



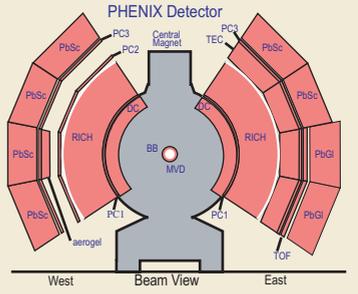
Measurement of π^0 and η mesons with PHENIX in $\sqrt{s}=200\text{GeV}$ Au+Au collisions at RHIC.

Westfälische
Wilhelms-Universität
Münster

Baldo Sahlmüller for the PHENIX collaboration.

Experiment

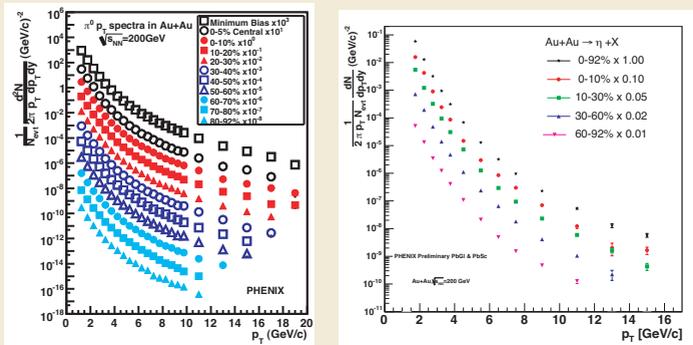
- PHENIX EMCal
 - Two different sub-detectors
 - Lead Glass (PbGl)
 - Lead Scintillator (PbSc)
- Beam-Beam Counter (BBC) and Zero Degree Calorimeter (ZDC)
 - Centrality Selection



Method

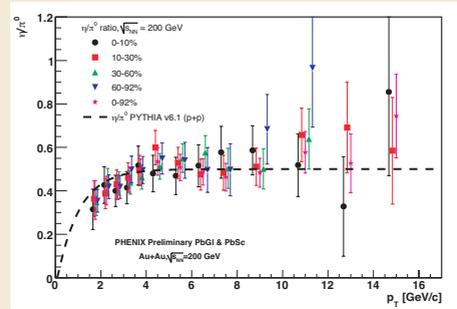
- Via the decay $\pi^0 \rightarrow \gamma\gamma$ or $\eta \rightarrow \gamma\gamma$: invariant mass analysis with event mixing
 - Calculate invariant mass of all photon candidates in an event
 - Calculate invariant mass of one photon candidate in the current event with all photon candidates in one or more other events to estimate combinatorial background
 - Scale mixed event invariant mass distribution to the background outside the π^0 or η peak, subtract it and integrate the peak
- In order to determine the h spectrum different corrections have to be applied to the measured spectrum. Corrections take into account the detector acceptance, the reconstruction efficiency, the conversion of decay photons and the merging of π^0 decay photon clusters at high transverse momenta.
- The results of both detectors are combined after doing the full analysis with both of them. For the η , the first time in Au+Au collisions, also the PbGl was used.

Results: π^0 and η Spectra



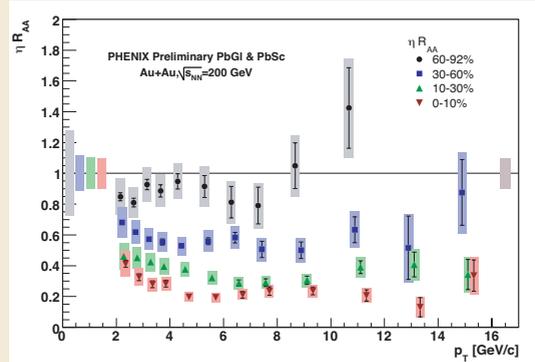
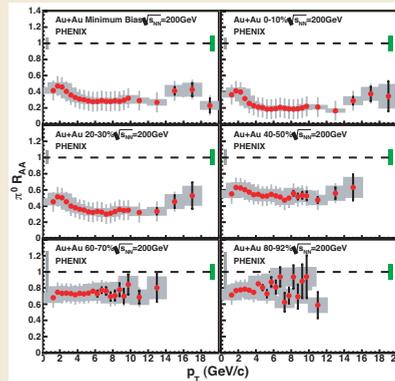
Results: Production Ratio η/π^0

- Production ratio of η and π^0 shows no dependence on the centrality



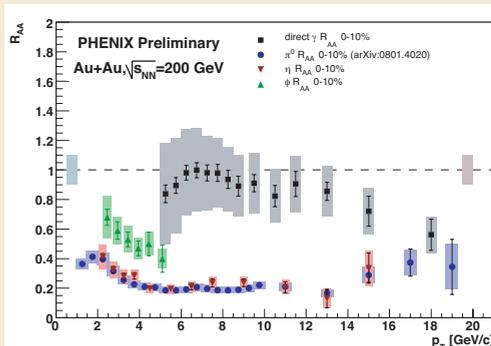
Results: Nuclear Modification Factor

- Measure to quantify possible effects of nuclear matter on the particle yields
- Comparison to p+p reference: $R_{AB} = \frac{dN/dp_T}{\tau_{AB} dN/dp_T} = 1$ in absence of any medium effects
- Observation:
 - Suppression by a factor of five in central Au+Au collisions
 - Suppression almost constant up to high p_T .
 - Similar suppression of both mesons.



Comparison

- π^0 and η nuclear modification factor in central Au+Au compared with direct photons and the ϕ meson.
- π^0 and η suppression very similar.
- Direct photons show only some suppression at highest p_T
- ϕ meson also suppressed at lower p_T , but not as much as the η and the π^0 .



Summary and Outlook

- The π^0 and η mesons have been measured in $\sqrt{s}=200\text{ GeV}$ Au+Au collisions.
- The nuclear modification factor and the production ratio η/π^0 are calculated. The suppression in central Au+Au collisions of η and π^0 is similar.
- The nuclear modification factor is compared to direct photons and the ϕ meson, both show a different behaviour.
- Data from 2007 RHIC run are currently analyzed, having more statistics they will allow reaching higher p_T .