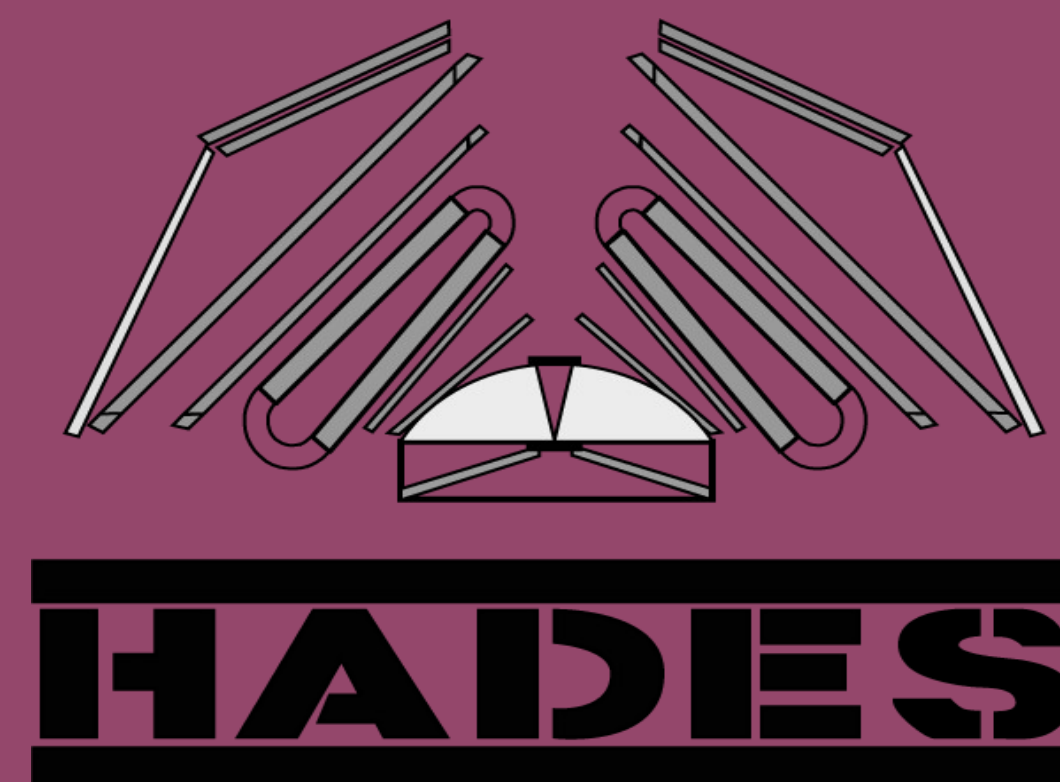


Charged Kaon- and Φ -Reconstruction in Au+Au-Collisions at 1.23 AGeV

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HADES

The **H**igh **A**ccceptance **D**i-**E**lectron **S**pectrometer **HADES** is a fixed target detector, located at SIS18 at Gesellschaft für Schwerionenforschung in Darmstadt, Germany.

Physics program:

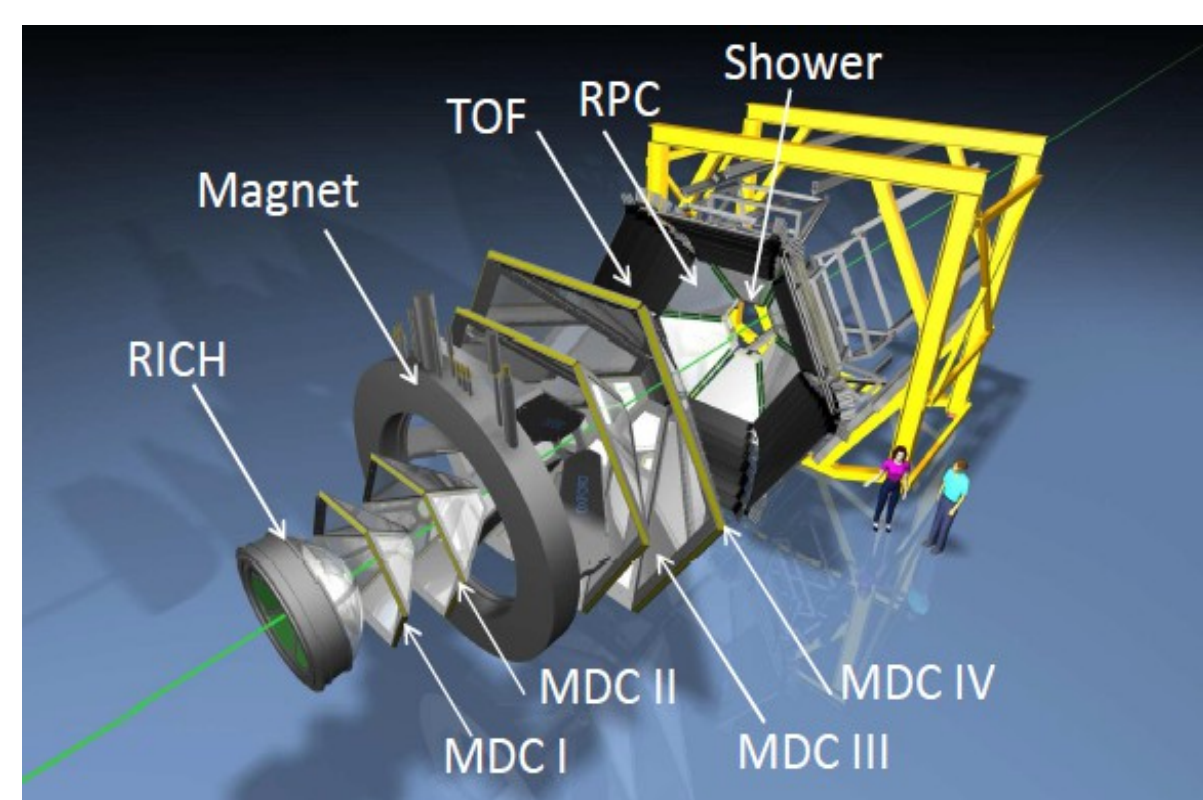
- Heavy ion collisions
- Elementary reactions ($p+p$, $d+p$, $\pi+p$, $\pi+A$)

