Kaon flow in Au+Au collisions at 1.23 AGeV with HADES

Lukáš Chlad for the HADES collaboration
Nuclear Physics Institute of the CAS, public research institution

Motivation

- Kaons are a good probe for nuclear EOS [1]
- Their propagation in nuclear medium likewise their production is affected by kaon-nucleon potential
- Flow measurements are essential input for models (HSD, IQMD, BUU...)
- Impact on astrophysics (kaon condensate in the core of neutron stars) [2]

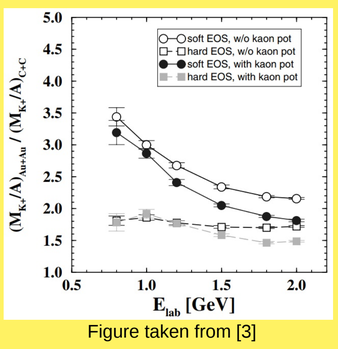
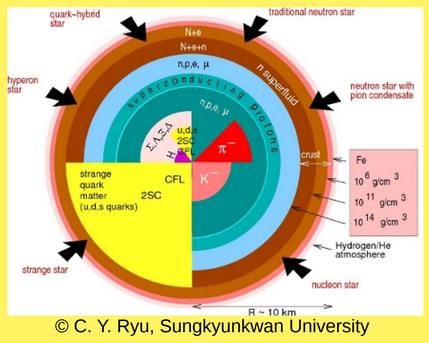


Figure taken from [3]



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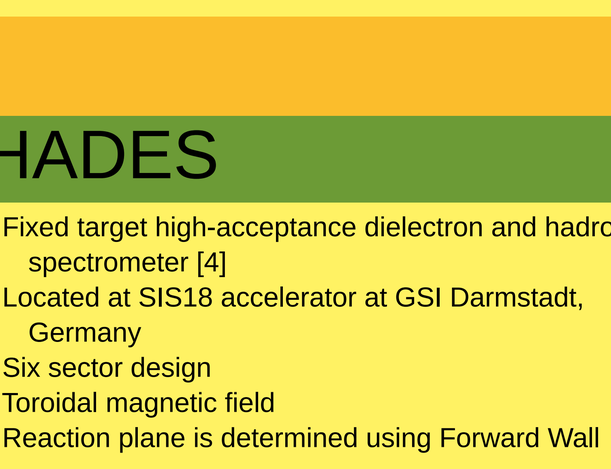
HADES

- Fixed target high-acceptance dielectron and hadron spectrometer [4]
- Located at SIS18 accelerator at GSI Darmstadt, Germany
- Six sector design
- Toroidal magnetic field
- Reaction plane is determined using Forward Wall

Analyzed dataset

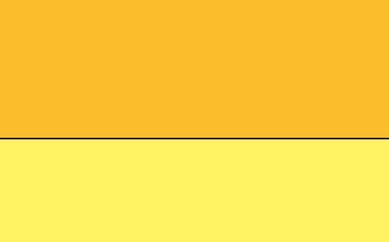
- Au+Au collisions at $\sqrt{s_{NN}} = 2.42\,\mathrm{GeV}$
- $2.6 \cdot 10^9$ events with centrality 0-40% recorded

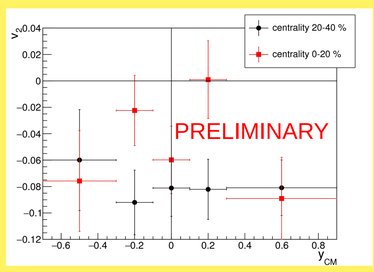


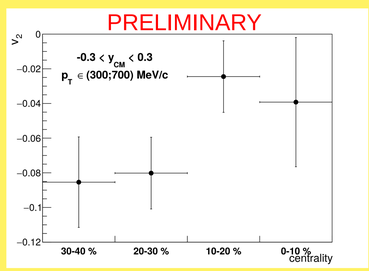
Method and Results

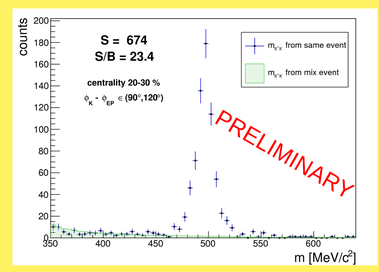
Neutral kaons

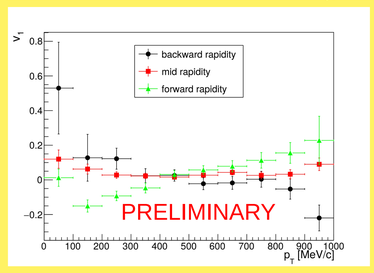
- Reconstructed via decay into two charged pions
- Pion-pair selection criteria based on topology of weak kaon decay
- Combinatorial background is calculated with mixed-event technique
- Azimuthal angle distribution relative to event plane angle is fitted with $\frac{N}{2\pi}\left[1 + 2v_1\cos(\phi_K - \phi_{EP}) + 2v_2\cos(2(\phi_K - \phi_{EP}))\right]$
- Obtained parameters are corrected for event plane resolution [5]

