

## HK 39 Physik mit schweren Ionen

Zeit: Mittwoch 16:30–18:30

Raum: D

## Gruppenbericht

HK 39.1 Mi 16:30 D

**Scale Dependence of Mean Transverse Momentum Fluctuations at Top SPS Energy** — ●GEORGIOS TSILEDAKIS for the CERES collaboration — Gesellschaft für Schwerionenforschung (GSI), Darmstadt

Non-statistical event-by-event fluctuations of mean transverse momentum,  $p_T$ , have been proposed as a possible signature for the QCD phase transition, in particular for the critical point. A surprising finding was that a small but practically beam energy independent value was found for the broad energy range of 40 AGeV at SPS up to top RHIC energy. Since fluctuations were characterized so far by one single (integral) number, it was difficult to estimate the many possible contributions to them. Taking into account the high available statistics offered by the CERES experiment combined with the full azimuthal acceptance, a differential study of mean  $p_T$  fluctuations is performed, which by allowing to discriminate among various correlation sources, provides the sensitivity to the fluctuations related to the vicinity of critical point. For the first time at SPS energy, the charge-dependent mean  $p_T$  fluctuations have been analyzed as a function of the angular pair separation,  $\Delta\phi$ , and of the separation in pseudorapidity,  $\Delta\eta$ . The results show that the overall fluctuations are dominated by the short range correlation peak at small opening angles ('near-side'), most probably originating from Bose-Einstein and Coulomb effects. Another important contribution is a broad maximum at  $\Delta\phi=180^\circ$  ('away-side') originating from back-to-back (dijet-like) correlations. Concerning the observed away-side peak, we demonstrate that it comes from high- $p_T$  correlations that cannot be attributed to elliptic flow.

## Gruppenbericht

HK 39.2 Mi 17:00 D

**Produktion von  $\phi$ -Mesonen in Schwerionenkollisionen bei SPS-Energien** — ●V. FRIESE<sup>1</sup>, C. ALT<sup>2</sup>, C. BLUME<sup>2</sup>, P. DINKELAKER<sup>2</sup>, D. FLIERL<sup>2</sup>, M. GAZDZICKI<sup>2</sup>, C. HÖHNE<sup>1</sup>, M. KLIEMANT<sup>2</sup>, S. KNIEGE<sup>2</sup>, B. LUNGWITZ<sup>2</sup>, M. MITROVSKI<sup>2</sup>, M. OTTO<sup>2</sup>, F. PÜHLHOFER<sup>3</sup>, R. RENFORDT<sup>2</sup>, A. SANDOVAL<sup>1</sup>, R. STOCK<sup>2</sup>, C. STRABEL<sup>2</sup> und H. STRÖBELE<sup>2</sup> für die NA49-Kollaboration — <sup>1</sup>Gesellschaft für Schwerionenforschung, Darmstadt — <sup>2</sup>Institut für Kernphysik, Universität Frankfurt — <sup>3</sup>Fachbereich Physik, Universität Marburg

Hochrelativistische Schwerionenkollisionen erlauben das Studium stark wechselwirkender Materie bei extrem Energiedichten. Die Produktion von seltsamen Teilchen verspricht hierbei Informationen über das frühe Stadium der Reaktion. So wurden vom Experiment NA49 Anomalien in der Energieabhängigkeit der relativen Produktion von Kaonen beobachtet, die als Indikation für das Erreichen des Deconfinements bei niedrigen SPS-Energien (etwa 30 AGeV) interpretiert werden können.

In diesem Zusammenhang ist das  $\phi$ -Meson von besonderem Interesse, da es zwei seltsame Quarks beinhaltet, gleichwohl als Hadron seltsamkeitsneutral ist. Es sollte also geeignet sein zu unterscheiden, ob der relative Anteil an Seltsamkeit im Endzustand auf partonischer oder hadronischer Ebene bestimmt wird. NA49 hat die  $\phi$ -Produktion bei fünf Strahlenergien von 20 bis 158 AGeV gemessen. Damit ist die  $\phi$ -Anregungsfunktion von AGS- bis RHIC-Energien zugänglich. Wir diskutieren Transversalimpuls- und Rapiditätsverteilungen sowie Multiplizitäten und vergleichen mit thermischen und mikroskopischen Modellen.

HK 39.3 Mi 17:30 D

**Dielectron production in Pb-Au collisions at 158 GeV per nucleon.** — ●SERGEY YUREVICH — Physics Institute, Heidelberg University, Philosophenweg 12, D-69120 Heidelberg

The main goal of the CERES/NA45 experiment at the CERN SPS is the measurement of low mass dielectrons. A significant enhancement of the lepton pairs over the hadron decays was observed in ion-induced collisions. To distinguish between different theoretical explanations of the enhancement the experiment was upgraded by the addition of a radial TPC to improve the mass resolution in the vector meson region. The final results on electron-pair production in 158 A GeV/c Pb-Au collisions taken in 2000 with the upgraded setup will be presented with a complete error analysis. The measurement of  $\phi$ -meson in its  $e^+e^-$  and  $K^+K^-$  channels will be reported. All data are absolutely normalized.

