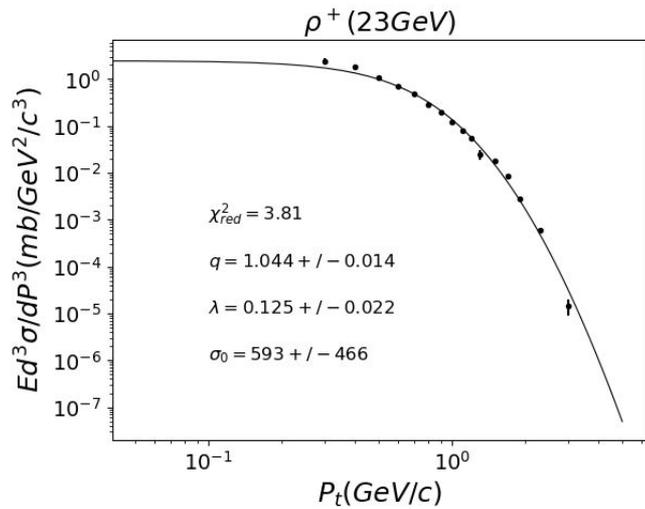
$$E \frac{d\sigma}{dp^3} = \sigma_0 \left(1 + (q-1) \frac{\varepsilon}{\lambda} \right)^{\frac{-1}{q-1}}$$

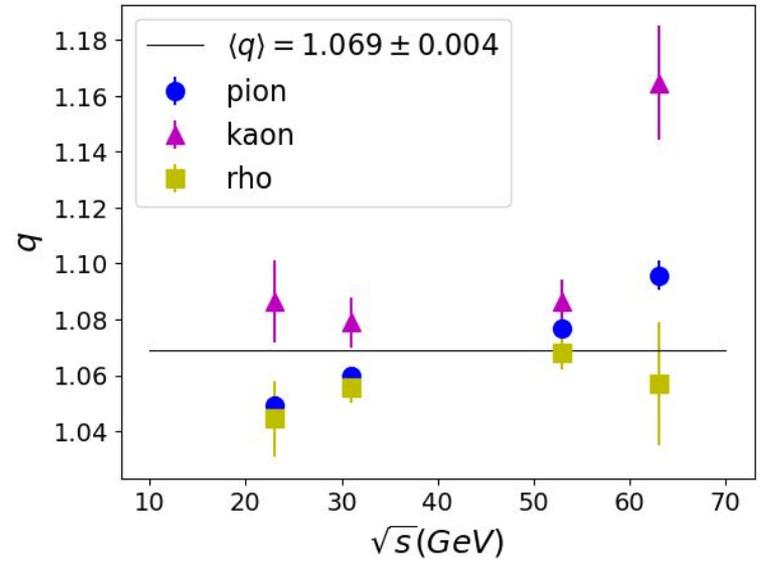
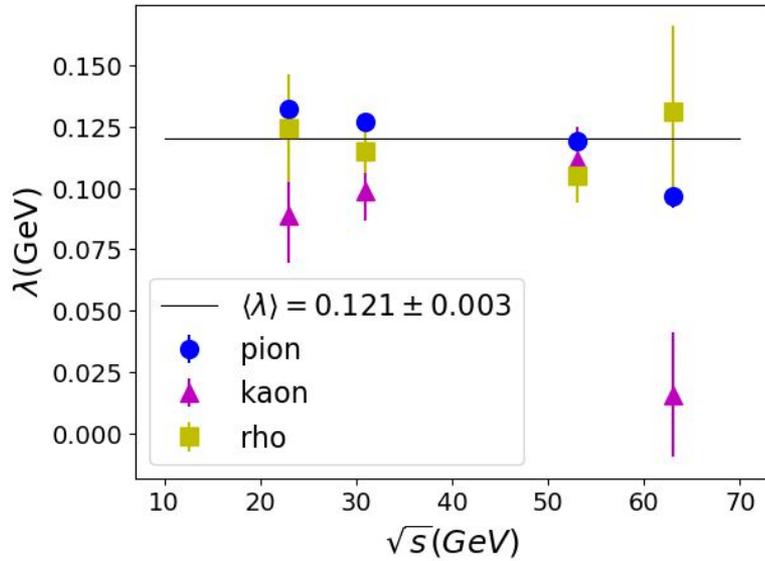
Parâmetros σ_0 λ q