Acceptance:

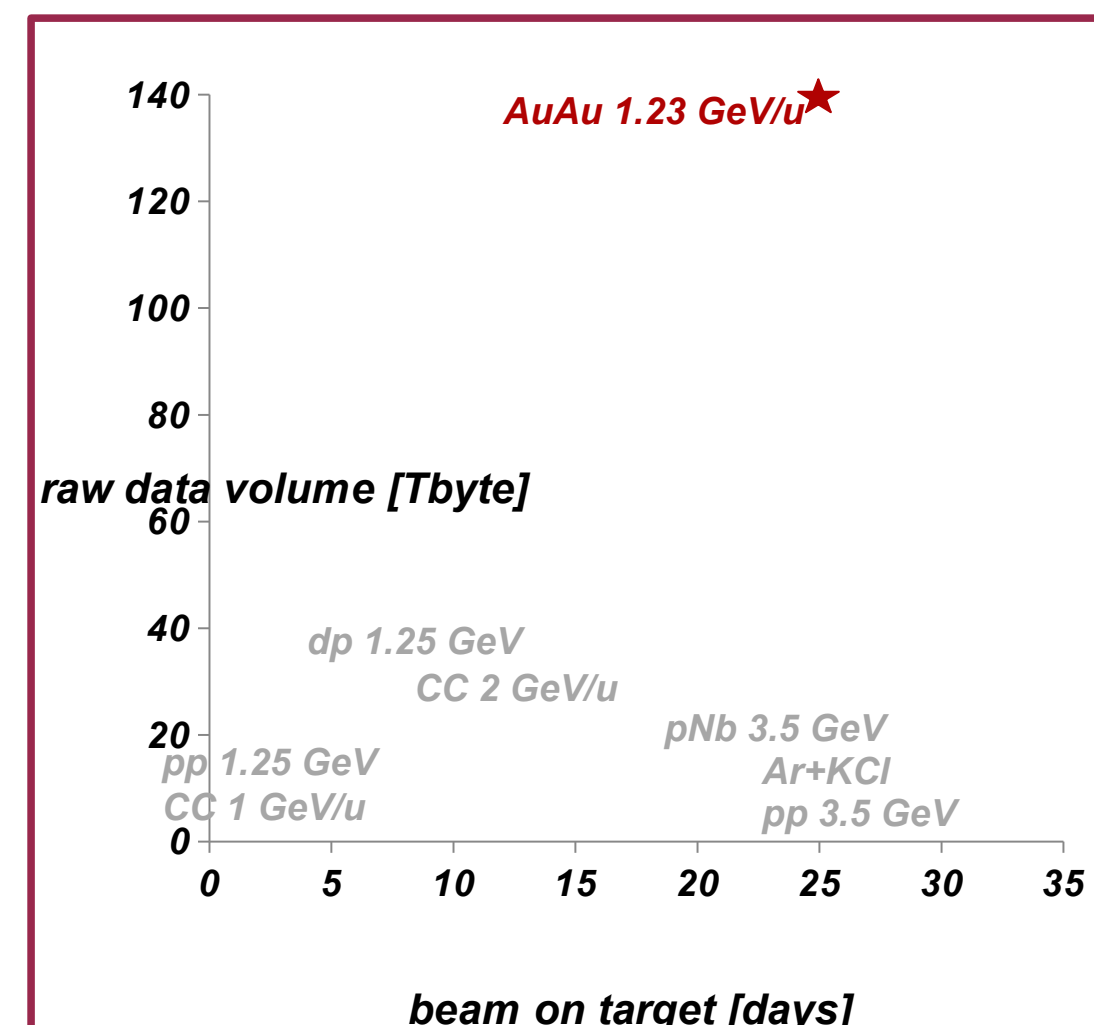
- Full azimuthal angle
- Polar angle $18^\circ - 85^\circ$