HK 39.4 Mi 17:45 D

**The measurement of the neutral kaon production in central Pb-Au collisions at CERN SPS top energy** — ●SYLWESTER RADOMSKI for the CERES collaboration — Gesellschaft fuer Schwerionenforschung, Planckstr. 1, 64291 Darmstadt

A precision measurement of  $K_s^0$  spectra in central Pb-Au collisions at 158 GeV per nucleon was performed by the CERES collaboration. The analysis used the large statistics of 30 million events with a centrality  $\sigma/\sigma_{geo} < 7\%$  collected during the CERN SPS run in October 2000.

The yield of neutral kaons was extracted from the invariant mass spectrum of pion pairs reconstructed by the radial TPC. The acceptance for  $K_s^0 \rightarrow \pi\pi$  decay covers the bulk of the transverse momentum spectra at  $p_T < 1.8$  GeV/c in the rapidity range  $2 < y < 2.6$  and thus allows an independent measurement of temperature and yield.

The measured spectra give an inverse slope value of  $220 \pm 4_{stat} \pm 10_{sys}$  MeV and the extrapolation of the yield to midrapidity gives  $dN/dy = 21.2 \pm 0.9_{stat} \pm 2.0_{sys}$ .

The talk presents details of the analysis, Monte-Carlo studies of the efficiency and corrected spectra. The results are compared with the prediction of the thermal model and results on  $K_s^0$  from the NA57 and  $(K^+ + K^-)/2$  from the NA49 experiments.

HK 39.5 Mi 18:00 D

**Production of  $K_s^0$  and  $\Lambda$  at High Transverse Momentum in Pb+Pb collisions at 158A GeV\*** — ●T. SCHUSTER<sup>1</sup>, C. ALT<sup>1</sup>, C. BLUME<sup>1</sup>, P. DINKELAKER<sup>1</sup>, D. FLIERL<sup>1</sup>, V. FRIESE<sup>2</sup>, M. GAZDZICKI<sup>1</sup>, C. HÖHNE<sup>2</sup>, M. KLIEMANT<sup>1</sup>, S. KNIEGE<sup>1</sup>, B. LUNGWITZ<sup>1</sup>, M. MITROVSKI<sup>1</sup>, M. OTTO<sup>1</sup>, R. RENFORDT<sup>1</sup>, A. SANDOVAL<sup>2</sup>, R. STOCK<sup>1</sup>, C. STRABEL<sup>1</sup>, and H. STRÖBELE<sup>1</sup> for the NA49 collaboration — <sup>1</sup>Institut für Kernphysik, Universität Frankfurt — <sup>2</sup>Gesellschaft für Schwerionenforschung (GSI), Darmstadt

In ultrarelativistic heavy ion collisions, the bulk of the particles is produced in the transverse momentum region of  $p_t < 2$  GeV/c. However, important information about the produced matter can be obtained from the higher  $p_t$  domain. Properties of the baryon/meson ratios and the elliptic flow in the region  $2 < p_t < 4$  GeV/c seen at RHIC can be explained by quark coalescence models. A study of the  $p_t$  dependence of baryon/meson ratios at the top SPS energy can answer the question which hadron production mechanisms are relevant in this energy range.

In the NA49 large acceptance hadron spectrometer,  $K_s^0$  and  $\Lambda$  are identified via the  $V^0$  topology of their decay into charged hadrons and the determination of their invariant mass. The available data allows for particle identification up to  $p_t = 3.8$  GeV/c ( $K_s^0$ ) and  $p_t = 4.4$  GeV/c ( $\Lambda$ ).

Preliminary spectra of  $K_s^0$  and  $\Lambda$  at high  $p_t$  produced in central Pb+Pb reactions at 158A GeV will be presented. The  $\Lambda/K_s^0$  ratio will be compared to models and to data obtained at RHIC.

\* Supported by BMBF and GSI

HK 39.6 Mi 18:15 D

**Energy dependence of  $K_s^0$  production in central Pb+Pb collisions at the CERN SPS** — ●CLAUDIA STRABEL<sup>1</sup>, C. ALT<sup>1</sup>, C. BLUME<sup>1</sup>, P. DINKELAKER<sup>1</sup>, D. FLIERL<sup>1</sup>, V. FRIESE<sup>2</sup>, M. GAZDZICKI<sup>1</sup>, C. HÖHNE<sup>2</sup>, M. KLIEMANT<sup>1</sup>, S. KNIEGE<sup>1</sup>, B. LUNGWITZ<sup>1</sup>, M. MITROVSKI<sup>1</sup>, M. OTTO<sup>1</sup>, R. RENFORDT<sup>1</sup>, A. SANDOVAL<sup>2</sup>, R. STOCK<sup>1</sup>, and H. STRÖBELE<sup>1</sup> for the NA49 collaboration — <sup>1</sup>Institut für Kernphysik, Universität Frankfurt — <sup>2</sup>Gesellschaft für Schwerionenforschung (GSI), Darmstadt

In the framework of the NA49 energy scan program, strange hadron production has been measured in central Pb+Pb collisions at energies between 20A and 158A GeV. One of the most striking observations is the pronounced maximum in the ratio of the strangeness to pion yield at low SPS energies. In order to cross-check these results and to complete the analysis of strange particles, the  $K_s^0$  production in central Pb+Pb collisions is studied.

This analysis is based on data measured with the NA49 large acceptance hadron spectrometer.  $K_s^0$  are identified via decay topology and invariant mass determination.

Preliminary transverse mass and rapidity spectra as well as the total yields will be presented for several SPS energies and a comparison to the corresponding results for charged kaons will be shown.