$$\varepsilon = \sqrt{p_t^2 + m^2} \quad p_z = 0$$









2 vértices independientes

$$\frac{1}{\bar{q} - 1} = \frac{2}{q - 1}$$

$$\bar{q} = 1.07 \Rightarrow q = 1.14$$

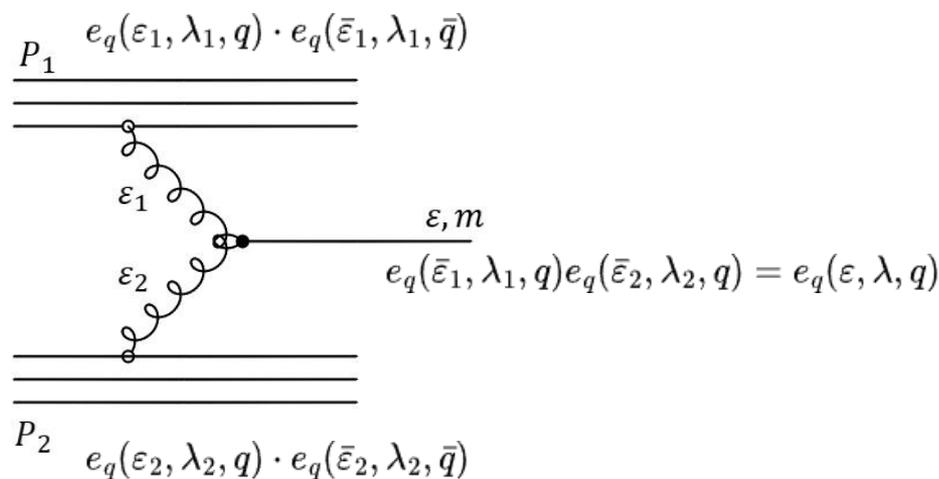
Passo 2

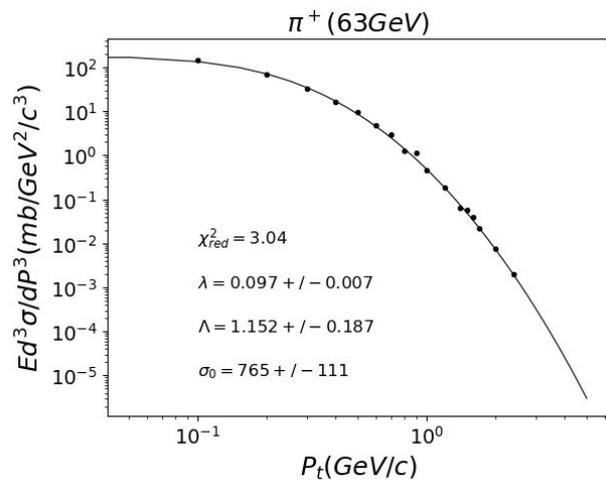
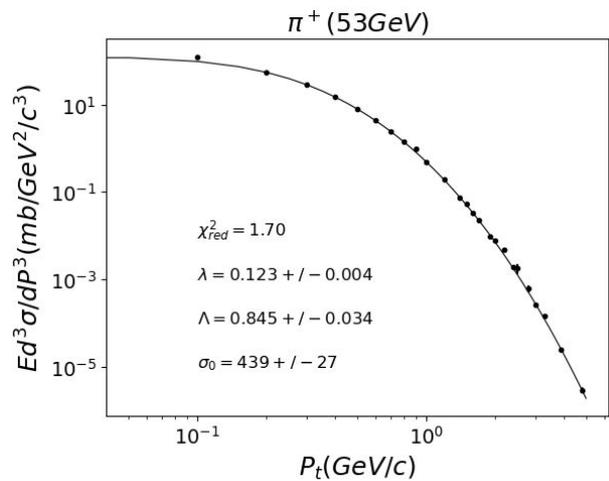
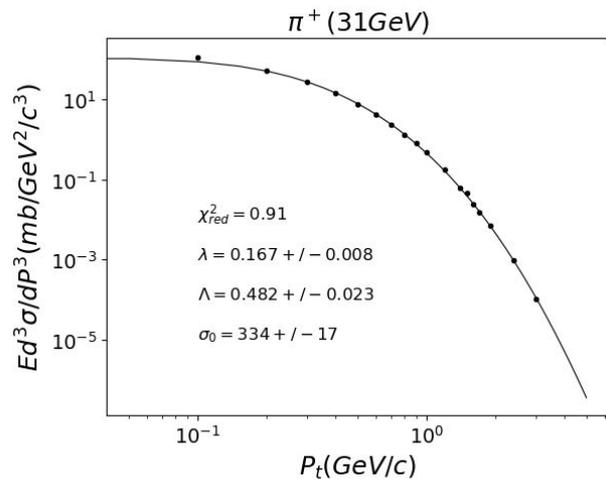
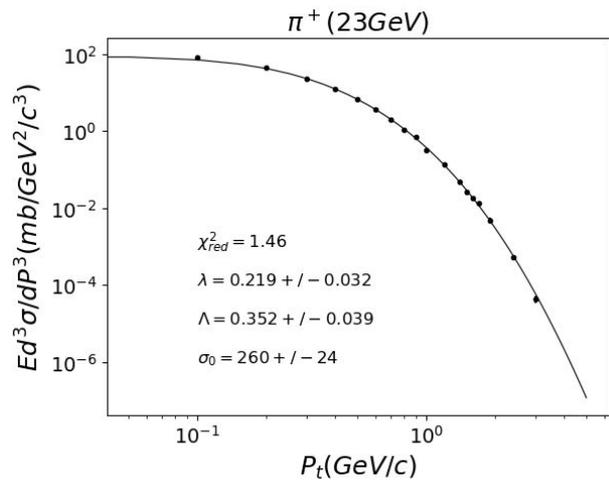
$$E \frac{d\sigma}{dp^3} = \sigma_0 \left(1 + (q-1) \frac{\varepsilon_1}{\Lambda}\right)^{\frac{-q}{q-1}} \left(1 + (q-1) \frac{\varepsilon_2}{\Lambda}\right)^{\frac{-q}{q-1}} \left(1 + (q-1) \frac{\varepsilon}{\lambda}\right)^{\frac{-1}{q-1}}$$

