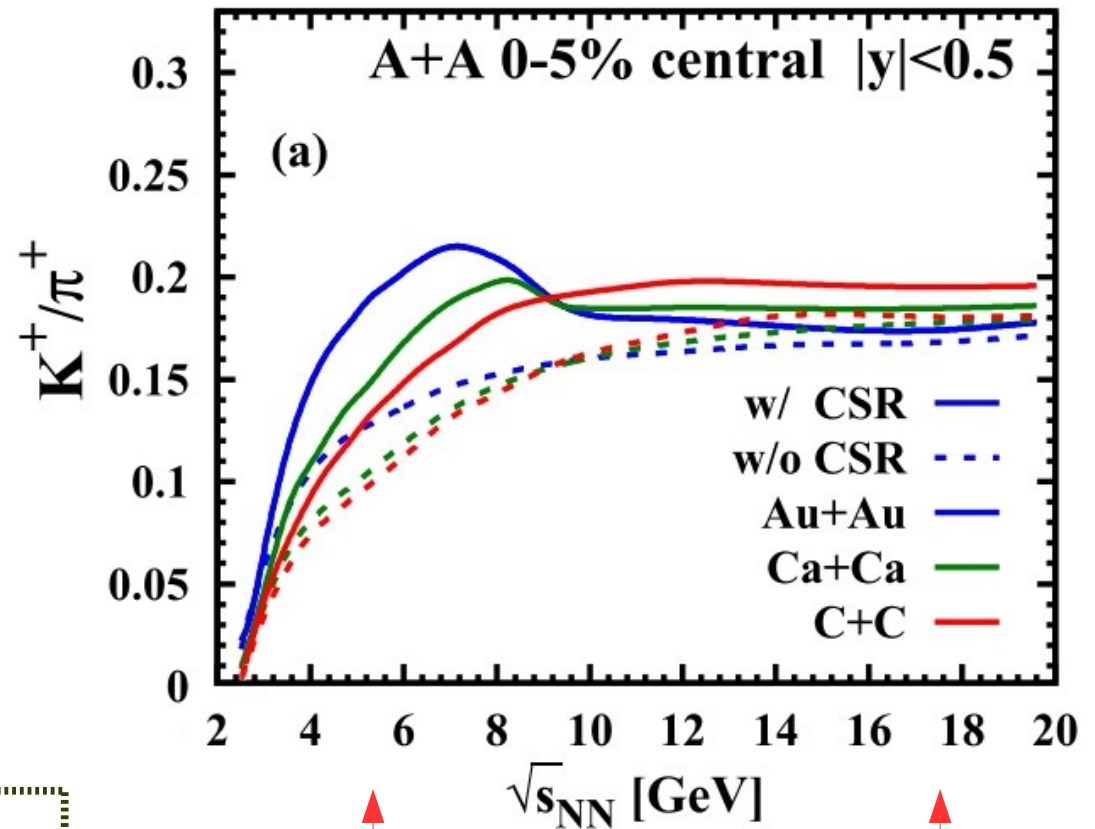
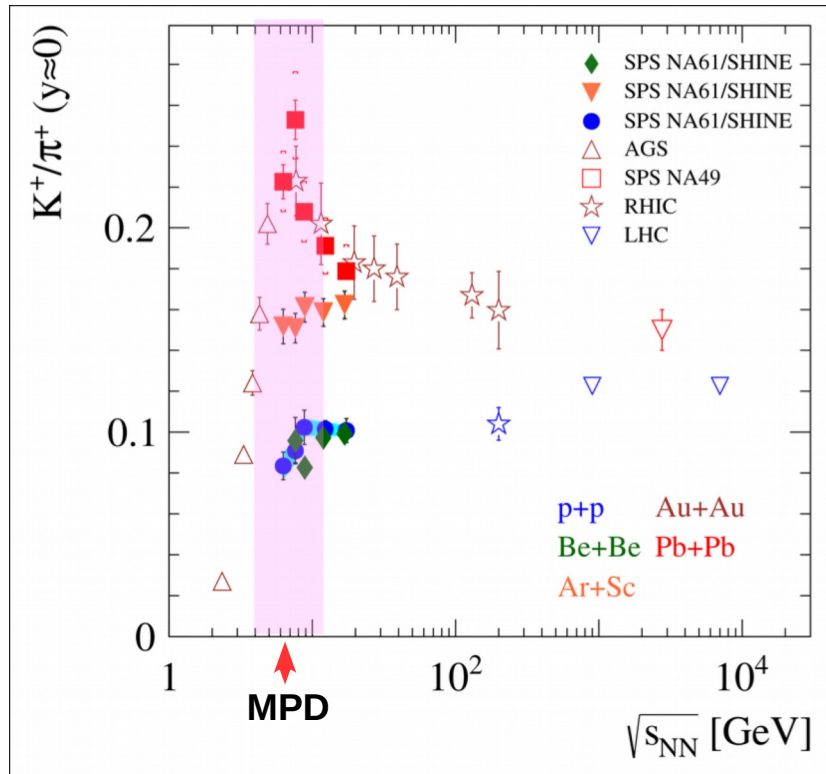




