π/K/p spectra, Au+Au for 7.7, 19.6, 27 GeV

UrQMD

Statistics: ~2M

Track cuts:

- PDG ($\pi^{\pm} = \pm 211$, $K^{\pm} = \pm 321$, p (p-bar) $= \pm 2212$)
- $|y| < 0.1$,
- $|\eta| < 0.5$
- $p_T > 0.2$ GeV/c

Bin width for spectra: 50 MeV/c

Centrality was calculated using multiplicity.

Variation of Tkin with <β> for different centralities and energies

Simultaneous fit of the π±, K±, p, and ¯p spectra across all the BES energies.

Experimental results from: Phys. Rev. C 96, 044904 (2017)

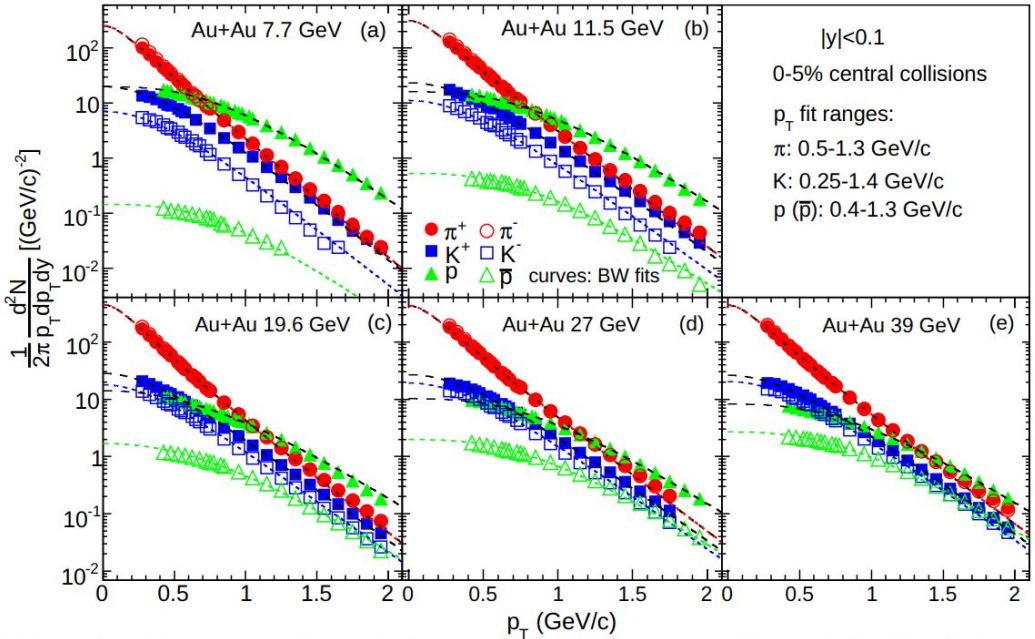


FIG. 36: (Color online) Blast wave model fits of $\pi^{\pm}$, $K^{\pm}$, p and $\bar{p}$ p_T spectra in 0–5% central Au+Au collisions at $\sqrt{s_{NN}}$ = (a) 7.7 GeV, (b) 11.5 GeV, (c) 19.6 GeV, (d) 27 GeV, and (e) 39 GeV. Uncertainties on experimental data represent statistical and systematic uncertainties added in quadrature. Here, the uncertainties are smaller than the symbol size.

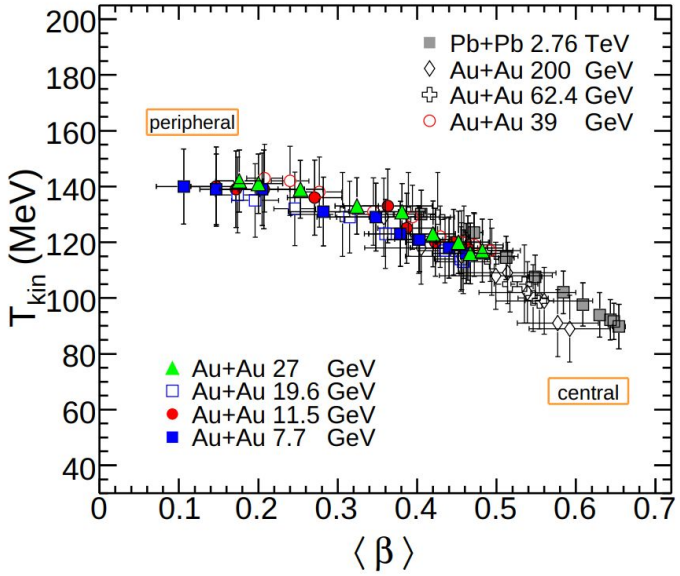
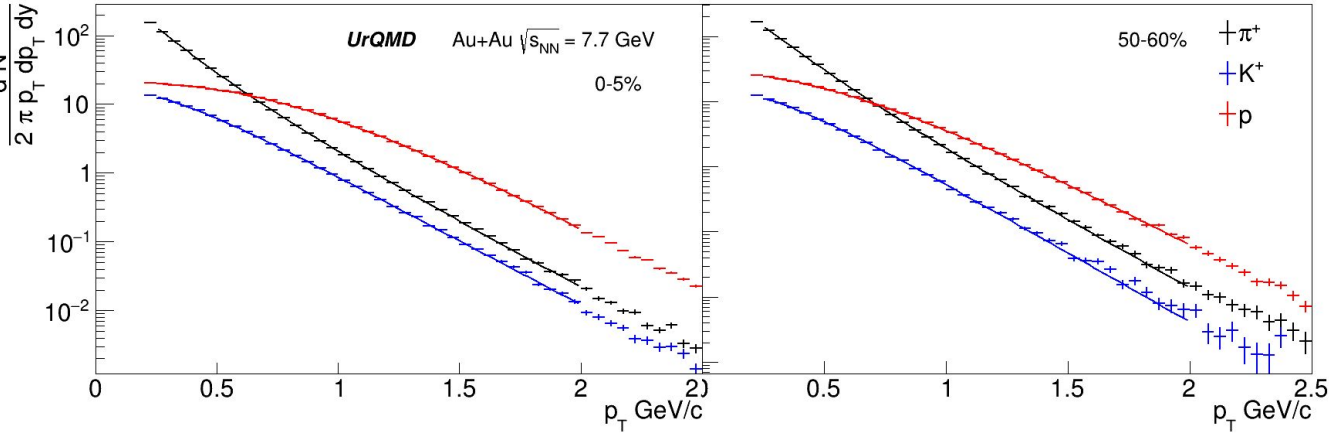
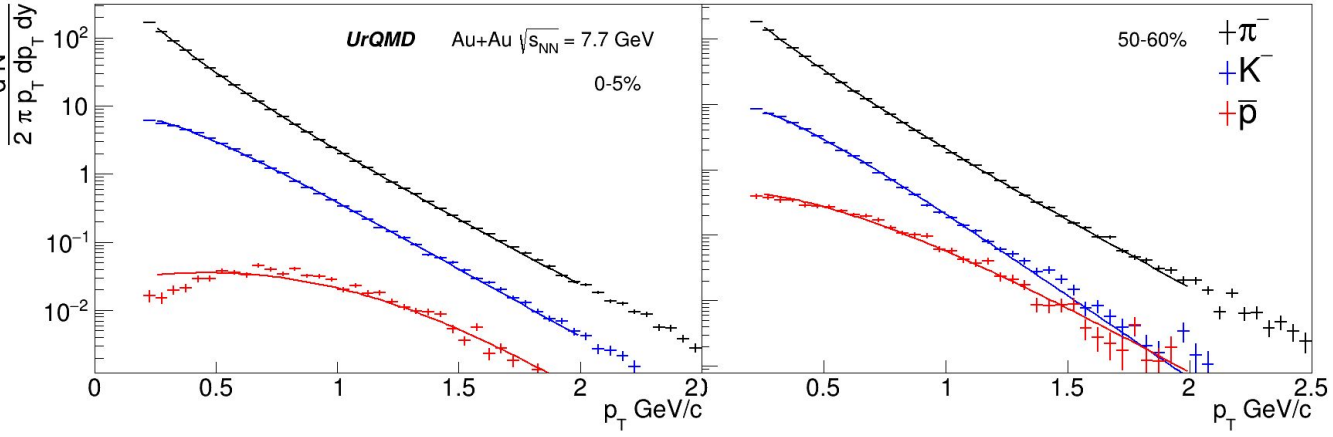


