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Type: **Parallel Talk**

## Collective flow and correlations measurements with HADES in Au+Au collisions at 1.23 AGeV

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HADES provides a large acceptance combined with a high mass-resolution and therefore allows to study dielectron and hadron production in heavy-ion collisions with unprecedented precision. With the high statistics of seven billion Au-Au collisions at 1.23 AGeV recorded in 2012 the investigation of collective effects and particle correlations is possible with so far unprecedented accuracy.

At low energies  $v_1$  and  $v_2$ , related to directed and elliptic flow, have been measured at the BEVALAC and SIS18, but so far high-order harmonics have not been studied. They allow to characterize the properties of the dense hadronic medium produced in these collisions, such as its viscosity, and provide thus an important reference to measurements at higher energies. We will present data on higher-order flow harmonics ( $v_3$  and  $v_4$ ) of protons and first results on multi-particle azimuthal correlation analyses, which can be utilized to disentangle the contribution from collective and non-flow process involved in the dynamical evolution of heavy-ion reactions. Furthermore, data on directed and elliptic flow of light nuclei will be shown.

Information on radial flow can be obtained from the analysis of pion HBT-correlations, deuteron coalescence and transverse momentum spectra of identified particles. We will present new results on these observables extracted from the HADES data and discuss their correlations. From these a consistent picture emerges which provides strong evidence for a substantial radial expansion already at these low beam energies.

### Content type

Experiment

### Collaboration

HADES

### Centralised submission by Collaboration

Presenter name already specified

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