Pion and kaon yields in Au+Au collisions: status of the analysis

Strangeness production at NICA



Data set: 5.5K central Au+Au @ 11 GeV (PHSD)

MPD setup: TPC & TOF, ideal centrality binning (0 – 3 fm)

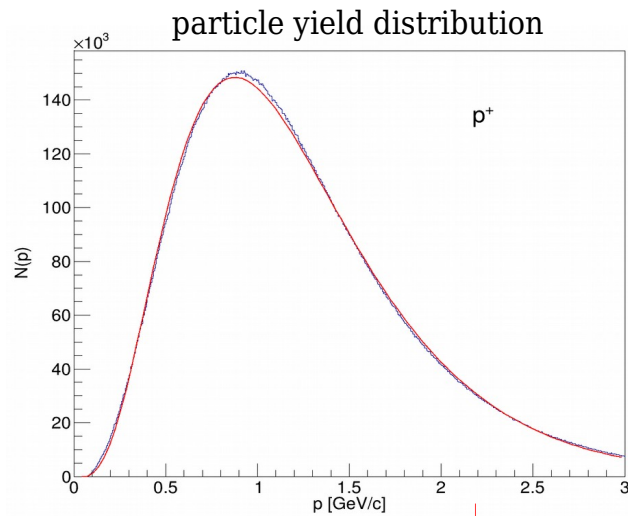
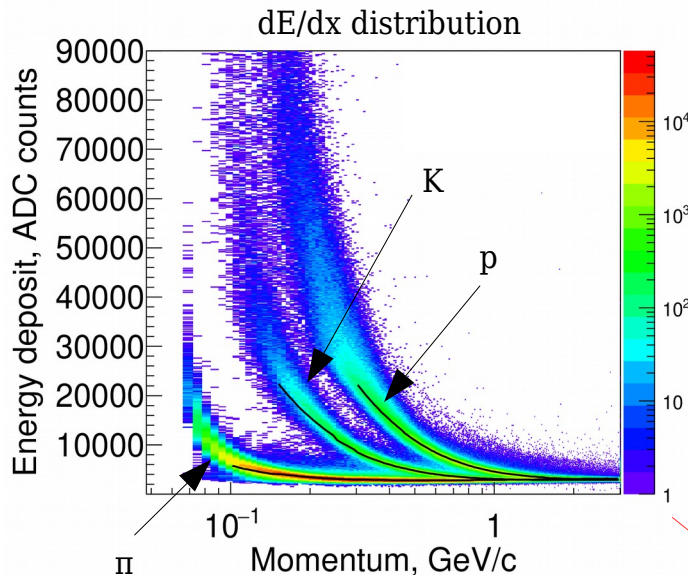
Selection criteria: $|\eta| < 1.6$, $N_{hits} \geq 20$, primary via DCA