FIG. 37: (Color online) Variation of $T_{\rm kin}$ with $\langle\beta\rangle$ for different energies and centralities. The centrality increases from left to right for a given energy. The data points other than BES energies are taken from Refs. [43, 66]. Uncertainties represent systematic uncertainties.

Blast wave fit of each spectra for 7.7 GeV

$$\frac{dN}{p_T\,dp_T} \propto \int_0^R r\,dr\,m_T I_0\left(\frac{p_T \sinh\rho(r)}{T_{\rm kin}}\right) \times K_1\left(\frac{m_T \cosh\rho(r)}{T_{\rm kin}}\right),$$

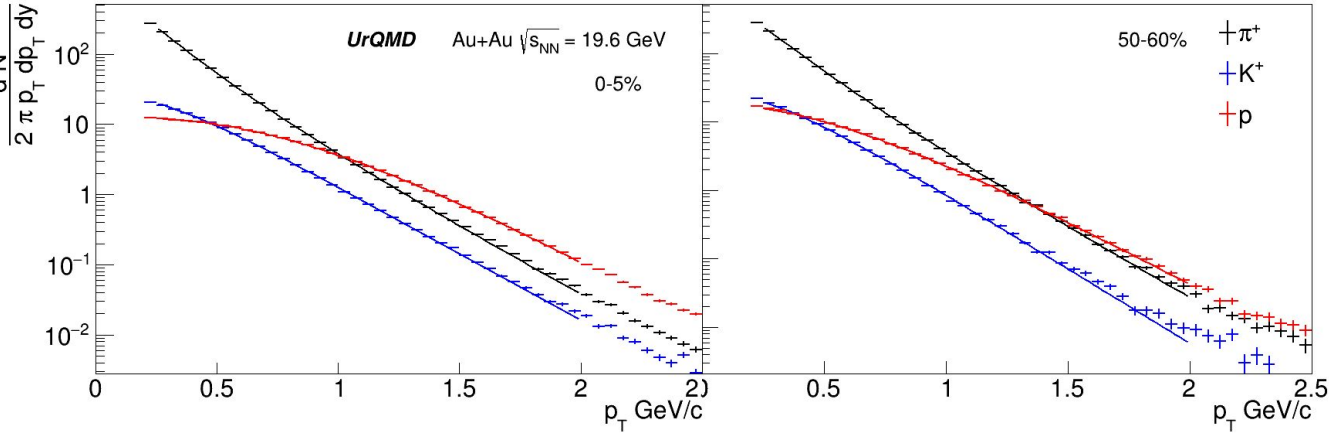


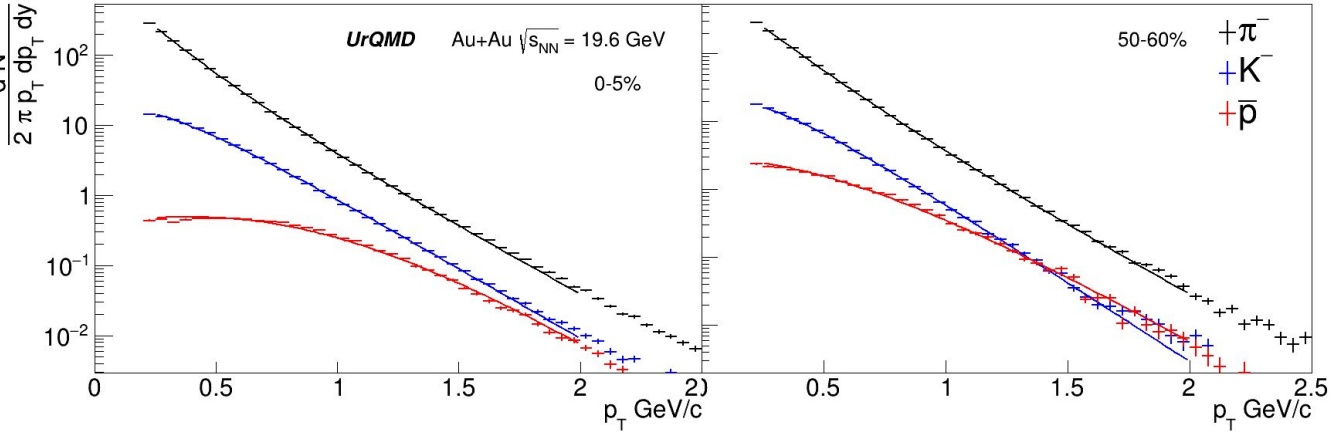


m_T - transverse mass
$\rho(r) = \tanh^{-1}(\beta)$
I_0, K_1 - Bessel functions
$\beta = 2 * \beta_S / (2+n)$
β_S - surface velocity
n - exponent of flow velocity profile

