

HK 18 Physik mit schweren Ionen

Zeit: Montag 14:00–16:00

Raum: TU MA041

Gruppenbericht

HK 18.1 Mo 14:00 TU MA041

Direct Photon Production Measured with the PHENIX Experiment — ●CHRISTIAN KLEIN-BÖSING and BALDO SAHLMÜLLER for the PHENIX collaboration — Institut für Kernphysik, Wilhelm-Klemm-Str. 9, 48149 Münster

Direct photons with a large transverse momentum p_T are in heavy ion collisions predominantly produced by parton scattering in the early phase of the reaction, similar to the direct photon production in p+p collisions. An additional source in heavy ion collisions is the thermal production in the possible quark-gluon plasma phase and in the subsequent hadron-gas phase, as well as the interaction of hard scattered partons with the medium.

The search for direct photons is in general a difficult task because of the large photon background from the decay of π^0 s and other mesons. But while the production of π^0 s with high transverse momentum in central Au+Au collisions is suppressed due to final state interactions of the hard-scattered partons, direct photons should be unaffected by the surrounding medium. The comparison of the photon and neutral pion production at large p_T in heavy ion collisions thus provides a direct verification of the jet quenching scenario, while the direct photon production in the intermediate p_T region ($p_T = 1 - 3 \text{ GeV}/c$) is most sensitive to thermal sources, such as the QGP.

This work is supported by BMBF.

HK 18.2 Mo 14:30 TU MA041

Lambda Production at Forward Rapidity in d+Au Collisions at $\sqrt{s_{NN}} = 200 \text{ GeV}$ — ●FRANK SIMON for the STAR collaboration — Max-Planck-Institut für Physik, München, Germany

We present results on the production of lambda and anti-lambda particles at forward rapidity in d+Au collisions at $\sqrt{s_{NN}} = 200 \text{ GeV}$. Using the forward time projection chambers in the STAR experiment, measurements of net lambda yields and the anti-lambda/lambda ratio at forward and backward rapidity at $y = \pm 2.75$ were obtained.

The contributions of different processes to particle production and baryon transport are probed using the asymmetry of d+Au collisions. Comparisons to a variety of model calculations show that the baryon transport on the deuteron side is due to multiple collisions of the deuteron nucleons with gold participants, while on the gold side the inclusion of target excitations or hadronic transport appears to be necessary.

Gruppenbericht

HK 18.3 Mo 14:45 TU MA041

Anisotropic Flow of Charged Hadrons for Au+Au Collisions at RHIC — ●GERHARD BURAU¹, JOHANNES BLEIBEL¹, CHRISTIAN FUCHS¹, AMAND FÄSSLER¹, LARISSA BRAVINA², and EUGENE ZABRODIN³ — ¹Institute for Theoretical Physics, University of Tübingen, Auf der Morgenstelle 14, D-72076 Tübingen — ²Department of Physics, University of Oslo, N-0316 Oslo — ³Centre of Mathematics for Applications, University of Oslo, N-0316 Oslo

The pseudorapidity distributions of the azimuthal anisotropy parameters $v_1(\eta)$ and $v_2(\eta)$ of inclusive charged hadrons and their centrality dependence has been studied in Au+Au collisions at full RHIC energy of $\sqrt{s} = 200 \text{ GeV}$ within the microscopic quark-gluon string model. The QGSM simulation results for the directed flow show qualitatively and quantitatively a good agreement with the $v_1(\eta)$ data measured experimentally at high pseudorapidities, but cannot reproduce the flat behaviour of $v_1(|\eta| \leq 1.3)$. The η dependence of the elliptic flow v_2 extracted from our simulation agrees well in the whole pseudorapidity range for all centrality classes. Furthermore, the transverse momentum dependence of the elliptic flow $v_2(p_T)$ of identified and inclusive charged hadrons obtained with the QGSM is presented. The QGSM descriptions are rather good at low p_T , whereas they underestimate the measured elliptic flow for transverse momenta $p_T > 1 \text{ GeV}/c$. Nevertheless, they coincide quite well with the qualitative p_T behaviour of the experimental data. In particular, the model is able to reproduce the experimental evidence of the crossing of the elliptic flow for mesons and baryons.

HK 18.4 Mo 15:15 TU MA041

Universal behaviour of the nuclear modification factor at RHIC ? — ●JÖRN PUTSCHKE — Max-Planck-Institut für Physik, Föhringer Ring 6, 80805 München

Measurements of the nuclear modification factor R_{dAu} (and R_{CP}) and back-to-back correlations at high p_T at mid-rapidity from d+Au collisions at RHIC at $\sqrt{s_{NN}} = 200 \text{ GeV}$ demonstrated, that the strong suppression of high p_T particle production previously observed in central Au+Au collisions are due to final-state interactions with the dense medium generated in such collisions [1]. Recent results of the pseudorapidity and centrality dependence of R_{dAu} (and R_{CP}) from the BRAHMS collaboration [2] were interpreted as a possible onset of parton saturation in the Color Glass Condensate [3].

An alternative explanation of the strong suppression of R_{dAu} (and R_{CP}) at forward rapidities will be presented. In this Ansatz the suppression at higher rapidities is explained by the suppression of particle yields in d+Au relative to p+p collisions caused by a shift of the center of mass in the asymmetric d+Au collisions with respect to the nucleon-nucleon center of mass system.

In this new reference system the pseudorapidity and centrality dependence of R_{dAu} (and R_{CP}) can be explained and taking the asymmetry into account R_{dAu} (and R_{CP}) show a universal behaviour at RHIC energies.

[1] J. Adams, et al., *Phys.Rev.Lett.*, 91:072304, 2003

[2] I. Arsene et al., arXiv:nucl-ex/0403005

[3] D. Kharzeev, E. Levin, and M. Nardi, *Nucl. Phys. A*, 730:448, 2004

Gruppenbericht

HK 18.5 Mo 15:30 TU MA041

Ultraperipheral Collisions at RHIC and LHC — ●KAI HENCKEN¹, GERHARD BAUR², UTE DREYER¹, and DIRK TRAUTMANN¹ — ¹Uni Basel — ²FZ Jülich

Ultraperipheral Collisions (UPC) use the strong Coulomb fields surrounding the ions at relativistic energies to study photon-photon and photon-hadron processes in collisions with an impact parameter $b > 2R$. RHIC has published results on UPC and ALICE, CMS and ATLAS plan to study UPCs in the future as part of their HI program.

STAR/RHIC has recently measured electron-positron pairs at small impact parameter ($b \approx 20 \text{ fm}$). We compare their results with our QED calculation with good agreement.

Coherent vector meson production in photon-nucleus collisions has been measured for the ρ at STAR/RHIC. Interference occurs in these processes as the role of the two ions can be exchanged. We study the transverse momentum distribution of this process especially for b . The results can be compared with the STAR measurements and are of importance for future experiments at the LHC.

Inelastic pair production offers the possibility to study quark pdfs inside nuclei, that is medium modifications, at moderate Q^2 and small x . We compare results of a full calculation with the equivalent photon and lepton approximation.