Realistic track reconstruction: clustering in TPC

Realistic PID: combined dE/dx+TOF

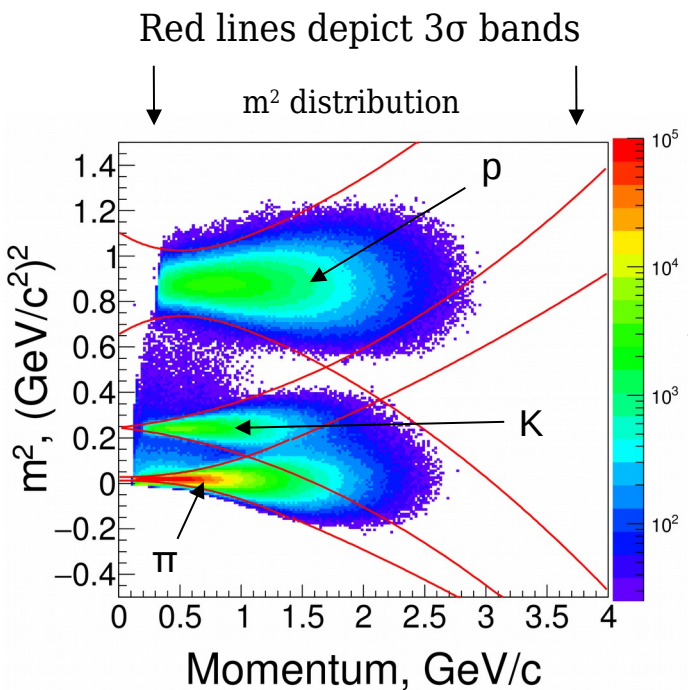
A. Palmese, W. Cassing, E. Seifert, T. Steinert, P. Moreau and E. L. Bratkovskaya, *Chiral symmetry restoration in heavy-ion collisions at intermediate energies*, Phys. Rev. C **94**, 044912 (2016)

MPD particle ID

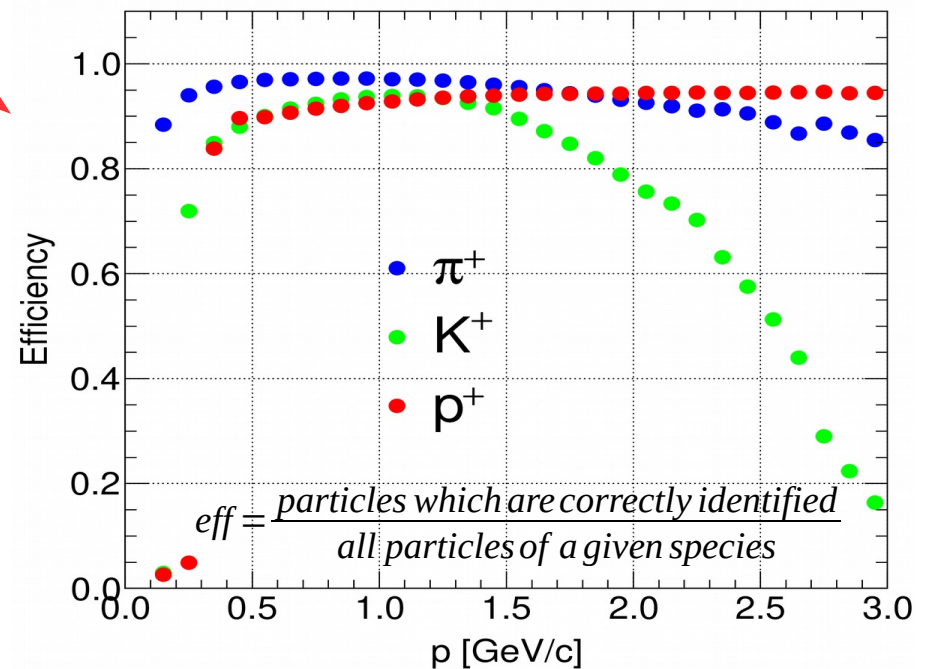


Track selection for PID:

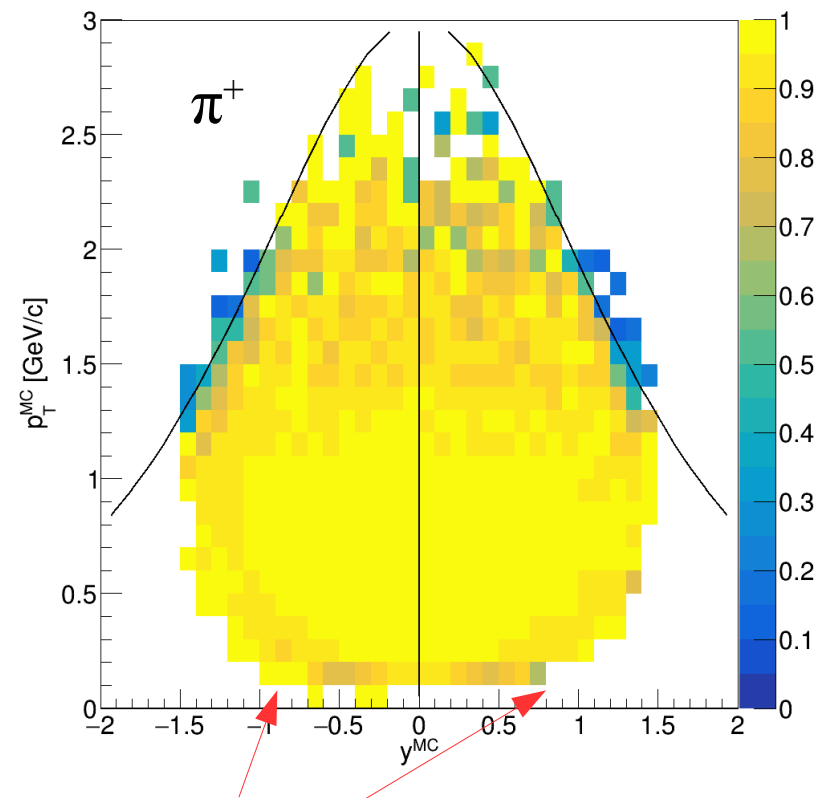
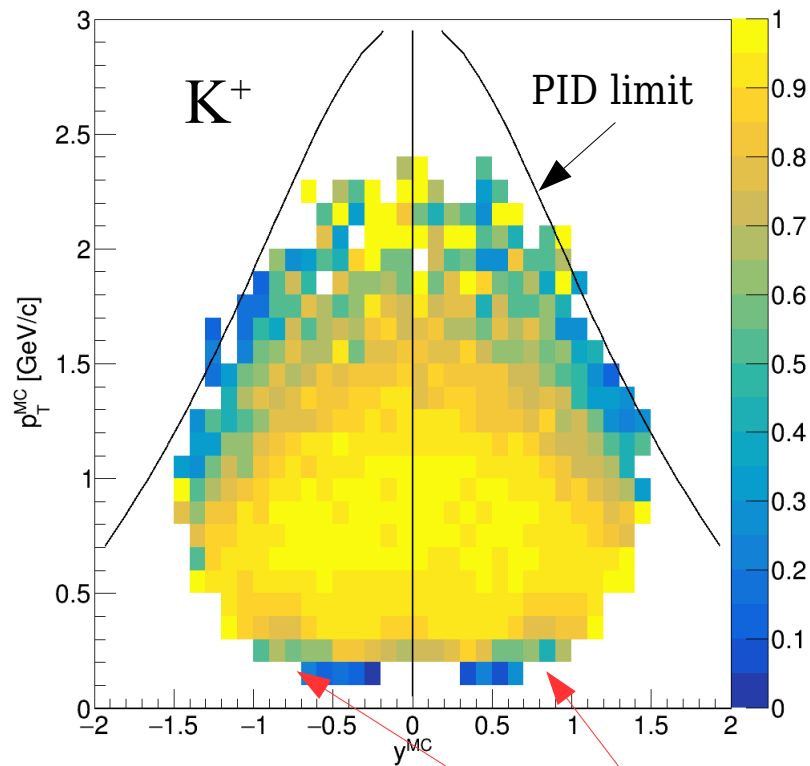
- $|\eta| < 1.6$
- $N_{\text{HITS}} \geq 20$
- Primary only (**GEANT**)