Blast wave fit of each spectra for 19.6 GeV

$$\frac{dN}{p_T\,dp_T} \propto \int_0^R r\,dr\,m_T I_0\left(\frac{p_T \sinh\rho(r)}{T_{\rm kin}}\right) \times K_1\left(\frac{m_T \cosh\rho(r)}{T_{\rm kin}}\right),$$

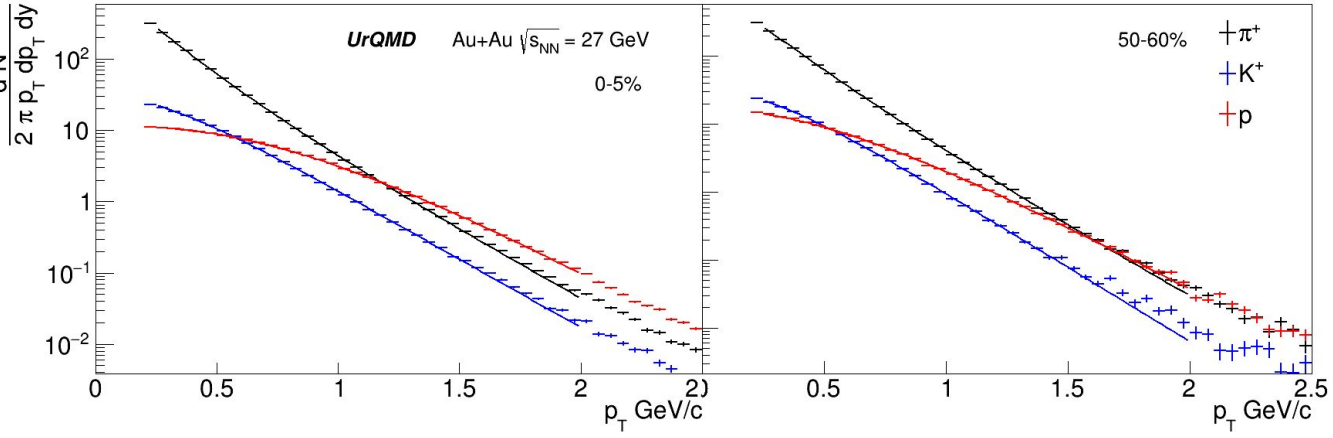


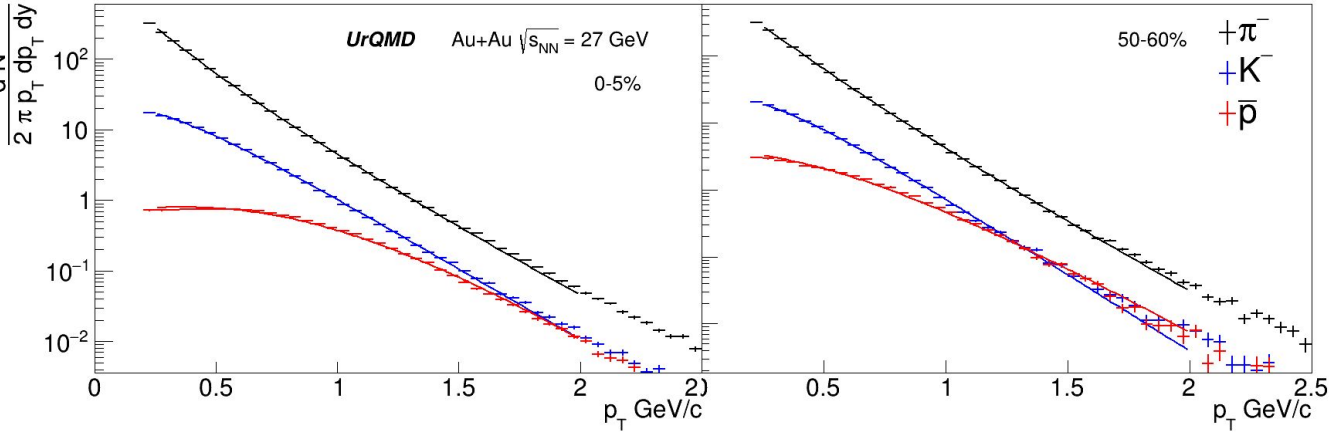


m_T - transverse mass
$\rho(r) = \tanh^{-1}(\beta)$
I_0, K_1 - Bessel functions
$\beta = 2 * \beta_S / (2+n)$
β_S - surface velocity
n - exponent of flow velocity profile

Blast wave fit of each spectra for 27 GeV

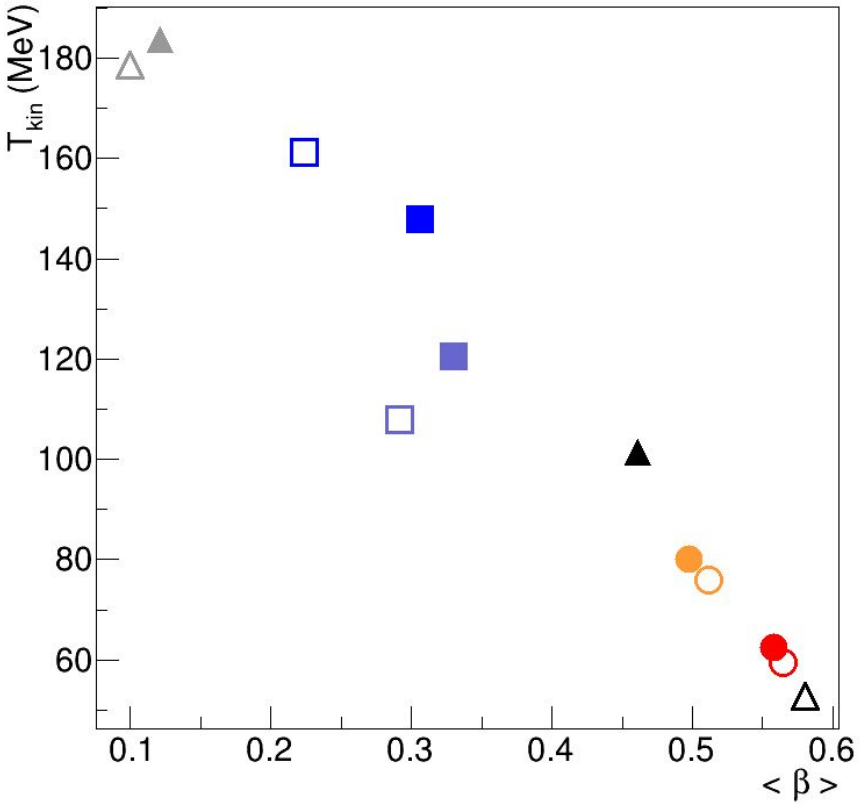
$$\frac{dN}{p_T\,dp_T} \propto \int_0^R r\,dr\,m_T I_0\left(\frac{p_T \sinh\rho(r)}{T_{\rm kin}}\right) \times K_1\left(\frac{m_T \cosh\rho(r)}{T_{\rm kin}}\right),$$