Detector components:

- RICH and SHOWER detector for lepton identification
- Multi-wire drift chambers (MDC) for tracking and energy loss information, and momentum determination (combined with a magnetic field)
- Time of flight detectors (TOF, RPC) for timing and energy loss information

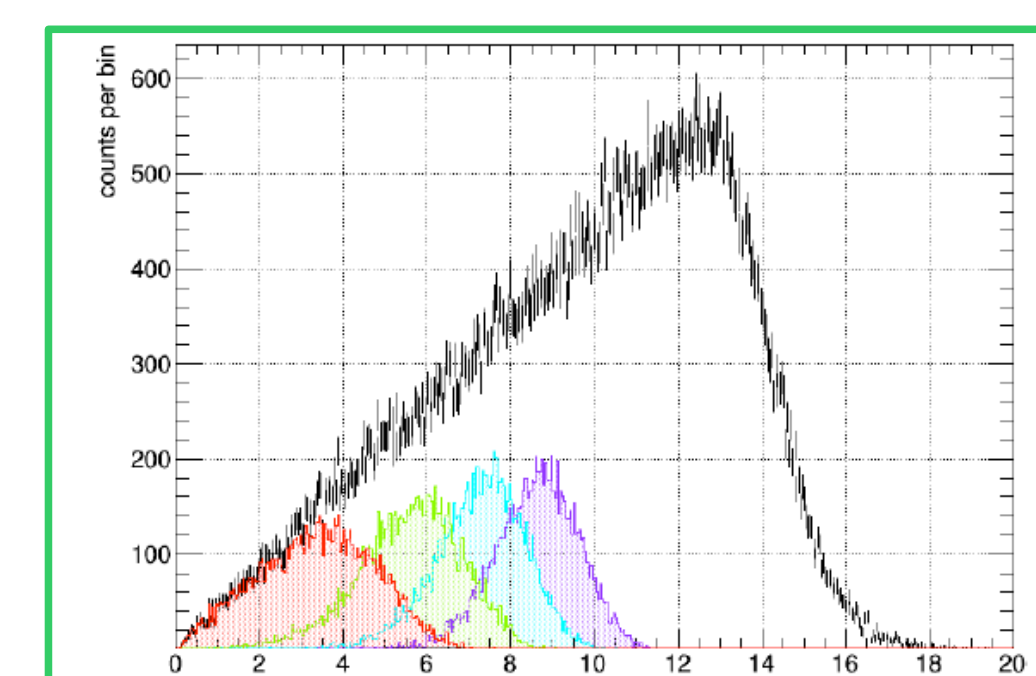
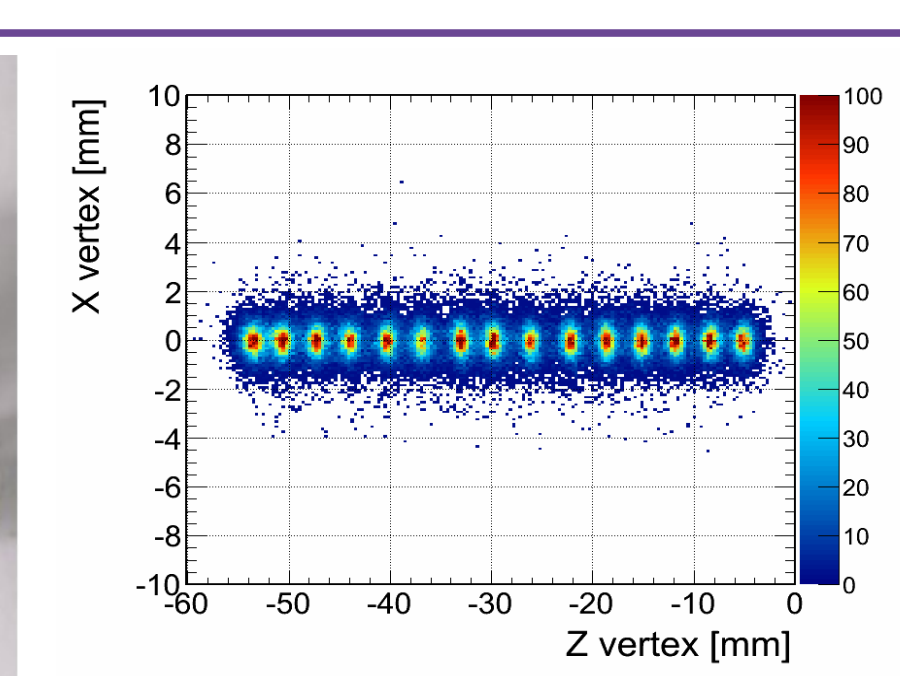
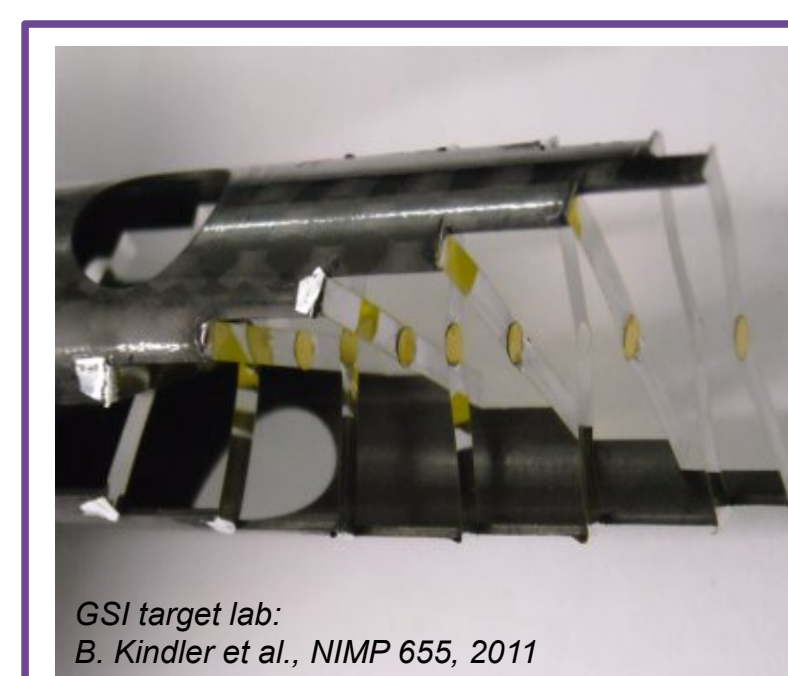