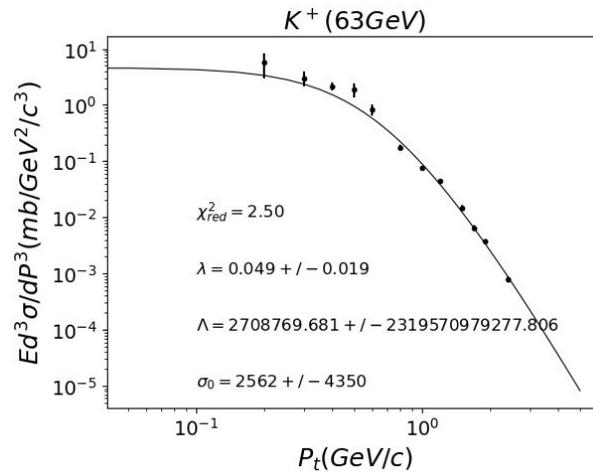
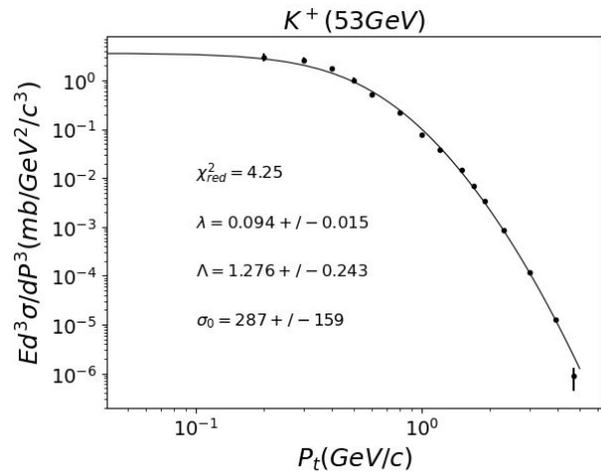
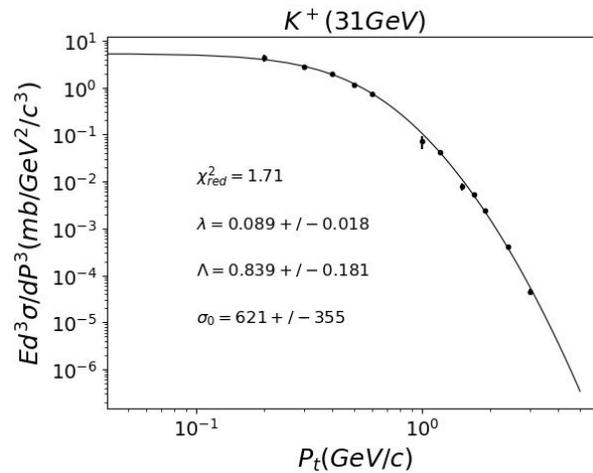
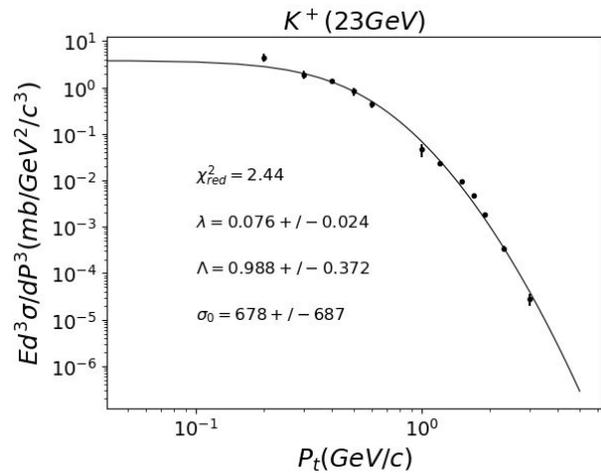
Parâmetros σ_0 λ Λ $q = 1.14$

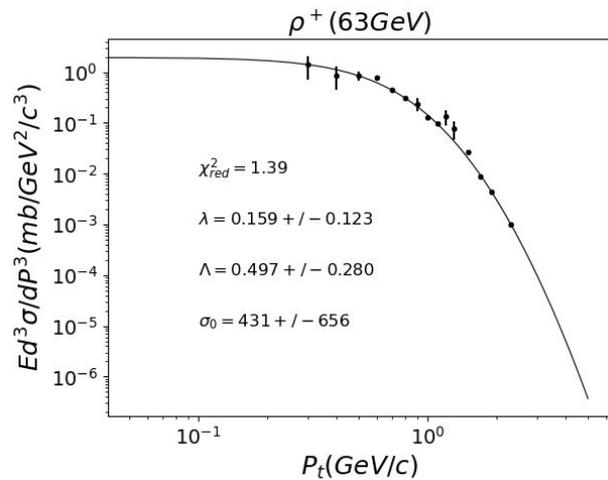
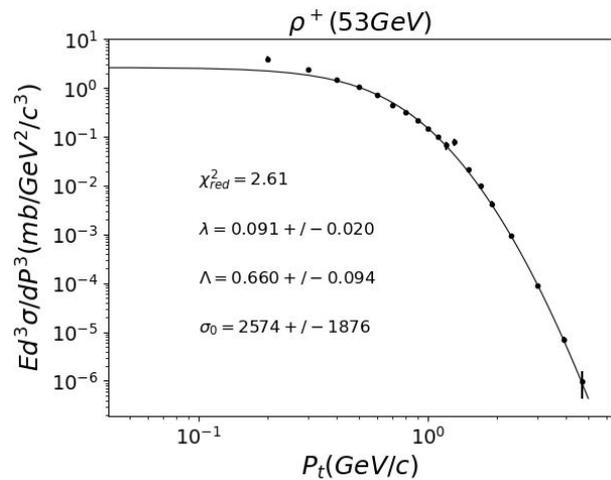
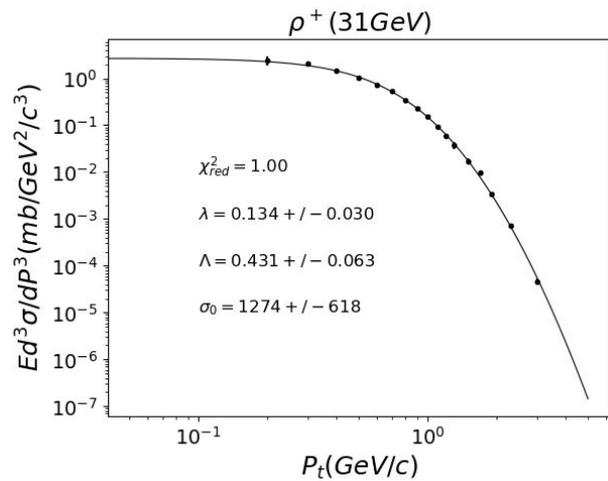
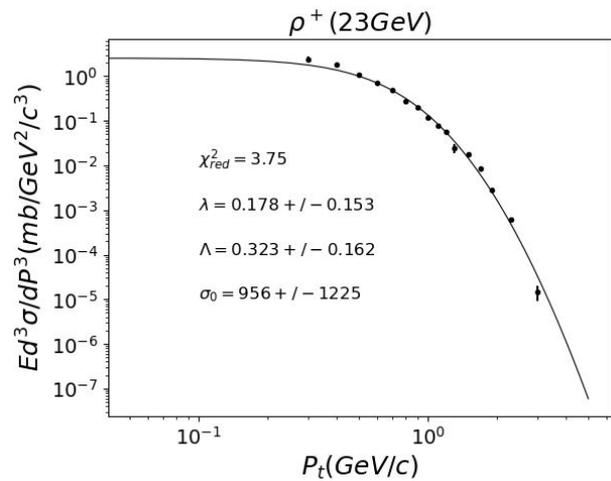
$$\varepsilon = \sqrt{p_t^2 + m^2}$$