Combined (TPC+TOF) PID efficiency



Strangeness production: K^+ and π^+ phase-space with realistic PID

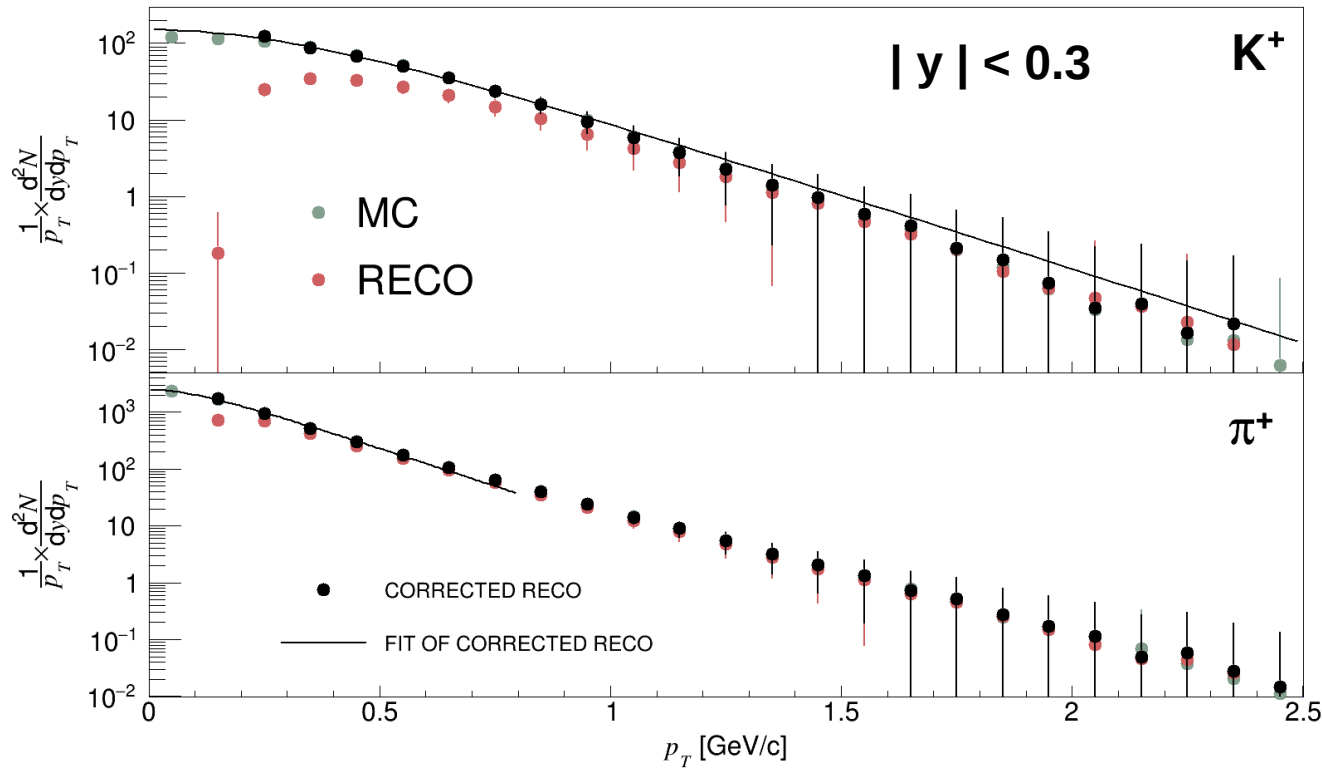


In order to reduce statistical errors at high p_T , spectra from the forward and backward part of detector were summed.

