

A large, octagonal particle detector visualization, likely from the STAR experiment at RHIC. It shows a dense pattern of tracks radiating from a central point, colored in shades of blue and purple. The tracks are arranged in a roughly circular pattern, with some tracks appearing more prominent than others. The overall appearance is that of a complex, multi-layered detector structure.

Nuclear Modification Factor in High Energy Collisions



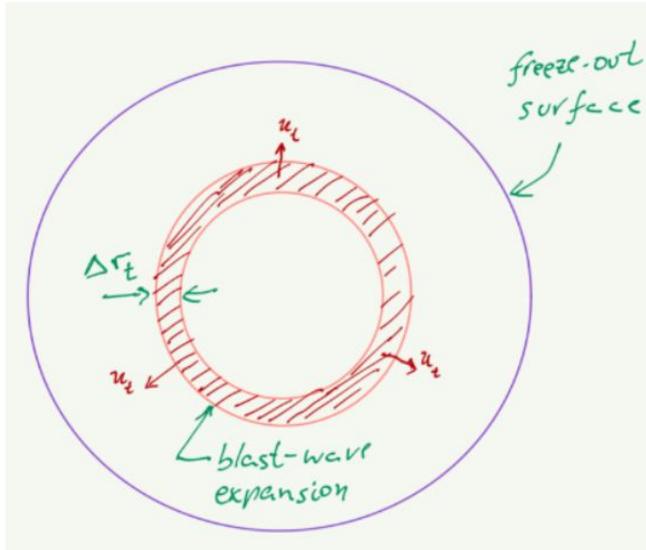
Fator de Modificação Nuclear

$$R_{AA}(p_T) = \frac{1}{N_{part}(\epsilon)} \frac{d\sigma^{AA}/dp_T}{d\sigma^{pp}/dp_T}$$

Modelo Blast-Wave

$$N = \int_{\Sigma} d\Sigma_{\mu} j^{\mu} \quad \rightarrow \quad E \frac{d^3 N}{dp^3} = \int_{\Sigma} d\Sigma_{\mu} p^{\mu} f^{AA}(p)$$

$$E \frac{d^3 \sigma(p)}{dp^3} = N g \pi r_T^2 \tau \Delta \eta m_t \cosh y \exp_q \left[-\frac{(p^{\mu} \cdot u_{\mu} - \mu)}{T} \right]$$



Distribuição para colisões próton-próton

$$\frac{1}{N} \frac{d\sigma}{dp_T} = f(p_T) \quad f(p_T) = \frac{gV\Delta y}{8\pi^2} p_T m_T \cosh y \left[1 + (q-1) \frac{m_t \cosh y - \mu}{T} \right]^{\frac{-q}{q-1}} \quad q = 1.14$$

Equação plastino-plastino - Dinâmica dos pártons no QGP

$$\frac{\partial f}{\partial t} - \gamma \frac{\partial f}{\partial p_i} - D \frac{\partial}{\partial p_i} \left(\frac{\partial f^{2-q}}{\partial p_j} \right) = 0$$

No referencial do fluido

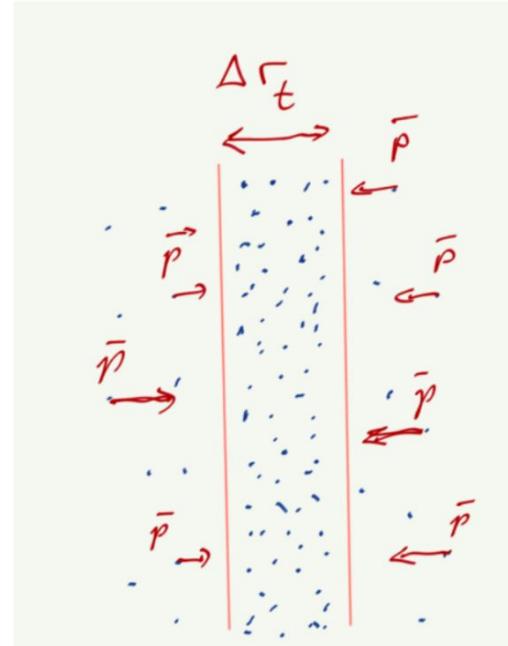
$$p_T^F = L_u(p_T) \quad L_u(p) = \gamma_f (p - uE)$$

Efeito do arrasto nos momentos

$$p_T^F = p_0^F \exp(-\gamma\tau) \quad \gamma(p_T) = \gamma_0 \exp_q [(m_T^F - a)/T]$$