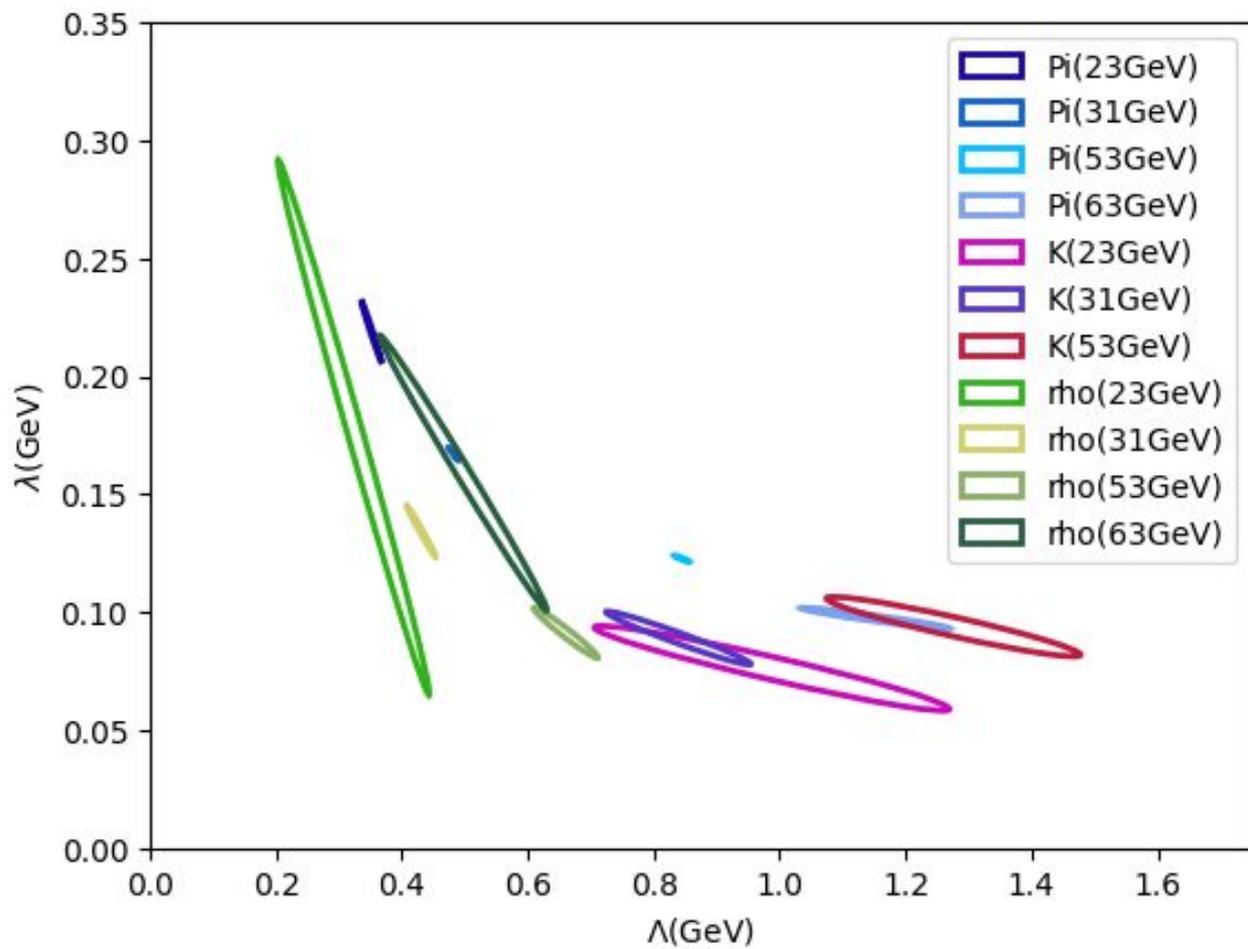
$$p_z = 0 \quad \Rightarrow \quad \varepsilon_1 = \varepsilon_2 = \frac{1}{2}\varepsilon$$