Analysis has been carried out within four rapidity intervals:

- 1) $|y| < 0.3$
- 2) $0.3 < |y| < 0.6$
- 3) $0.6 < |y| < 0.9$
- 4) $0.9 < |y| < 1.2$

Strangeness production: p_T spectra, corrections and dN/dy calculation



Corrections to RECO-spectrum:

- PID efficiency and contamination
- TPC-TOF (mis)matching
- Decay and interactions in TPC volume
- And others...

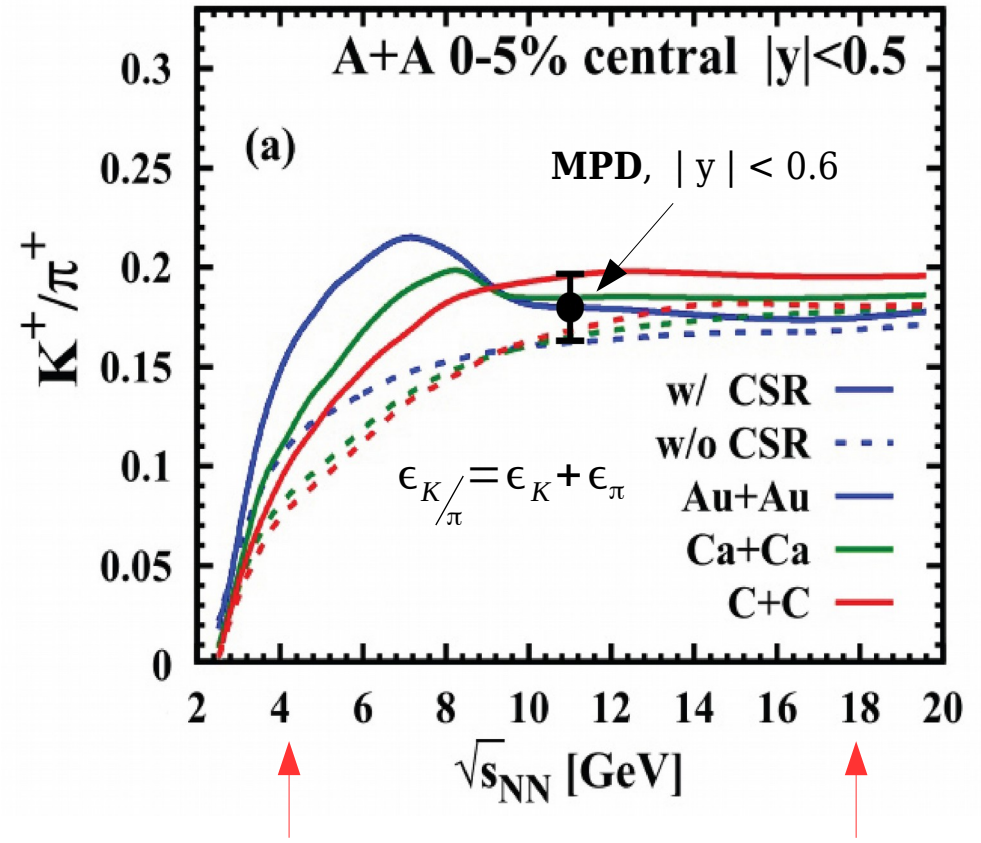
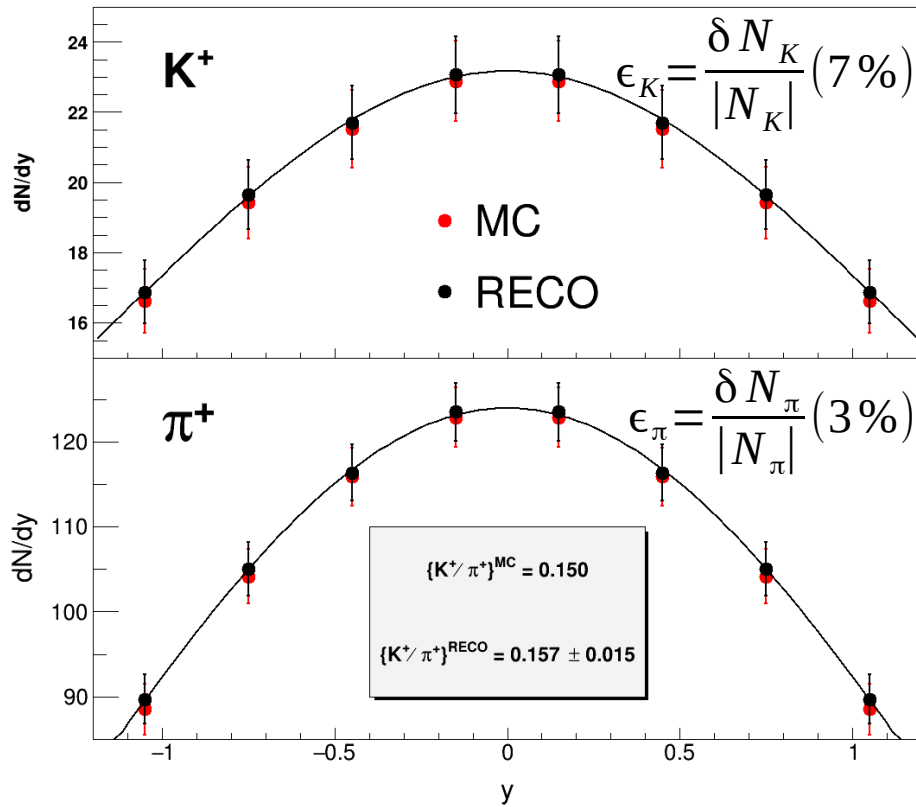
The p_T -integrated particle yield dN/dy is carried out from the p_T spectra using efficiency corrected data in the measured p_T ranges and extrapolation to the low- and high- p_T regions (up to 5 GeV/c).