Au+Au @ 1.23 AGeV

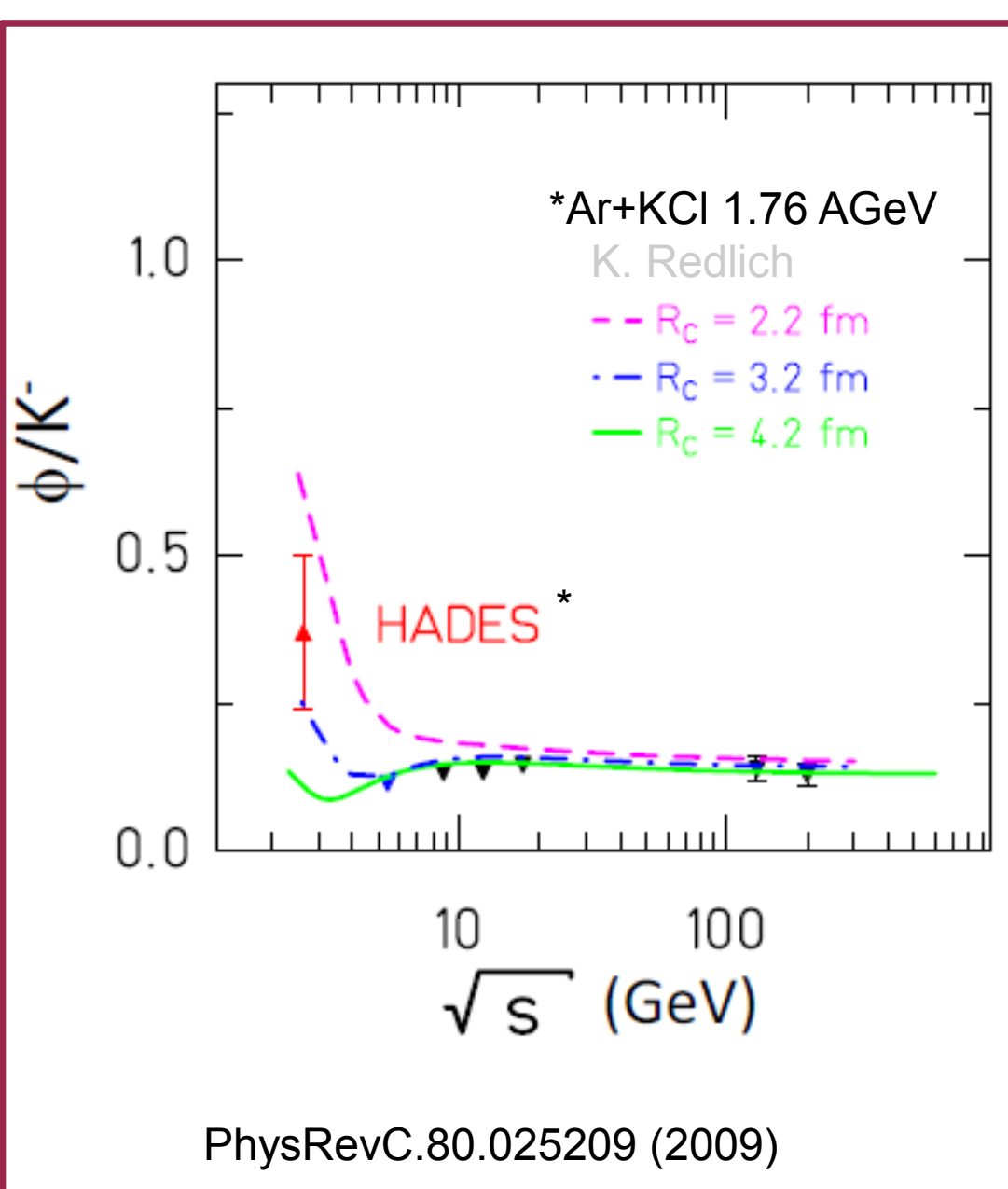


HADES DAQ performance:

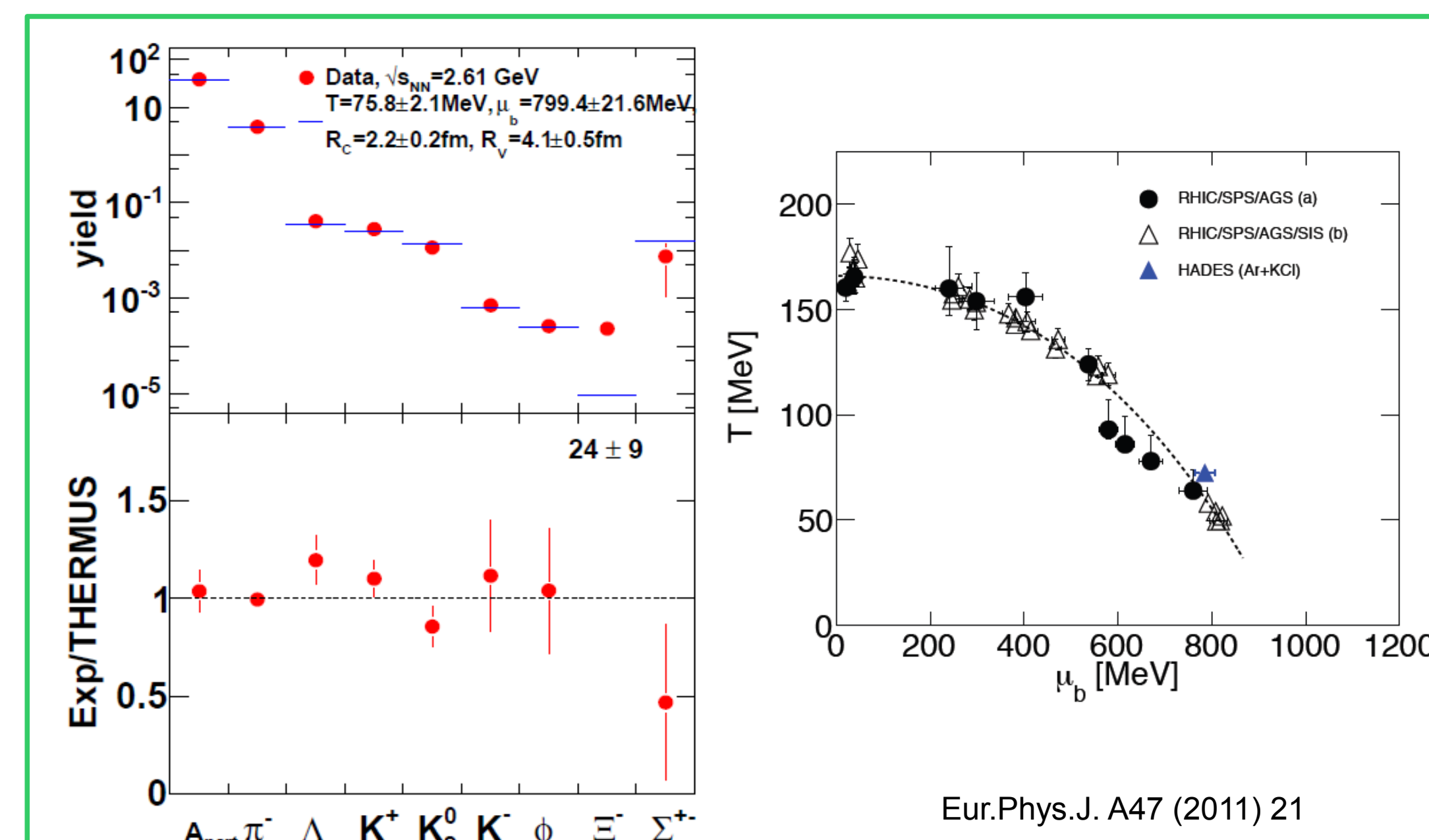
- 557 hours Au beam on Au target
- $(1.2 - 1.5) \times 10^6$ ions per second
- 8 kHz trigger rate
- 200 MByte/s data rate
- 7.3×10^9 events \Rightarrow **140 TByte of data**
- Beam energy 1.23 AGeV, $\sqrt{s} = 2.4$ GeV
- Segmented Au target
- Trigger on multiplicity in TOF ≥ 20 (PT3) $\Rightarrow b_{\text{max}} \approx 9$ fm