Solução calculada em p_0

$$f(p_T^F) = f(p_0^F \exp(-\gamma\tau))$$

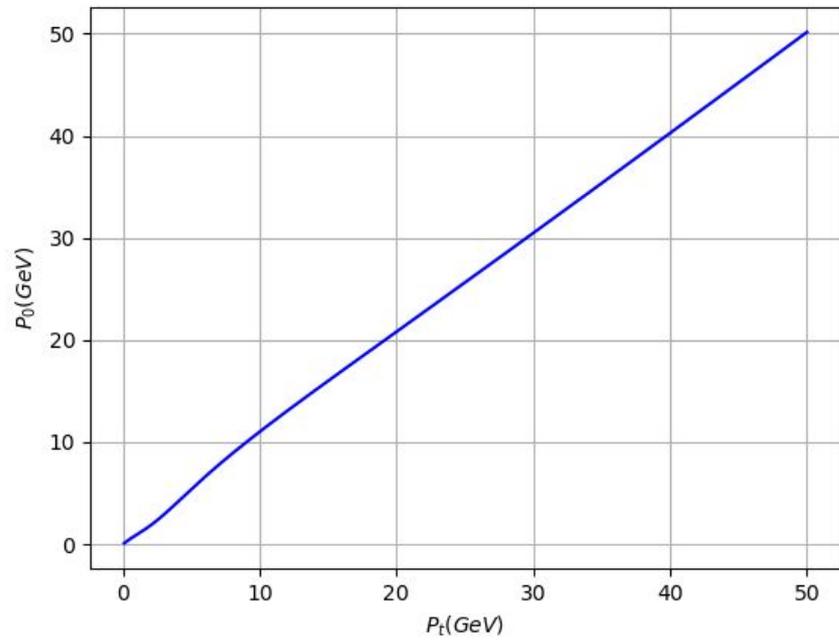
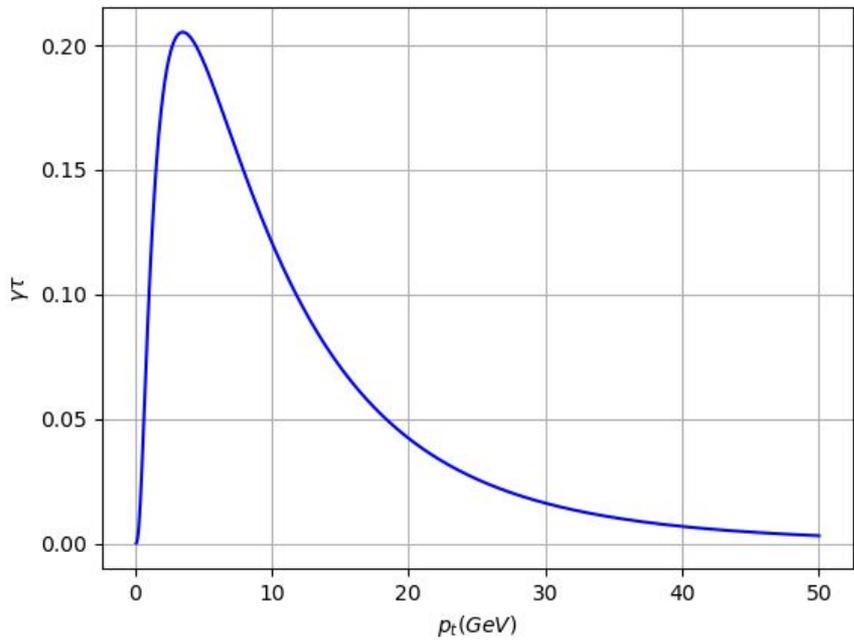