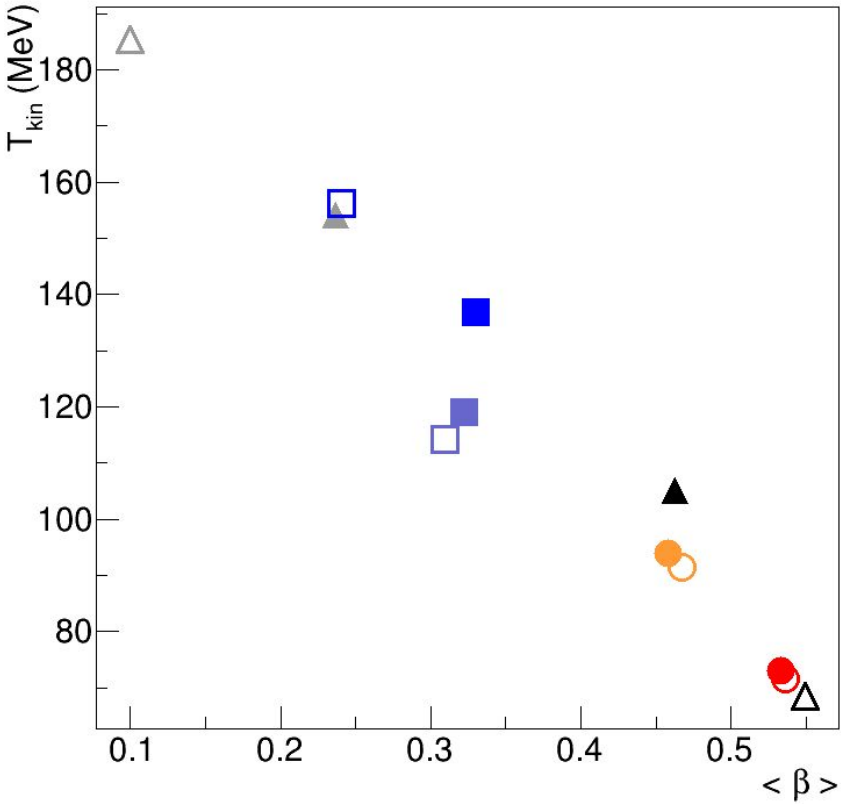


m_T - transverse mass
$\rho(r) = \tanh^{-1}(\beta)$
I_0, K_1 - Bessel functions
$\beta = 2 * \beta_S / (2+n)$
β_S - surface velocity
n - exponent of flow velocity profile

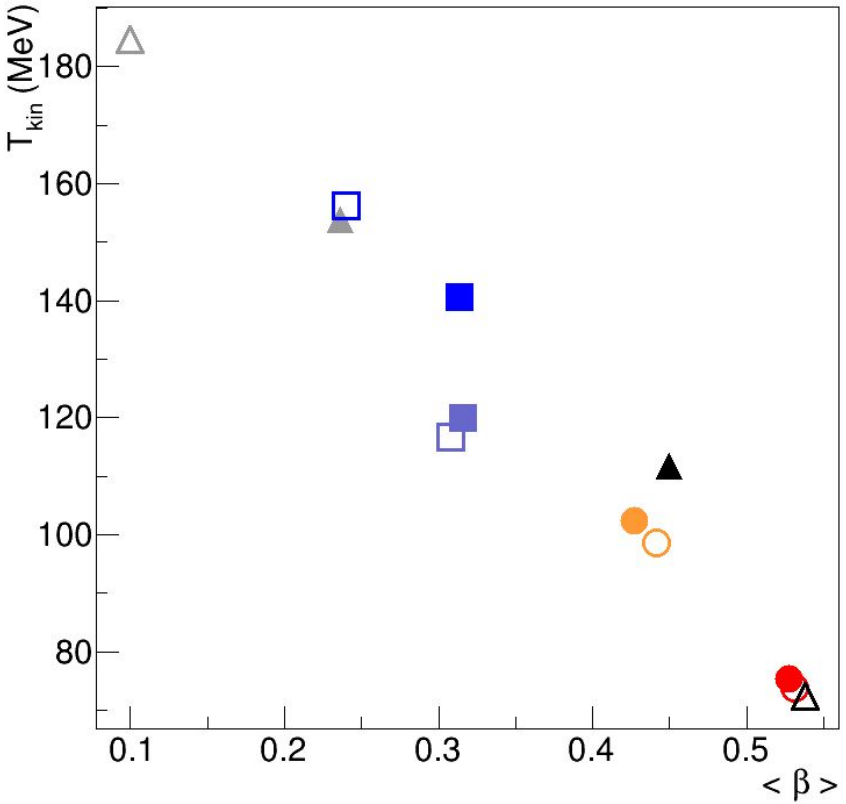
Variation of Tkin with <β> for different centralities for 7.7 GeV



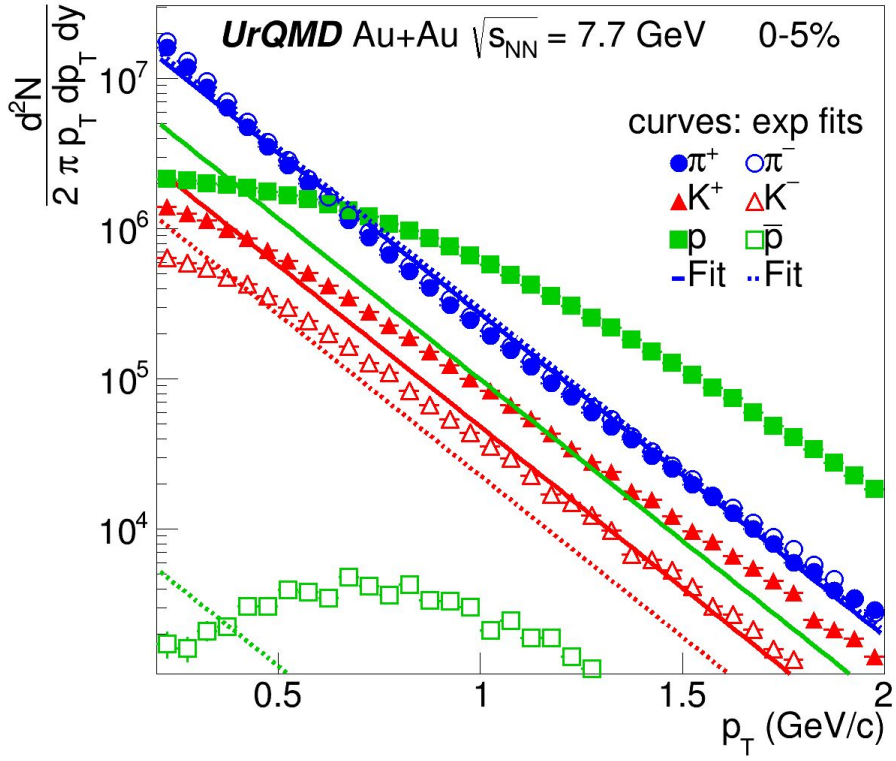
Variation of Tkin with <β> for different centralities for 19.6 GeV