Motivation



- In Au+Au-collisions at 1.23 AGeV, the complete strangeness production is below its nucleon-nucleon threshold.
- In baryon dominated matter K^+ and K^- exhibit different properties, because K^- can be resonantly absorbed by nucleons.
- Although strangeness exchange reactions have been proposed to be the dominant channel for K^- production below threshold, the production yield could also be explained in Ar+KCl-reactions at 1.76 AGeV based on a **statistical hadronization model fit** to the measured particle yields. To take care for strangeness conservation, strangeness is calculated canonically within R_c , and therefore the **ratio of Φ/K^- is predicted to rise with decreasing beam energies and hence the feed-down of Φ -mesons to K^- becomes more important.**

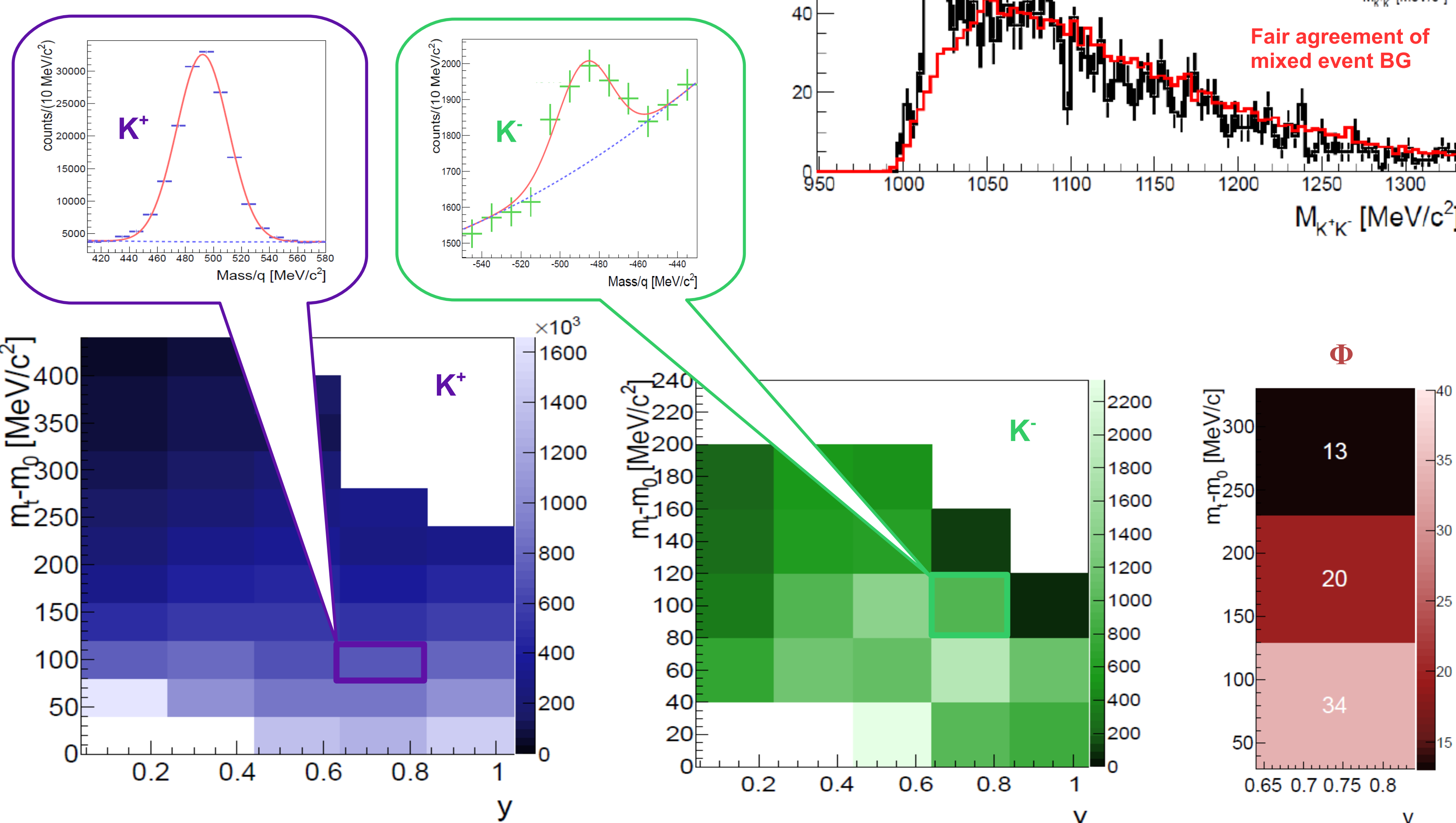


Analysis

Charged kaon identification via cuts in beta vs. momentum and dE/dx

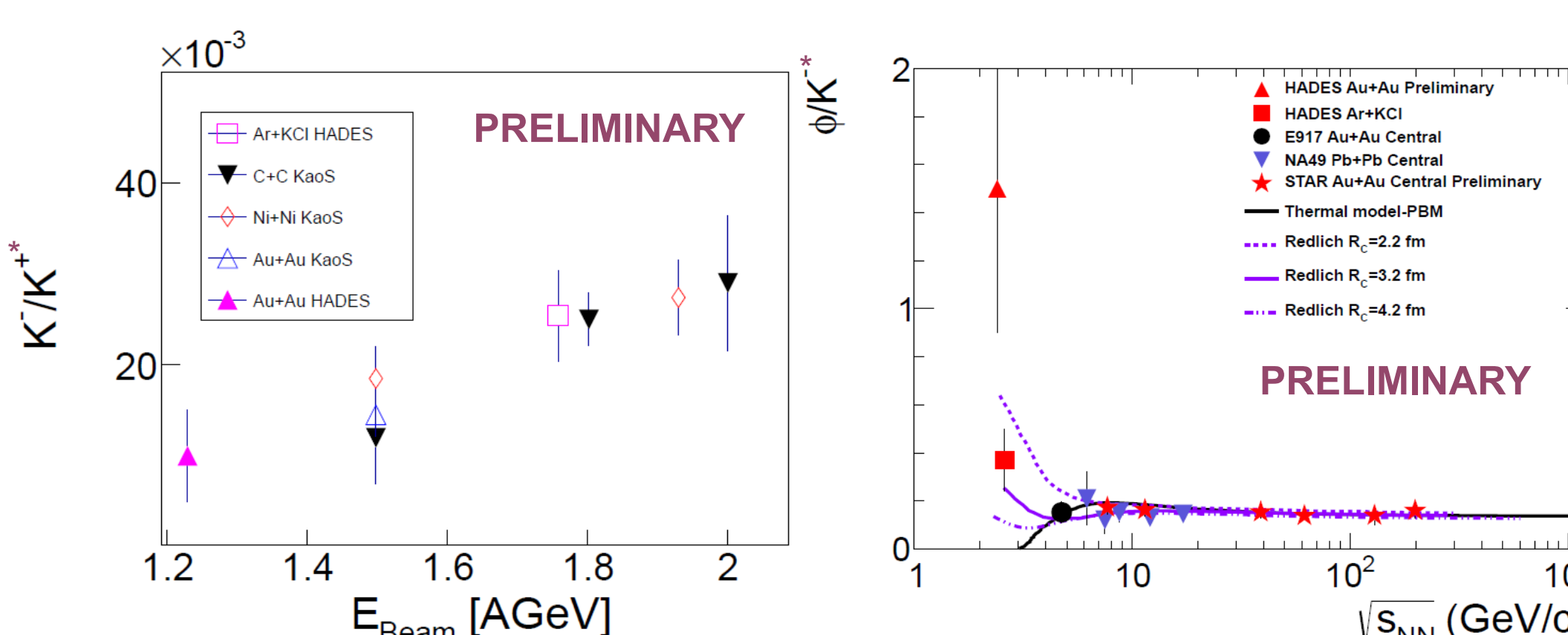
Φ -reconstruction:

- Invariant mass of decay products $\Phi \rightarrow K^+ K^-$
- Background subtraction, using mixed event method

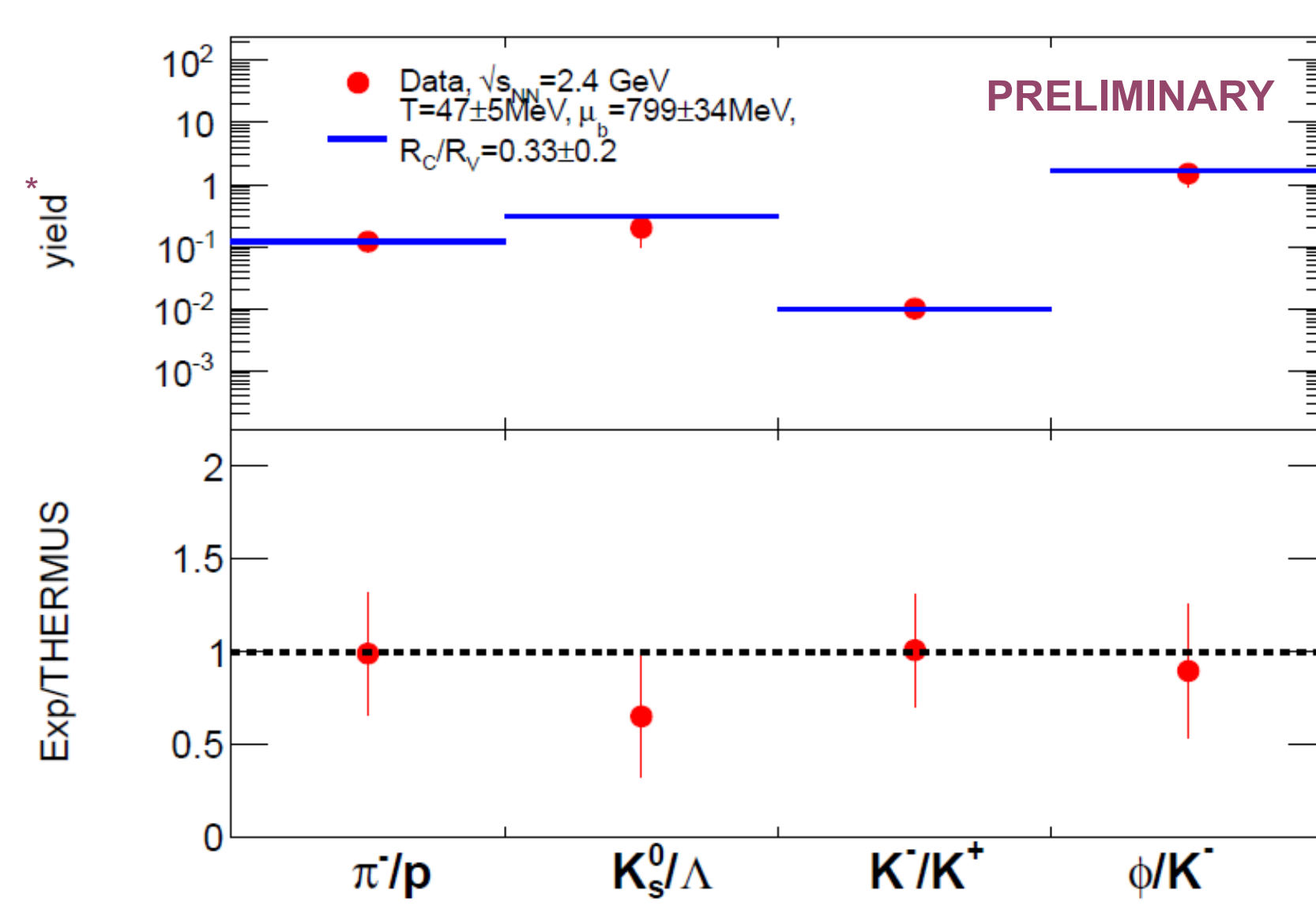


Results

- First observation of K^- and Φ in this low energy regime
- K^+/K^- -ratio* fits to the trend seen by other experiments
- The Φ/K^- -ratio rises strongly with decreasing beam energy



- First results from a statistical hadronization model fit to ratios of yields at mid-rapidity show nice agreement with the data



* Yields at mid-rapidity