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Strangeness production in Au+Au collisions at $\sqrt{s_{NN}} = 62.4GeV$

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BRAHMS experiment took data in the short RHIC run for Au+Au collisions at c.m. energy of 62.4 GeV. The BRAHMS setup was able to measure and identify charged particles over the widest rapidity range at RHIC. This feature enabled us to shed some light on one of the predicted signals of quark gluon plasma (QGP), strangeness enhancement.
Experimentally, BRAHMS measures charged pions, charged kaons, protons and anti-protons so the strange quarks are identified through the charged kaons. The majority of the produced strange quarks form negative kaons and Λ baryons in comparable quantities so K^- is not a good tool for strangeness estimation when we don't control the Λ yield. The anti-strange quarks however form mostly positive kaons and K^0s in equal quantities. The other species containing anti-strange quarks are rare, thus the number of positive kaons approximately represents the total strangeness created during the collision.
From the AGS energies up to the highest RHIC energy we observed experimentally that the K^+/π^+ ratio is higher than the same ratio in p+p collisions at the same collision energy. This fact was interpreted to happen due to the final state effects (rescatterings) taking place in a nucleus-nucleus collision. We also observed that the difference between the strangeness ratio in nucleus-nucleus collisions and the one in p+p collisions is varying. By looking at older SPS data in mid-rapidity, together with BRAHMS 62.4 GeV data in different rapidity slices, we observed that there is a scaling of the K^+/π^+ ratio with the $\bar{p}/p$ ratio (within BRAHMS coverage, the $\bar{p}/p$ ratio is varying with a factor bigger than 20 which allows this comparison). Our conclusion is that in nucleus-nucleus collisions where the formed medium is baryon rich (e.g. AGS energies [1], low SPS energies [2], forward rapidity in Au+Au collisions at 62.4GeV in RHIC), the additional strangeness created through rescatterings is higher than in the collisions where the medium created is highly deconfined and baryon poor (e.g. RHIC at 200GeV [3]). A possible explanation might be the evolution time which is longer in low energy collisions and allows for multiple rescatterings before the chemical freezeout.
In this work we will show measured yields and ratios of identified particles from the 10% most central Au+Au collisions at 62.4 GeV together with comparisons with results from other experiments and from theoretical models.

References

[1] L. Ahle et al. (E-802 Collaboration), *Phys. Rev. C*, **59**, (1999) 4.
[2] M. Gazdzicki et al. (NA49 Collaboration), *J. Phys. G*, **30**, (2004) S701-S708.
[3] I. Arsene et al. (BRAHMS Collaboration), *Nucl. Phys. A* , **757**, (2005) 1-27.