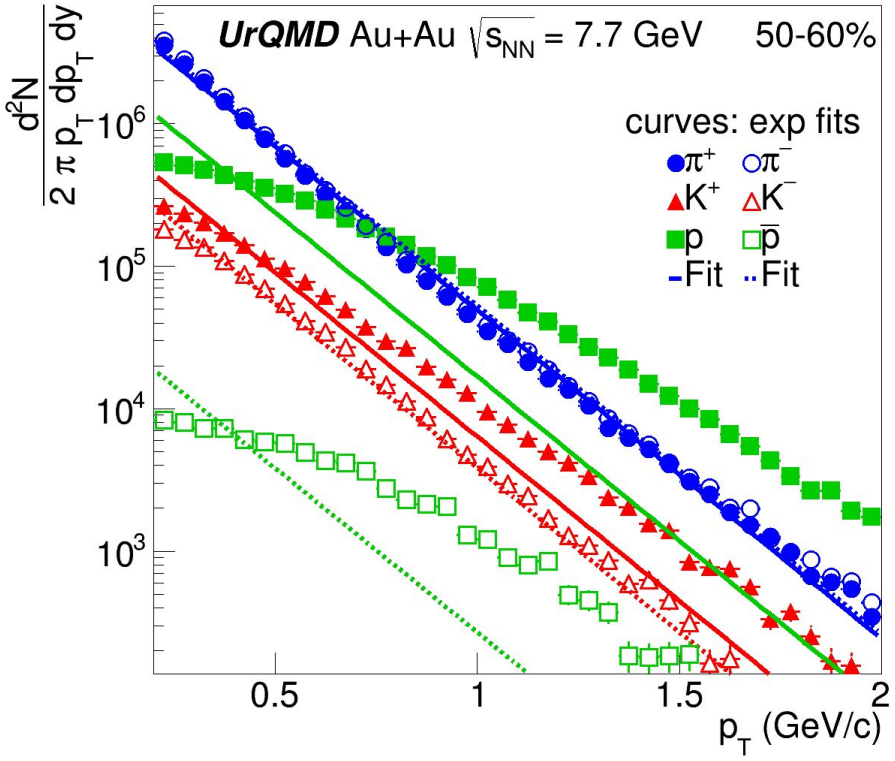
Variation of Tkin with <β> for different centralities for 27 GeV