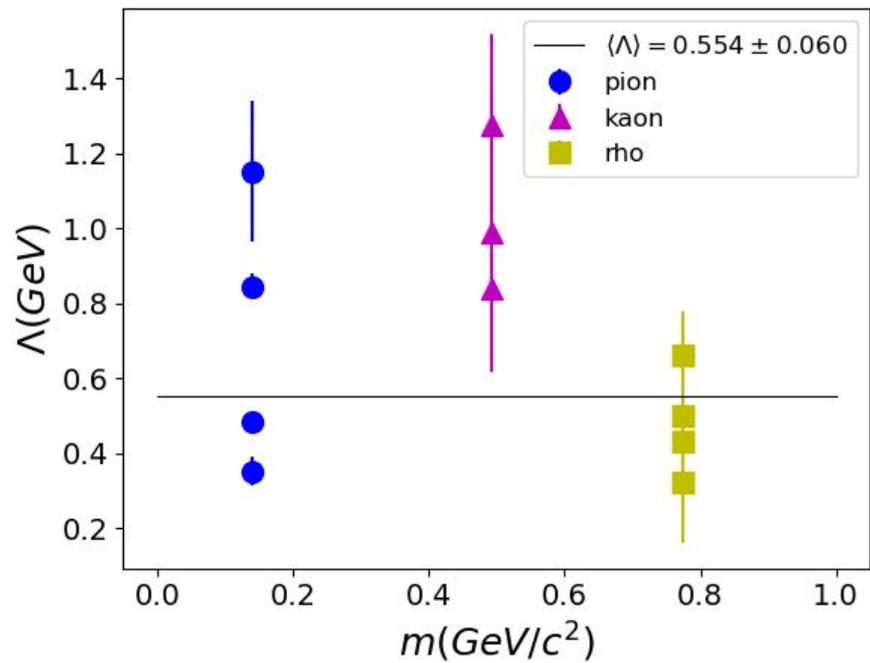
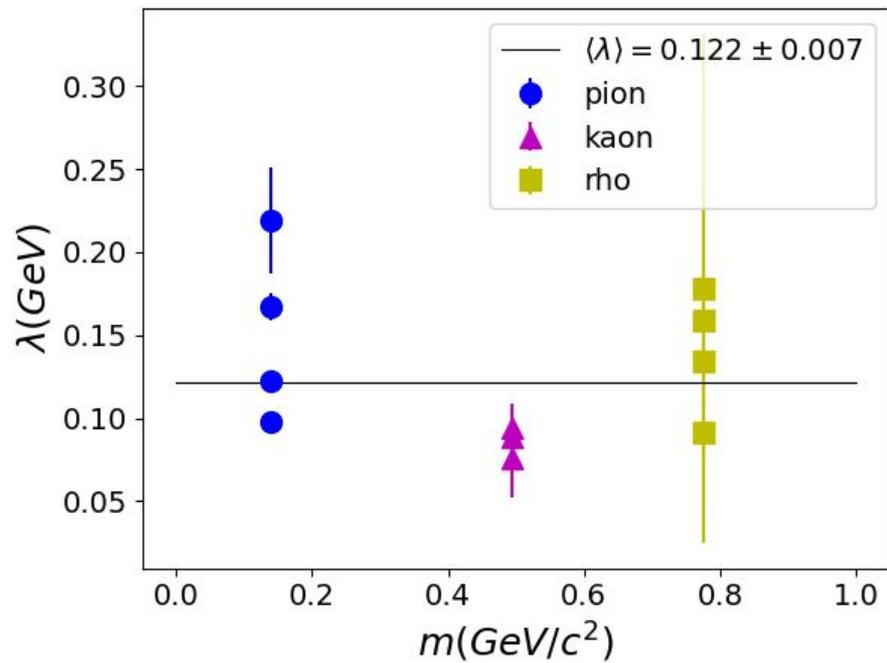