For both pions and kaons function used to obtain dN/dy is m_T -exponential:

$$\frac{1}{p_T} \times \frac{d^2 N}{dy dp_T} = \frac{dN/dy}{T(m+T)} \cdot \exp\left(-\frac{m_T - m}{T}\right)$$

The percentage contribution to the yields from extrapolation are typically **25-30% (5-10%)** for kaons (pions).

Strangeness production: K^+/π^+ ratio



- The uncertainty of measured K^+/π^+ ratio at $\sqrt{s_{NN}} = 11$ GeV does not allow to distinguish CSR at experiment definitely
- However, the current analysis at whole energy range provided by NICA is underway

A. Palmese, W. Cassing, E. Seifert, T. Steinert, P. Moreau and E. L. Bratkovskaya, *Chiral symmetry restoration in heavy-ion collisions at intermediate energies*, Phys. Rev. C **94**, 044912 (2016)

In plans:

- Accurate uncertainty estimation (study of possible systematics cancellation in the strangeness-to-entropy ratio).
- Expand this analysis at the whole NICA energy range:

New data sets preparation:

100K central Au+Au @ **4, 6.2, 7.6, 8.8** and **12.3** GeV (PHSD),

Each data set is splitted to the data with and w/o CSR (50K events)

Reconstruction via NICA cluster (VBLHEP):

Simulation (MC) + reconstruction of 50K events @ 4 GeV takes **7** hours.

Total reconstruction time is ~**1** week.

Reconstruction of 1M events takes ~**6** days and requires **3** TB (**7** TB) of disc space to store reconstructed (Monte Carlo) data, respectively.