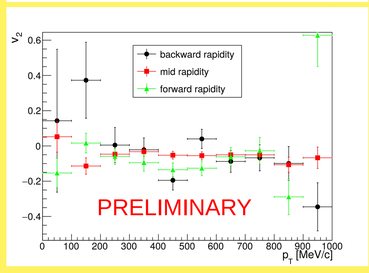


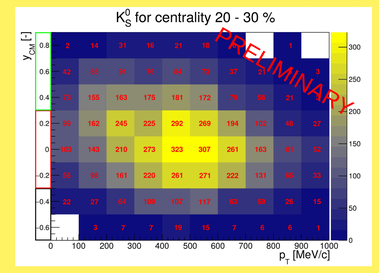






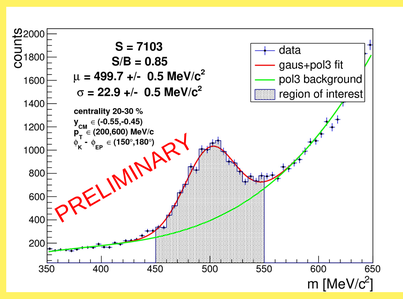


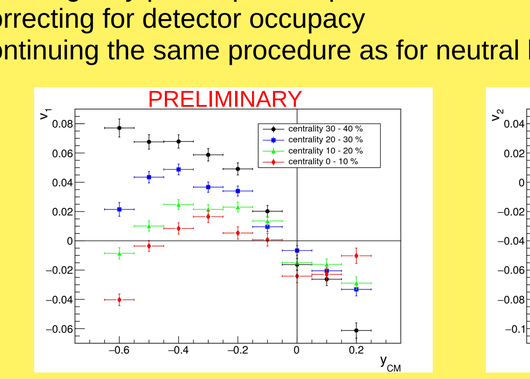


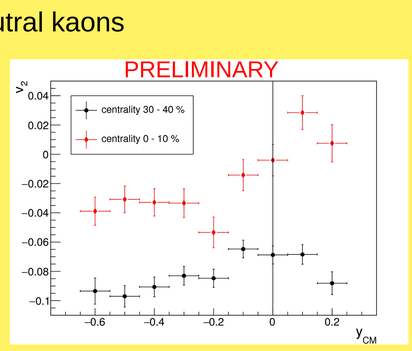


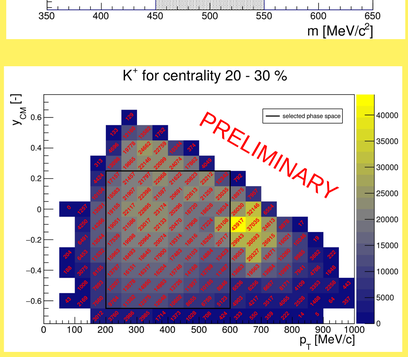
Positively charged kaons

- Only high quality tracks are selected
- Energy loss deposition in MDC and TOF detectors
- Fitting mass distribution of selected candidates and subtracting cubic background within region of interest (two sigma around mean value)
- Selecting only part of phase space with uniform acceptance
- Correcting for detector occupacy
- Continuing the same procedure as for neutral kaons









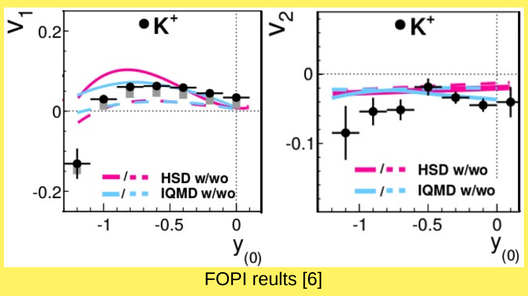
Conclusions and Outlook

Neutral kaons

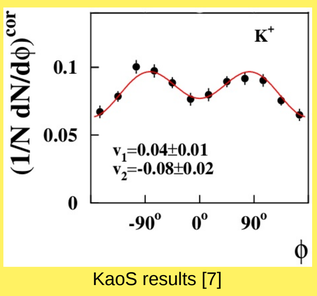
- Systematic effects are under investigation
- Combinatiorial background subtraction works well thus it might be possible to relax topological cuts to increase statics

Positively charged kaons

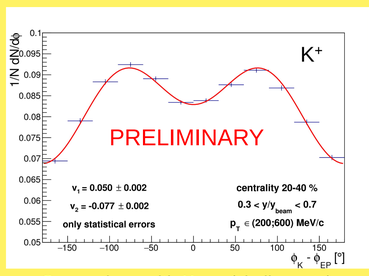
- Direct antiflow is decreasing with increasing event centrality
- Good qualitative and quantitative agreement with FOPI and KaoS results
- Systematical errors are studied



FOPI reults [6]



KaoS results [7]



Comparison with Kaos (similar cuts)

References

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Acknowledgement

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