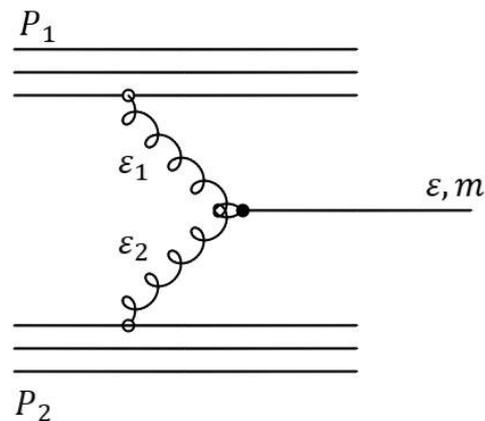
Passo 3

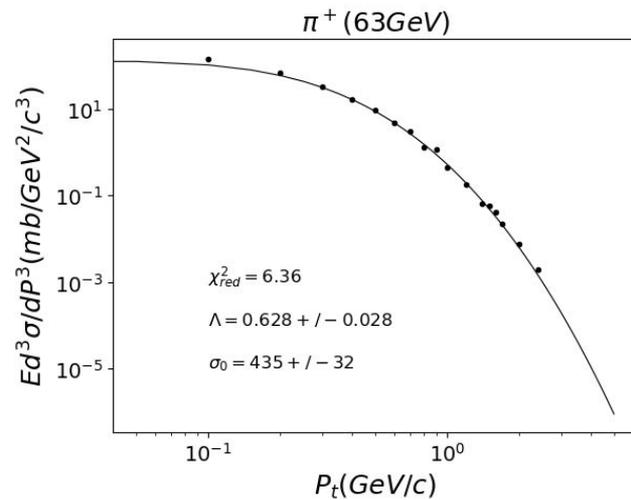
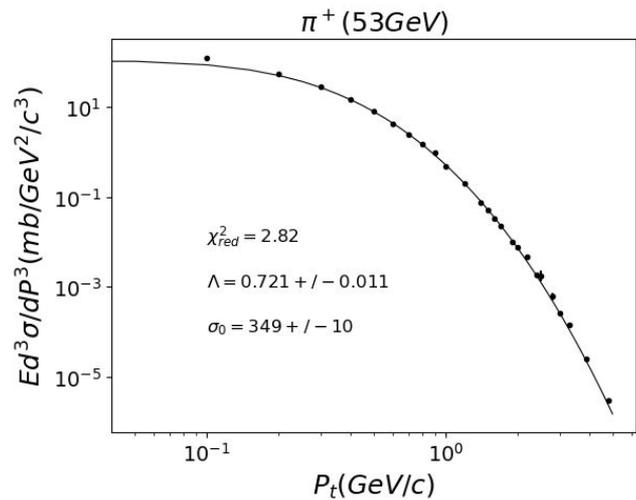
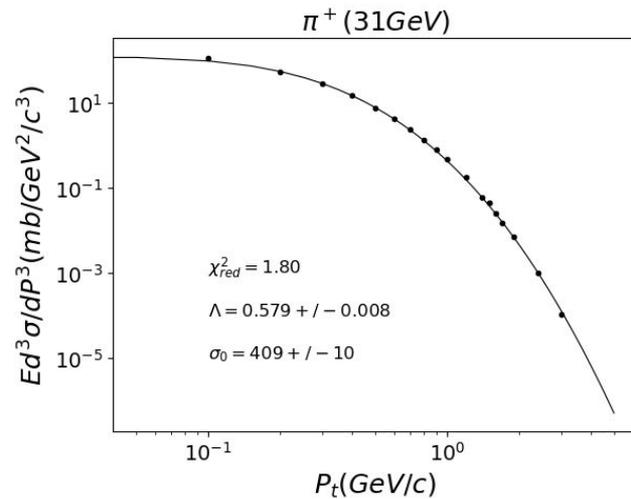
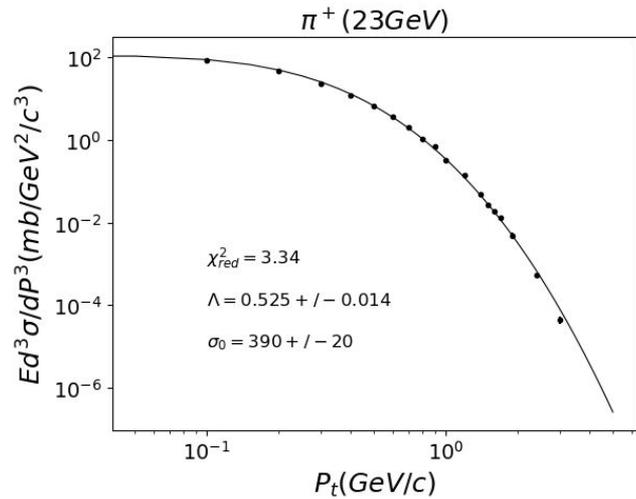
$$E \frac{d\sigma}{dp^3} = \sigma_0 \left(1 + (q-1) \frac{\varepsilon_1}{\Lambda}\right)^{\frac{-q}{q-1}} \left(1 + (q-1) \frac{\varepsilon_2}{\Lambda}\right)^{\frac{-q}{q-1}} \left(1 + (q-1) \frac{\varepsilon}{\lambda}\right)^{\frac{-1}{q-1}}$$

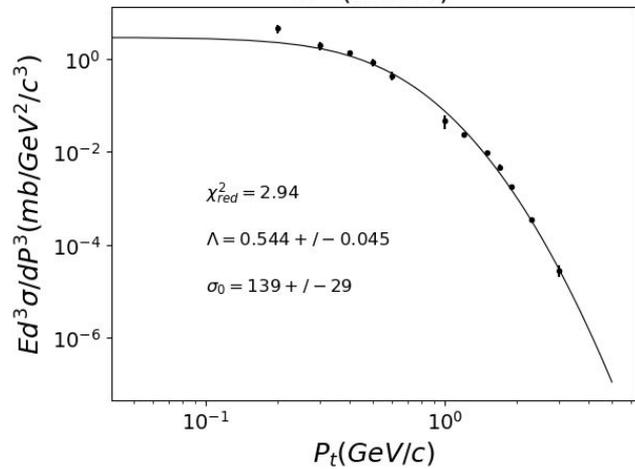
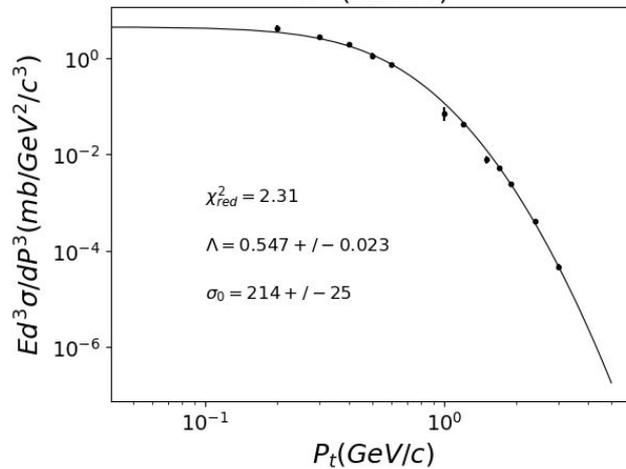
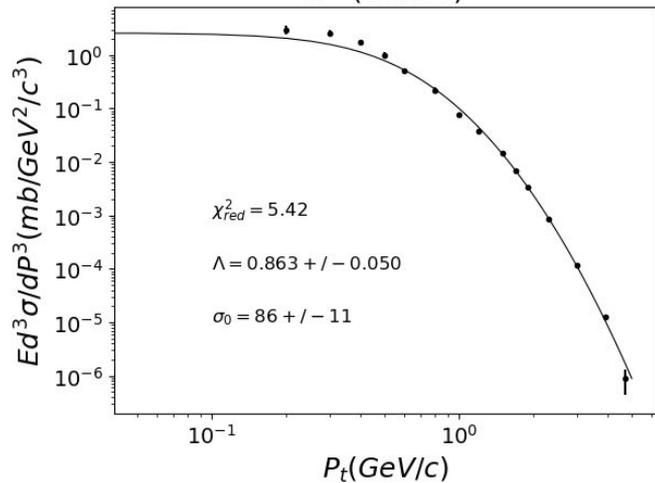
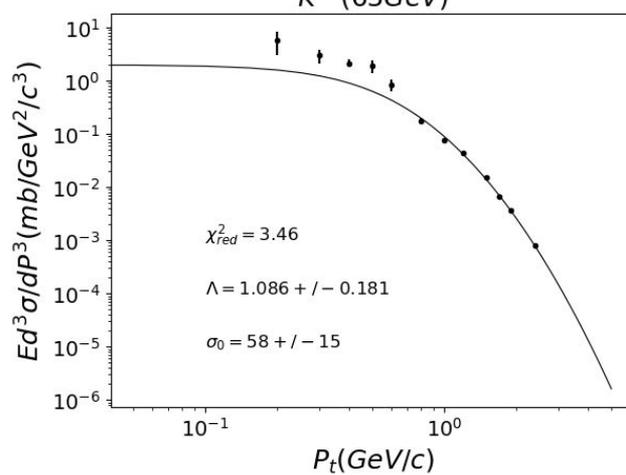
Parâmetros σ_0 Λ $\lambda = 0.14$ $q = 1.14$