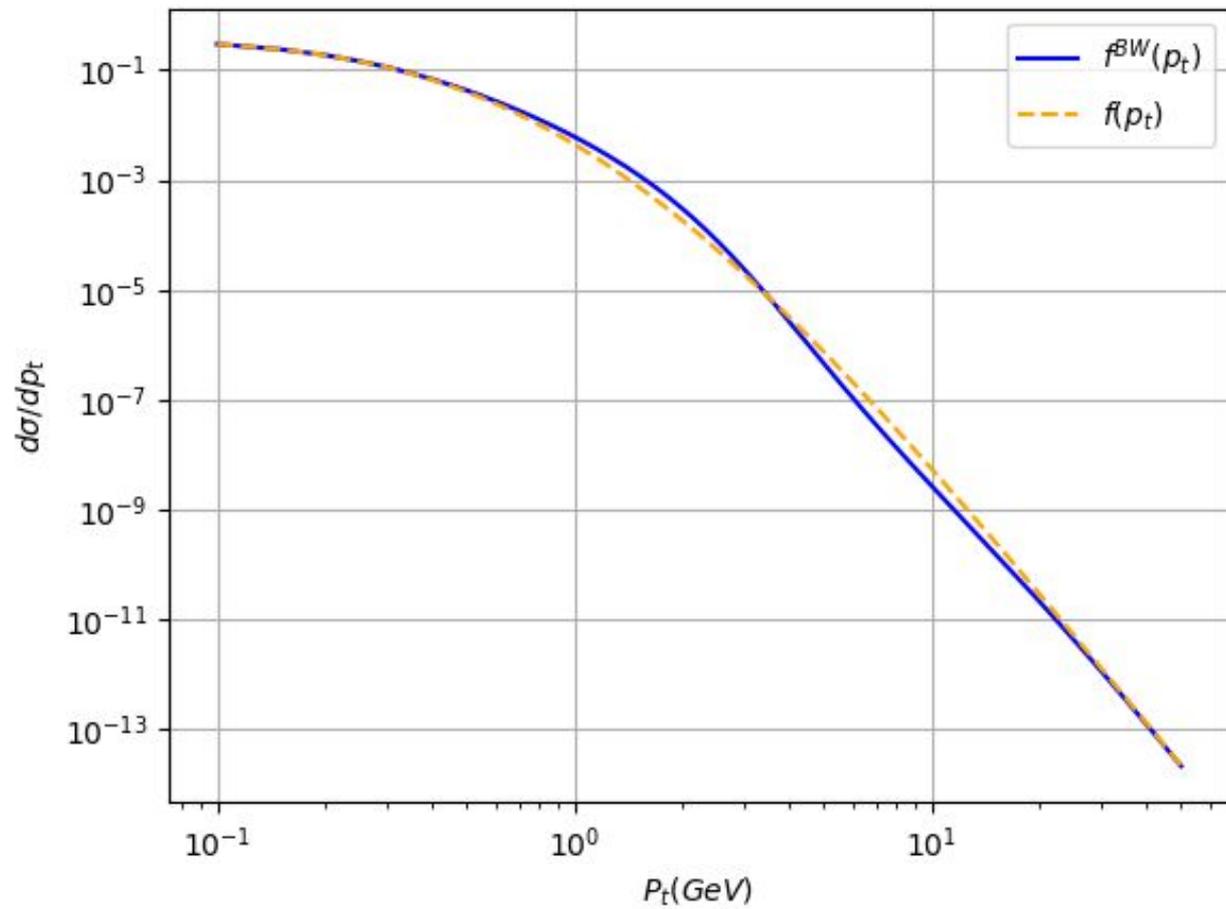
$$R_{AA}(p_T) = \frac{1}{N_{part}(\epsilon)} \frac{d\sigma^{AA}/dp_T}{d\sigma^{pp}/dp_T} \quad R_{AA} \text{ é calculado para um mesmo valor de } p_T \text{ nas distribuições de colisões pp e AA}$$

Distribuições calculadas em p_T no referencial do lab

$$f^{BW}(p_T) = f(L_{-u}[L_u[p_T] \exp(\gamma\tau)]) \quad p_o = L_{-u}[L_u[p_T] \exp(\gamma\tau)]$$

$$f(p_T) = \frac{gV\Delta y}{8\pi^2} p_T m_T \cosh y \left[1 + (q-1) \frac{m_t \cosh y - \mu}{T} \right]^{\frac{-q}{q-1}}$$





Incluindo a dispersão

$$g_q(p_T, p_M) = A \left(1 + (q - 1) \frac{(p_T - p_M)^2}{2\sigma(p_T)^2} \right)^{\frac{-1}{q-1}}$$

Uma q-Gaussiana com média p_j tem uma probabilidade de gerar um momento observado p_i

$$f^{AA}(p_i) = A \sum_j g_q(L_u(p_i), L_u(p_j)) f(L_{-u}[L_u[p_j] \exp(\gamma\tau)])$$

$$j = i - \delta, \dots, i + \delta \quad \delta = 20$$

$$A = 1 / \sum_j g_q(L_u(p_i), L_u(p_j))$$

$$R_{AA} = [N_{AA}(1 - \epsilon)]^{-D} \frac{V_{AA}}{V_{pp}} \frac{f_{\Delta p_T}^{AA}(p_T)}{f_{\Delta p_T}(p_T)}$$

