Production of charged pions in the Au+Au at 1.23 AGeV reaction*

M. Gumberidze[1], *P. Tlusty*[2] *and H. Schuldes*[3] *for the HADES Collaboration*

[1]Technische Universität Darmstadt, Darmstadt, Germany; [2]Nuclear Physics Institute, Academy of Sciences, 25068 Rez, Czech Republic; [3]Institut fur Kernphysik, Johann Wolfgang Goethe-Universitat, 60438 Frankfurt, Germany

The High Acceptance DiElectron Spectrometer HADES [1] is devoted mainly to study production of dielectron pairs from proton, pion and nucleus induced reactions at 1-2 AGeV. At the same time, the spectrometer provides detection and high quality identification of charged particles with a large solid angle.

In this contribution we focus on the analysis of charged pion production in Au + Au collisions at 1.23 AGeV. The results contribute to the data from systematic studies of pion production in heavy ion collisions with an unprecendented statistics, and serve as an input for the normalization of the dielectron data obtained in the same experiment.

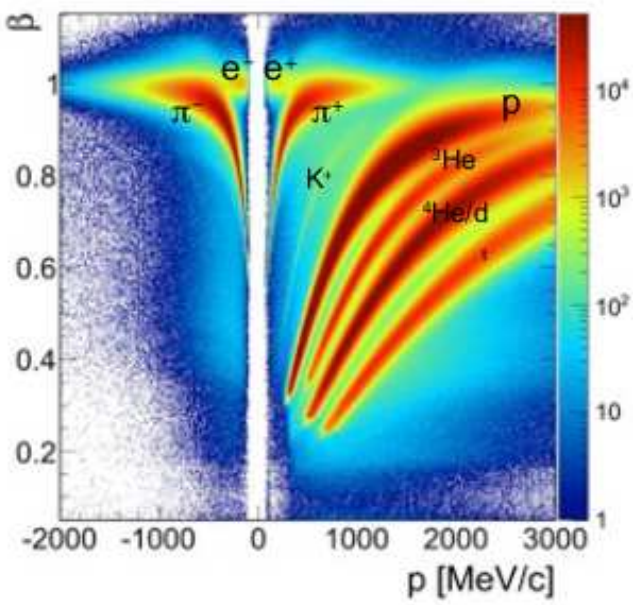

Figure 1: Velocity vs. charge-times-momentum of charged particles in HADES.

In April/May 2012, HADES has measured rare and penetrating probes in Au+Au collisions at 1.23 AGeV. About seven billion collisions have been recorded in with an event rate of 10 kHz.

For the particle identification, the velocity of particles detected in the time-of-flight detectors as a function of momentum was used (Fig. 1). Resulting yields were corrected for efficiency, acceptance and purity of the PID method, as well as for the detector and tracking inefficiencies using Monte Carlo simulations.

Preliminary results on π^- production are presented in Figure 2, showing the measured transverse mass distributions of π^- in different intervals of rapidity. The transverse-mass (m_t) distributions have been fitted for each rapidity bin using the sum of two exponential functions:

$\frac{1}{m_t^2}\frac{dN(y)}{dm_t} = C_1(y)e^{-\frac{m_t}{T_1(y)}} + C_2(y)e^{-\frac{m_t}{T_2(y)}}$

with $m_t = (p_t^2 + m^2)^{1/2}$, and p_t as transverse momentum. $C_{1,2}$ are normalizations and $T_{1,2}$ the inverse slope parameters.

Due to the wide acceptance of the present experiment we will be able to do a direct comparison of the HADES data with the results of previous experiments of charged pions done by e.g. FOPI collaboration [2].

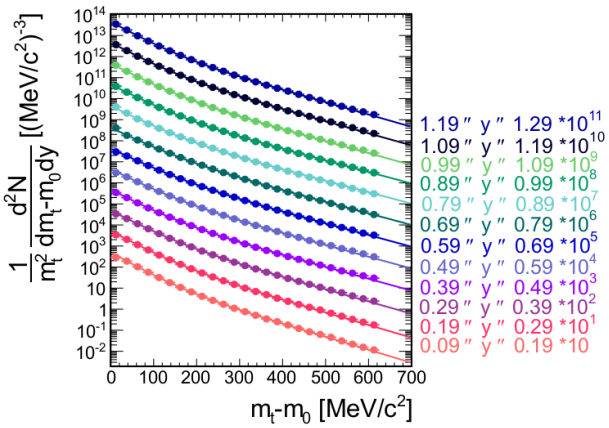

Figure 2: Transverse-mass distributions for negatively charged pions in different slices of rapidity. Full lines show the results of fits to the data (closed points) using the sum of two exponential functions.

Our preliminary results show that the p_t and y integrated negative pions yields are consistent with the FOPI data. More detailed comparisons are ongoing.

References

[1] G. Agakishiev *et al.* [HADES Collaboration], Eur. Phys. J. A 41 (2009) 243.

[2] W. Reisdorf et al. (FOPI Collaboration) Nucl. Phys. A 781 (207) 459-508.

* Work supported by TU Darmstadt: VH-NG-823, GSI, Helmholtz Alliance HA216/EMMI, SIP JUC Cracow: 2013/10/M/ST2/00042 and NN202198639, HIC for FAIR, NPI Rez: GACR 13-067595 and AS CR M100481202, HGS-HIRe and H-QM.