Exponential fits of π±, K±, p and ¯p pT spectra for 7.7 GeV

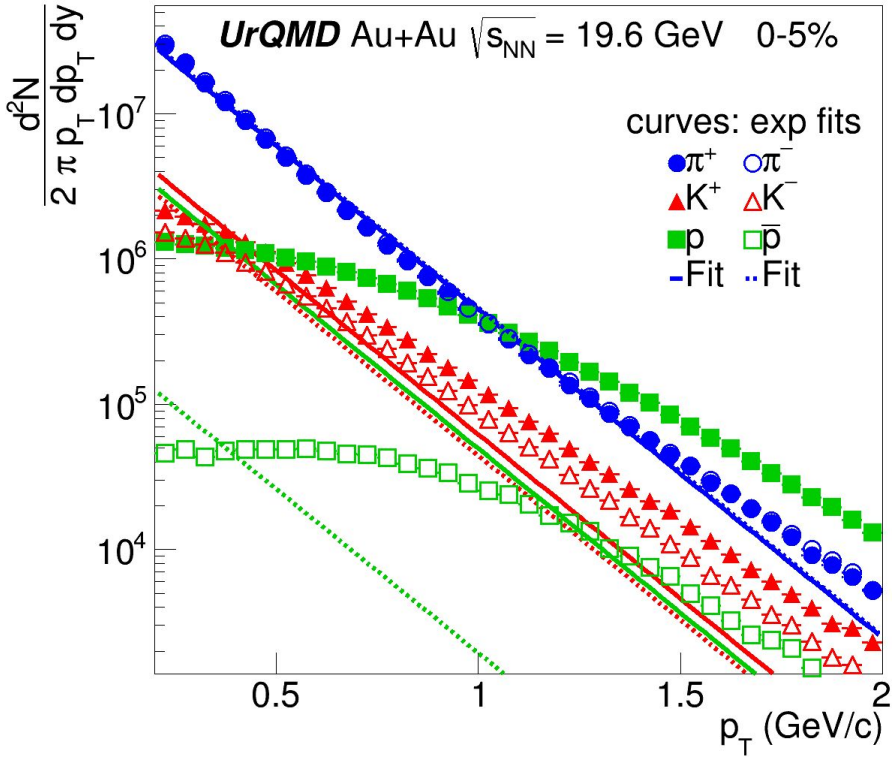


Tkin ≈ 202.3 MeV

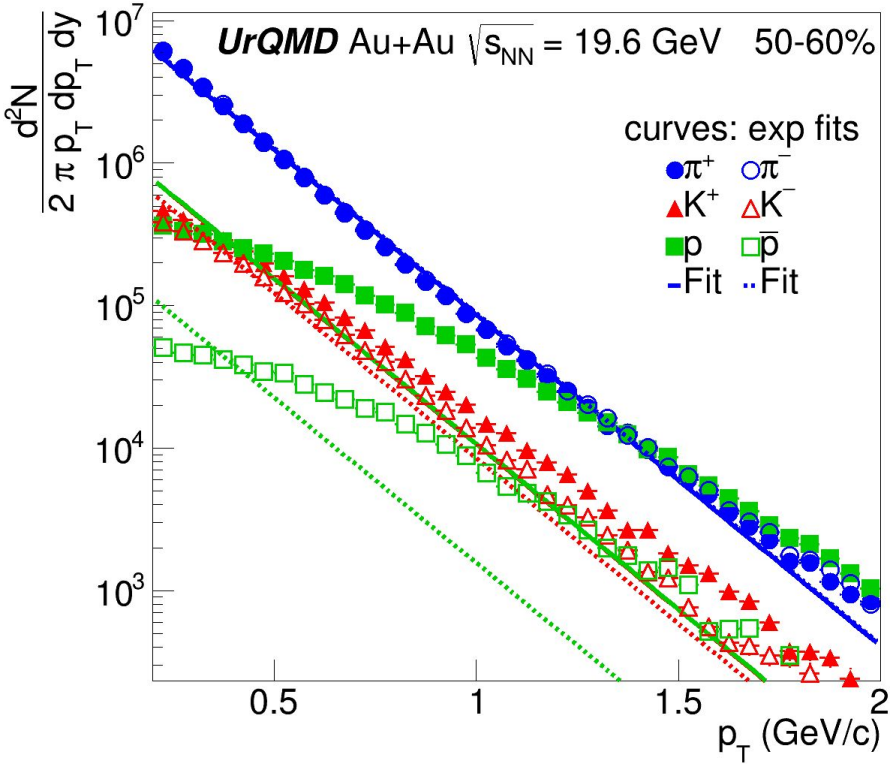


Tkin ≈ 188.4 MeV

Exponential fits of π±, K±, p and ¯p pT spectra for 19.6 GeV

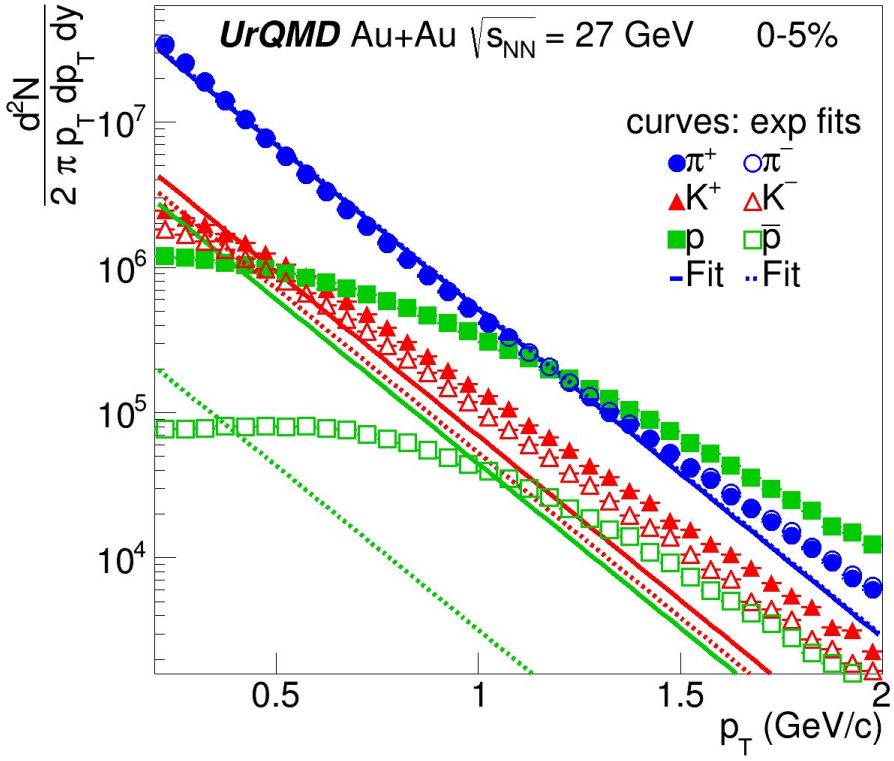


Tkin ≈ 192.2 MeV

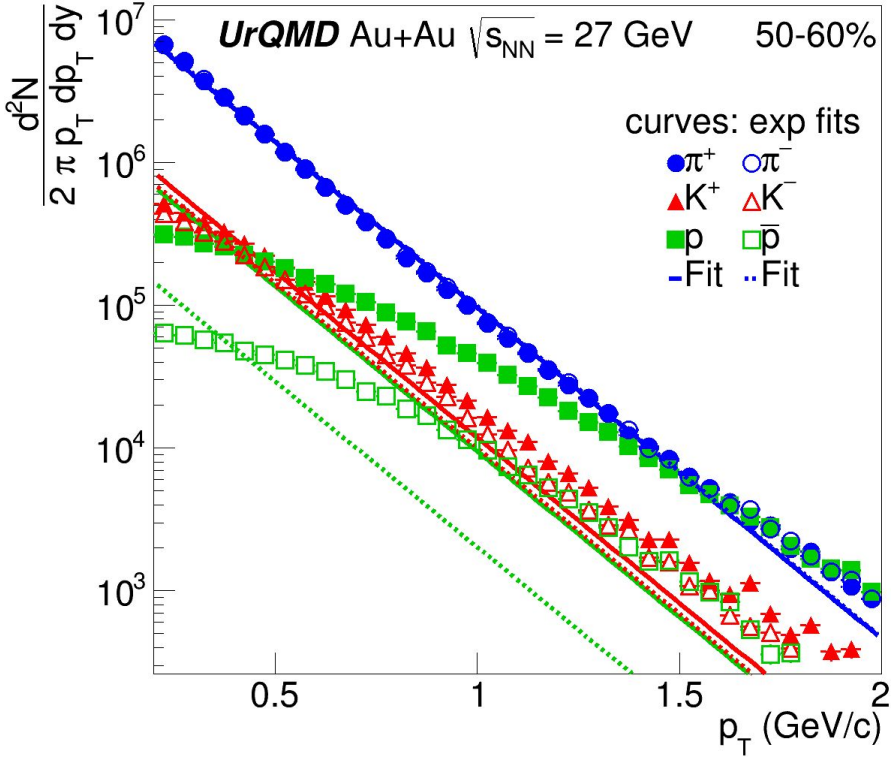