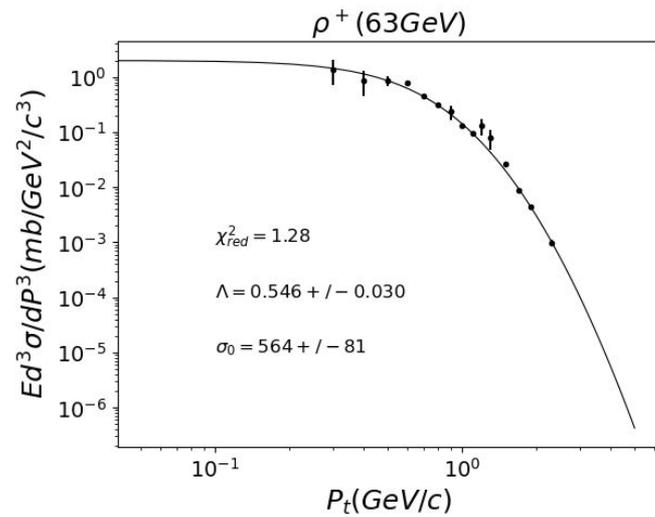
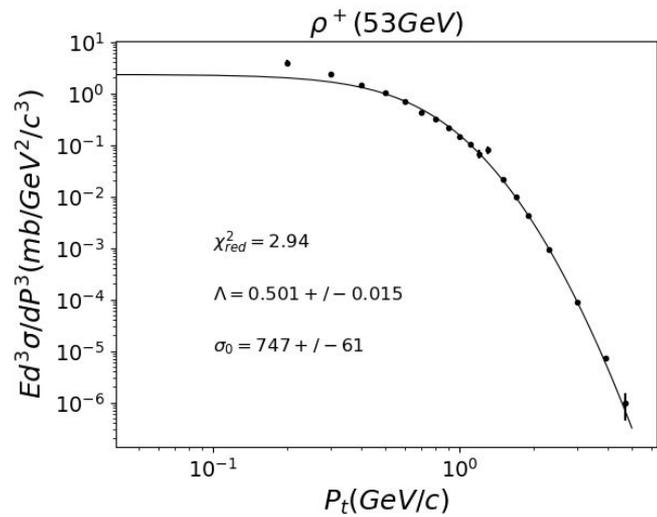
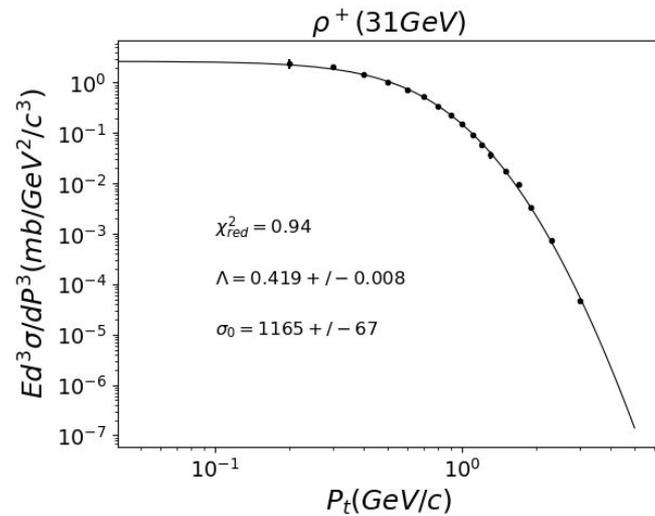
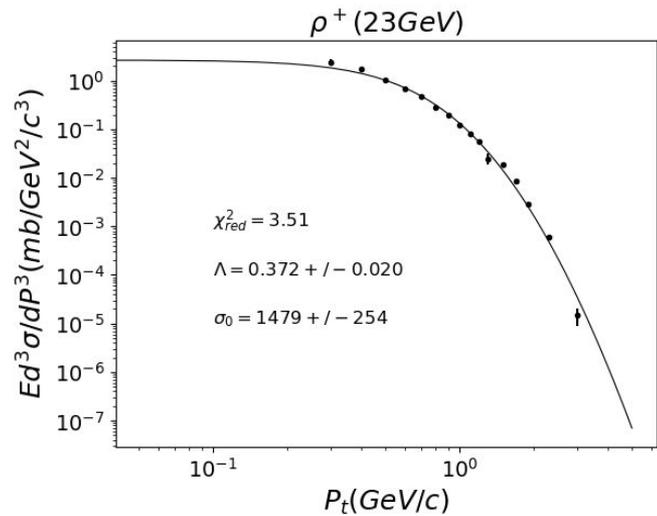
$$\varepsilon = \sqrt{p_t^2 + m^2}$$

