Contribution ID: **79** Type: **Parallel**

Anisotropic flow of strange hadrons emitted from Ag+Ag collisions at beam energy of 1.6\textit{A} GeV measured with HADES

Monday, 29 June 2026 17:40 (20 minutes)

The High Acceptance Di-Electron Spectrometer (HADES) [1] installed at the SIS18 accelerator in GSI Darmstadt registers products of heavy-ion collisions (as well as of elementary interactions) at energies of a few GeV per nucleon. The nuclear matter produced in such collisions reaches extreme densities and temperatures [2,3,4], comparable to those expected in Neutron Star mergers [5].

Particles containing (anti)strange quarks are of particular interest, as they are produced sparsely in this energy regime and the study of their interaction with the medium is of high relevance. For charged kaons it is predicted that, due to their interaction with nuclear matter, their effective mass and decay constant should change [6]. This phenomenon was investigated by other experiments, but so far without a definitive conclusion [7]. Another interesting particle species is the Λ baryon, due to its role in the so-called hyperon puzzle [8], where its interaction potential with nuclear matter is an important piece of the "puzzle".

It is predicted that the anisotropic flow of strange hadrons should be sensitive to their interaction with the surrounding nuclear medium [7,9]. This contribution will contain preliminary distributions of anisotropic flow coefficients $v_n(p_t, y_0)$ of the 1st and 2nd order of strange hadrons – $K^{\pm}$ mesons and Λ baryons – emitted from Ag+Ag collisions at a beam energy of 1.6 GeV/nucleon. The distributions were measured in a broad centrality class of 5-25 % most central collisions and cover a large area of the momentum phase space with $-0.9 < y_0 < 0.7$ and $100 < p_t[\text{MeV/c}] < 1500$. The measurement of the anisotropic flow of Λ baryons would be the lowest energy at which such a measurement was carried out.

HADES allows the direct measurement of charged kaon four-momenta, while the Λ baryon must be reconstructed via its primary decay channel: $\Lambda \to p\pi^-$. The background is then subtracted using a mixed event technique. Neural networks are used to maximize the signal extraction. All of the flow results are corrected for the resolution of the event-plane measurement and possible inefficiencies due to high detector occupancies will be discussed, as well as selected aspects of systematic uncertainties.

References:

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Collaboration

HADES

Primary author: ORLIŃSKI, Jan (University of Warsaw)

Presenter: ORLIŃSKI, Jan (University of Warsaw)

Session Classification: Parallel session A7

Track Classification: Light mesons (production, spectroscopy, decays)