Tkin ≈ 186.9 MeV

Exponential fits of π±, K±, p and ¯p pT spectra for 27 GeV

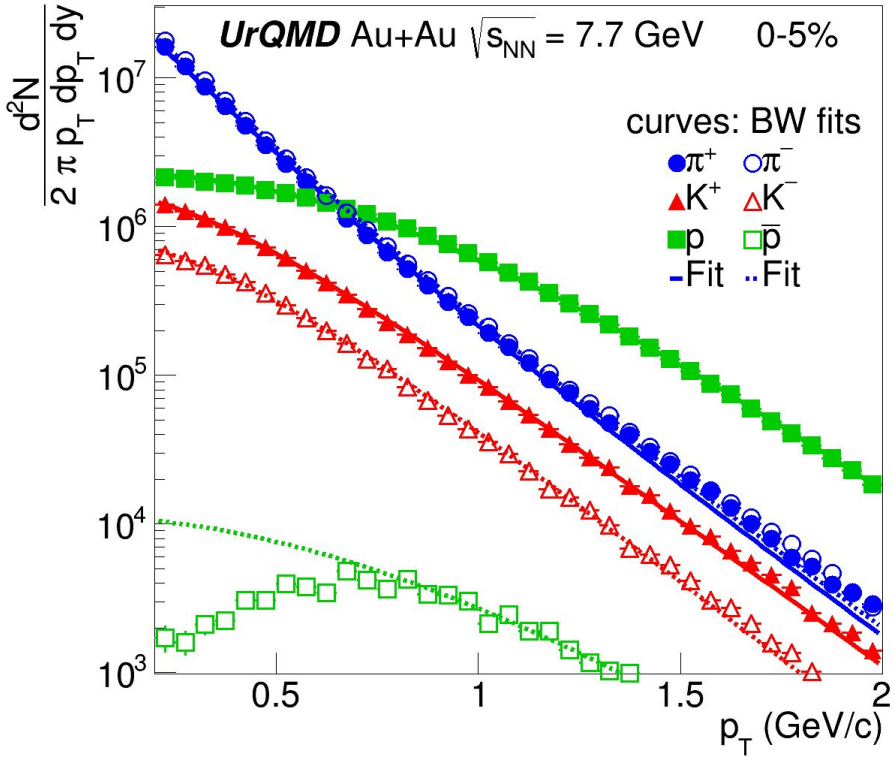


Tkin ≃ 191.9 MeV

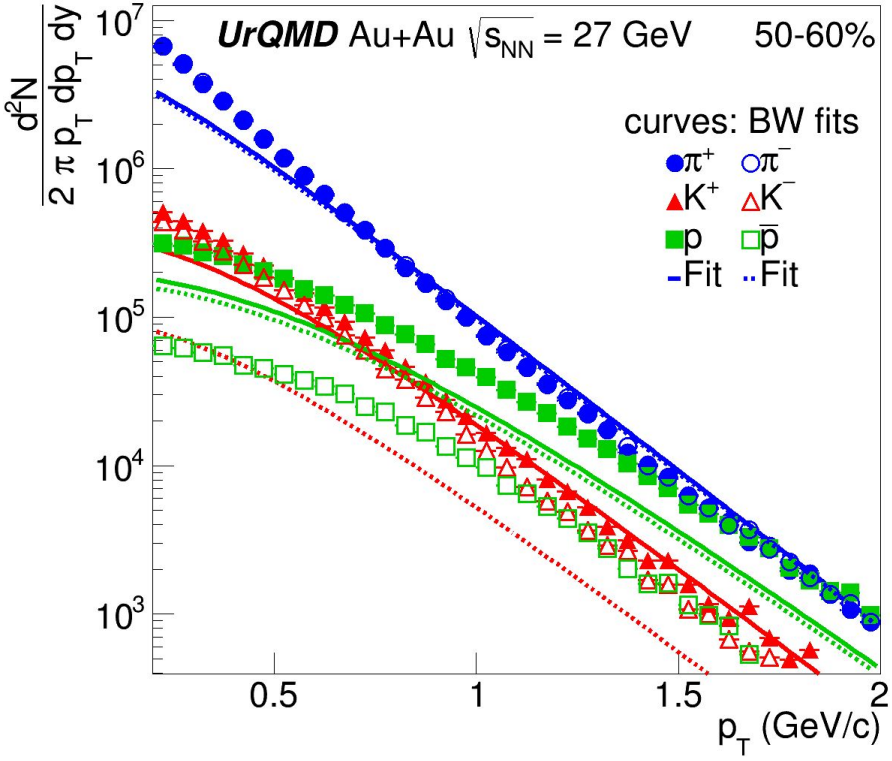


Tkin ≃ 187.1 MeV

Blastwave fits of π±, K±, p and ⁻p pT spectra for 7.7 GeV

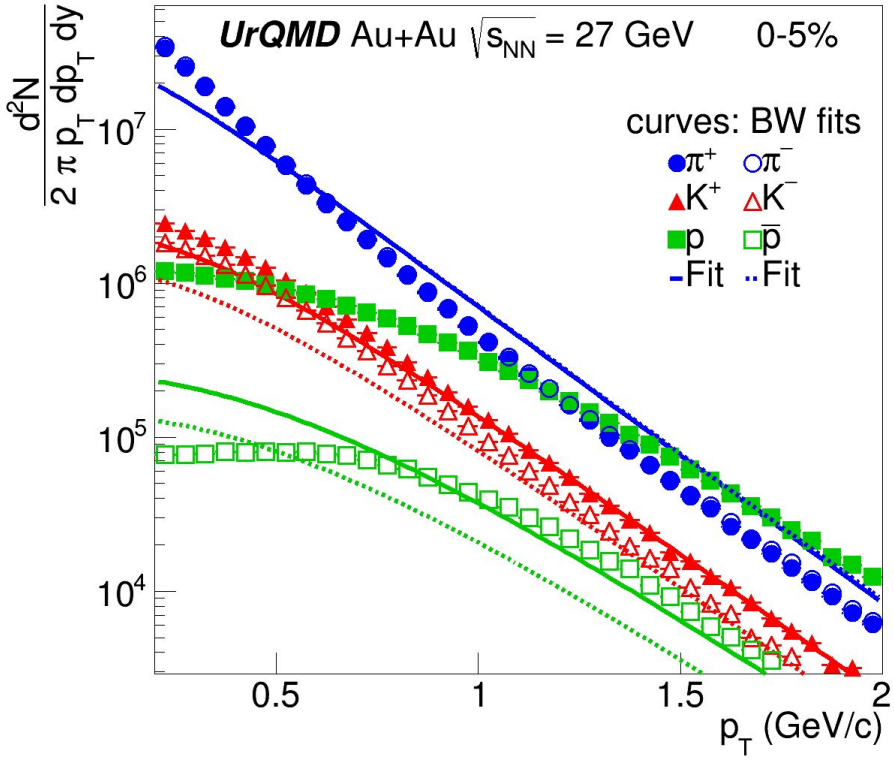


Tkin ≃ 98.4 MeV

