



K^*/\bar{K}^* meson production in heavy-ion collisions

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Introduction and motivation

- **Goal:** Use the strange vector meson resonance $\mathbf{K}^*/\bar{\mathbf{K}}^*$ to study the properties of dense and hot matter created in heavy-ion collisions

$$\mathbf{K}^* = (K^{*+}, K^{*0})$$

$$\bar{\mathbf{K}}^* = (K^{*-}, \bar{K}^{*0})$$

- **Experimental side:**

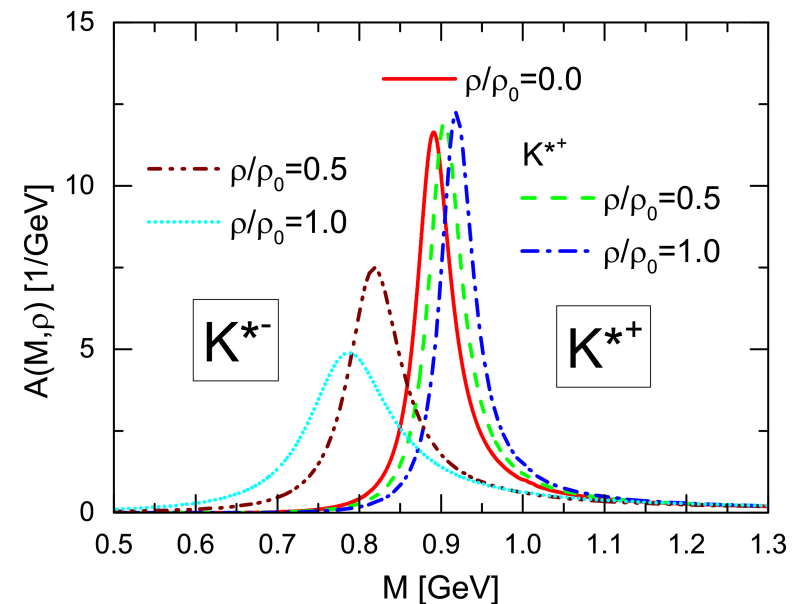
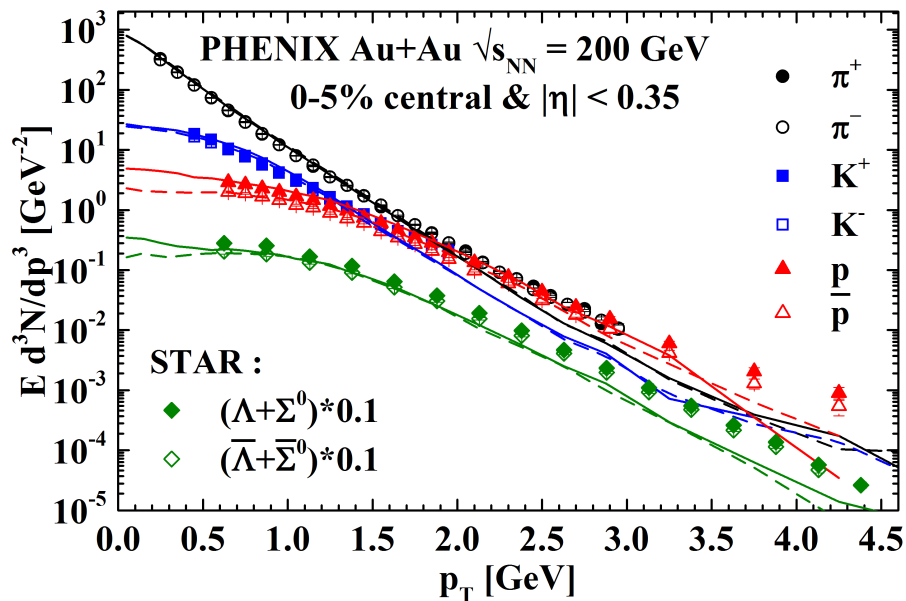
- $\mathbf{K}^*/\bar{\mathbf{K}}^*$ has a **very short lifetime**
 - difficult to detect
- Final particles, $\mathbf{K}=(K^+,K^-)$ and $\boldsymbol{\pi}=(\pi^+,\pi^-)$, can be seen in detector
 - $\mathbf{K}^*/\bar{\mathbf{K}}^*$ can be reconstructed
- Experiments usually detect charged kaons and pions
 - reconstruction of neutrally charged $\mathbf{K}^*/\bar{\mathbf{K}}^*_S = K^{*0}/\bar{K}^{*0}$

- **Problems:**

- Final particles suffer from **rescattering** and **absorption effects** in the **nuclear medium**
 - reconstructed $\mathbf{K}^*/\bar{\mathbf{K}}^*$ signal is **distorted**
- Kaons can be modified by the **medium**