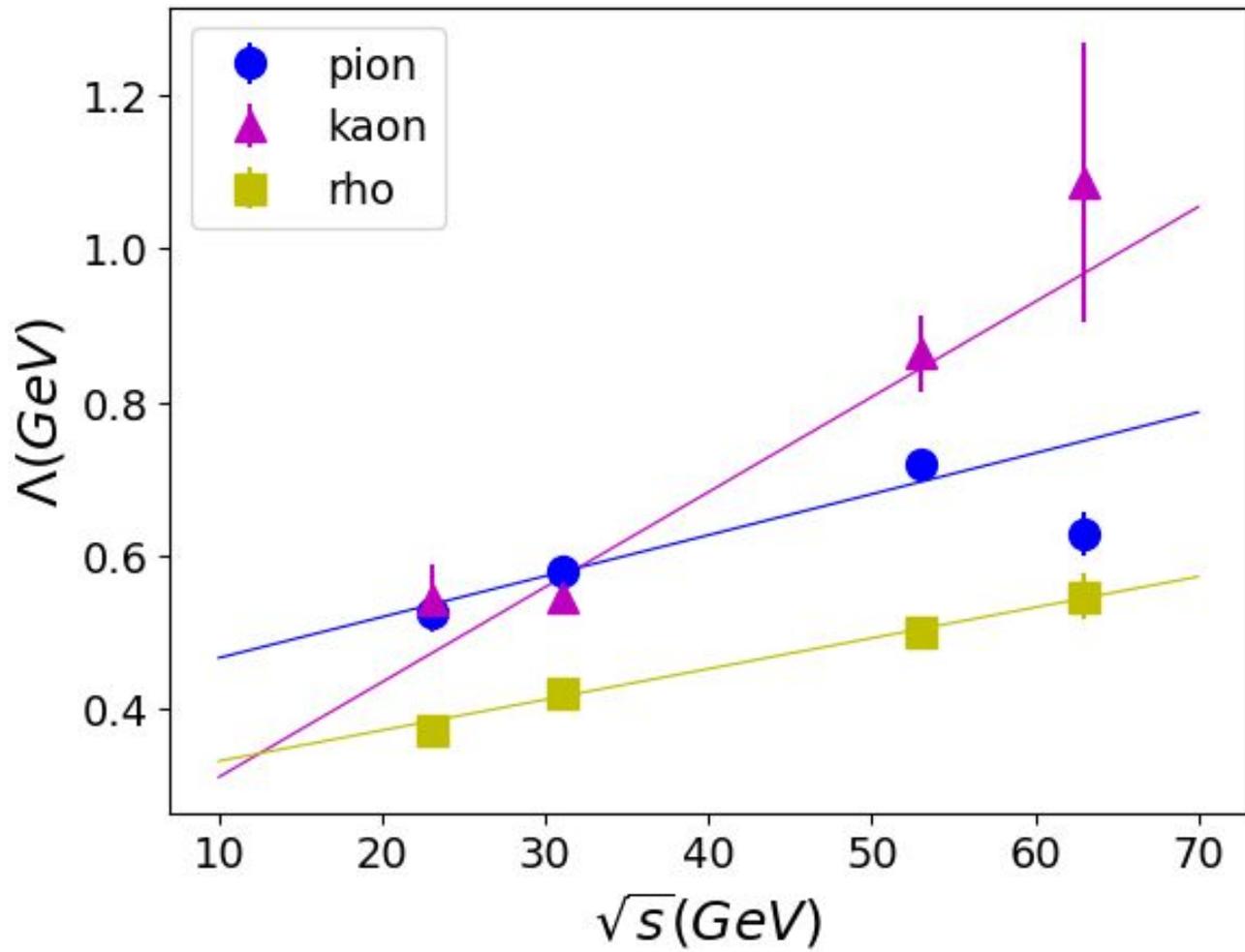
$$p_z = 0 \quad \Rightarrow \quad \varepsilon_1 = \varepsilon_2 = \frac{1}{2}\varepsilon$$



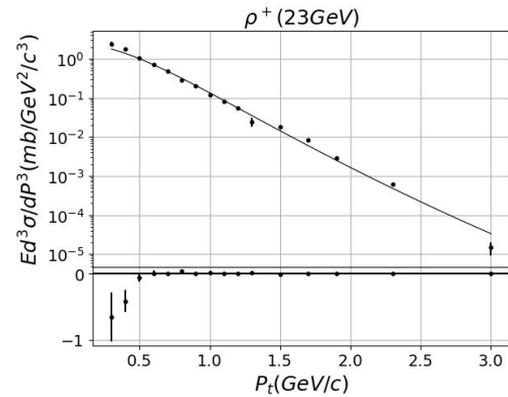
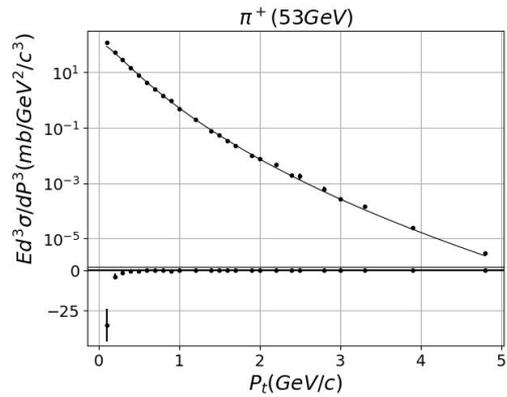
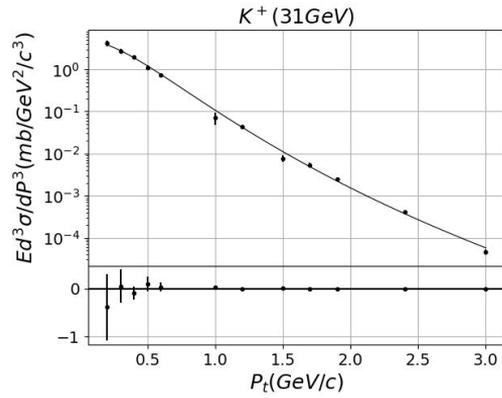


K^+ (23GeV) K^+ (31GeV) K^+ (53GeV) K^+ (63GeV)





Resíduos



Discussão dos resultados

- Evidência de estrutura fractal nos hádrons
- Escala de energia Λ depende da composição de quarks do méson criado
- Não aparenta haver oscilação na distribuição de momento transversal como no qgp