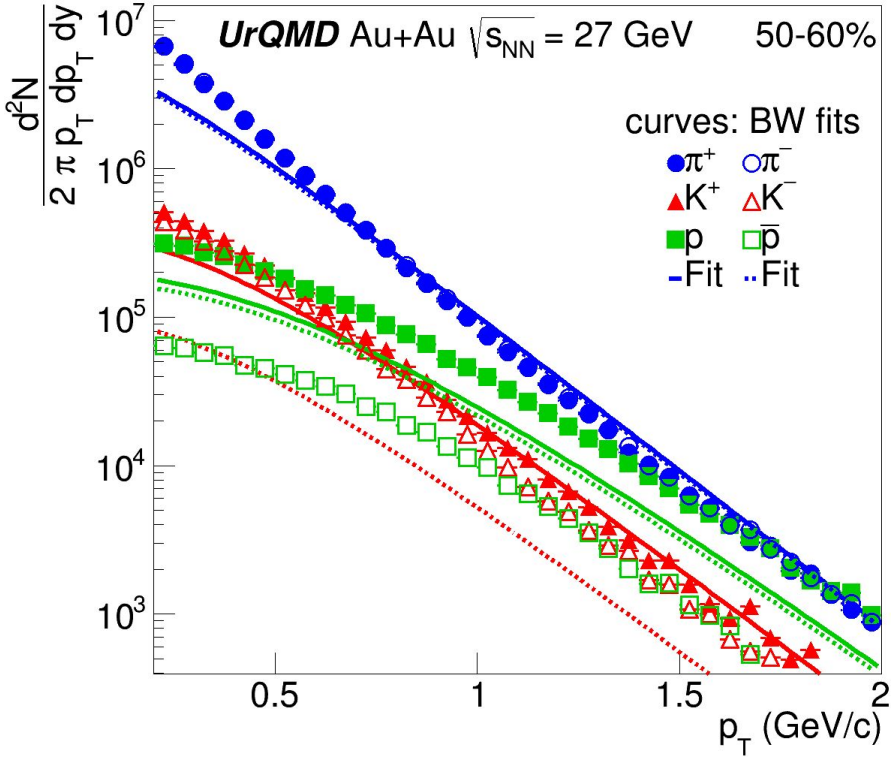


Tkin ≃ 139.8 MeV

Blastwave fits of π±, K±, p and ⁻p pT spectra for 27 GeV

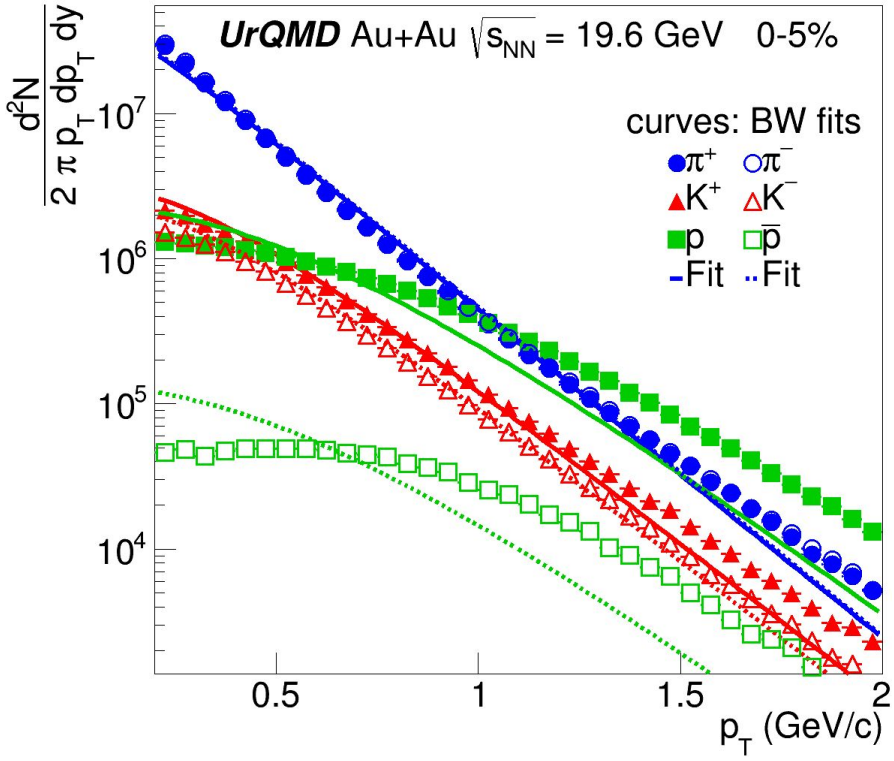


Tkin ≈ 189.2 MeV

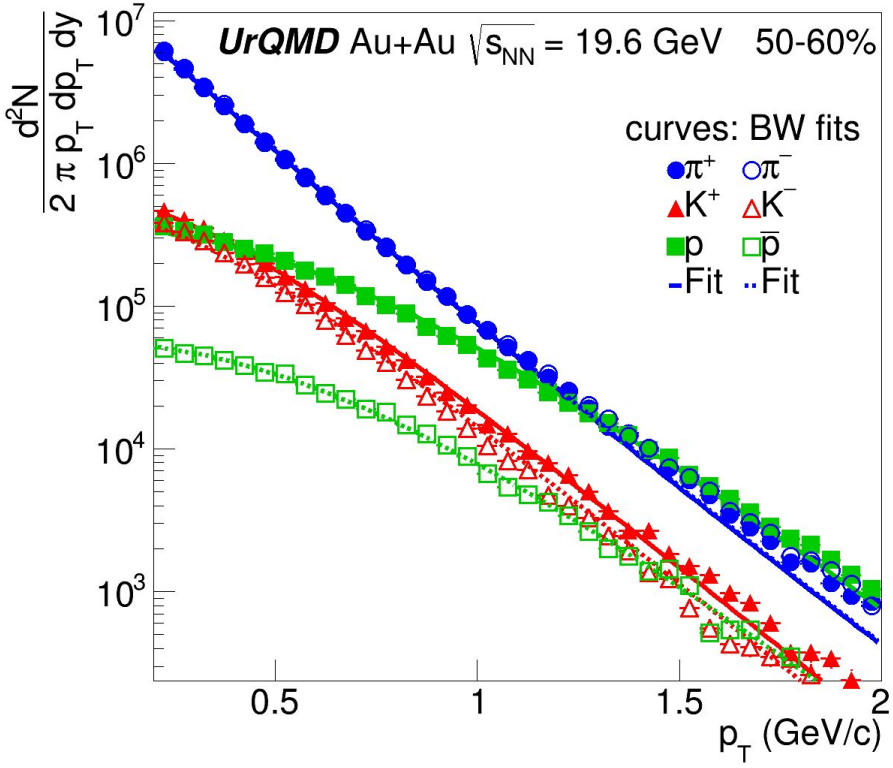


Tkin ≈ 185.8 MeV

Blastwave fits of π±, K±, p and ⁻p pT spectra for 19.6 GeV



Tkin ≈ 154.3 MeV



Tkin ≈ 117.8 MeV