K^*/\bar{K}^* in-medium effects

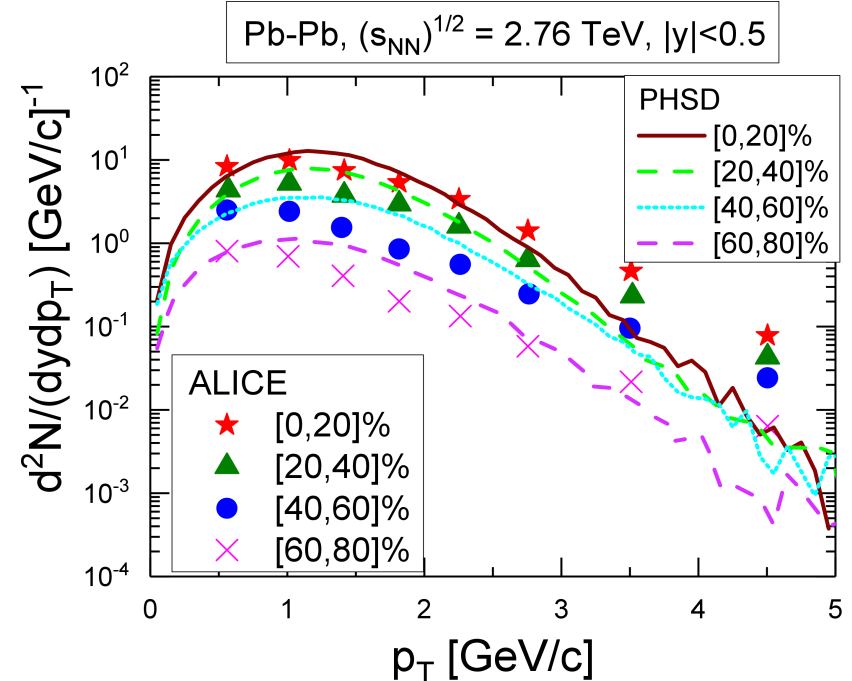
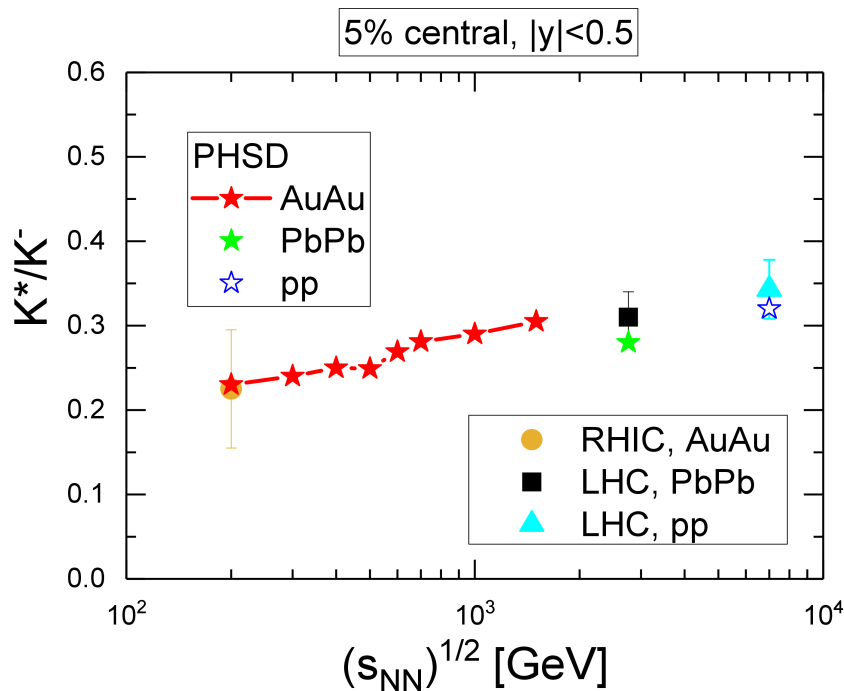
- The **Parton-Hadron-String-Dynamics (PHSD)** transport approach is a non-equilibrium microscopic dynamical model for strongly interacting systems



- Self-consistent coupled-channel unitary **G-Matrix** approach is used to calculate self-energy of K^*/\bar{K}^* in dense nuclear medium
- Off-shell K^*/\bar{K}^* dynamics implemented into **PHSD** in the form of relativistic **Breit-Wigner** spectral functions with mass- and density-dependent widths and mass shifts

Results

- **PHSD** reproduces data for p+p and A+A in relativistic collisions very well



- Only a relatively small number of K^*/\bar{K}^* comes from the **QGP** as compared to the **hadronic** channels
- Furthermore, the final decay particles of the K^*/\bar{K}^* , the K and π , suffer from absorption and rescattering effects in the medium and misidentification in the analysis

➔ Signal is distorted