HK 31: Physik mit schweren Ionen

Zeit: Mittwoch 14:15–16:00 Raum: F

HK 31.1 Mi 14:15 F

Two- and three particle azimuthal correlations of high-p_T charged hadrons in Pb-Au collisions at 158 AGeV/c — •Mateusz Płoskoń for the CERES-Collaboration — Frankfurt University, Germany

The suppression of high-p_T particles observed in heavy-ion collisions at RHIC has been connected to a significant final state interaction of the hard-scattered parton with a dense color-charged medium. A recent re-evaluation of high-pt data from SPS indicates that moderate suppression may also be observed at SPS energy. The analysis of azimuthal correlations of charged hadrons at high-p_T provides deeper insight into modifications of the fragmentation process and the response of the medium. Similar to observations at RHIC, significant modifications of the di-jet structure have also been observed by the CERES experiment at SPS. In order to discriminate between different scenarios of the parton-medium interaction, such as jet deflection or shock wave creation, the study has been extended to investigations of three-particle correlations. We present recent results on two- and three particle correlations from the CERES experiment and discuss possible implications on the mechanism of parton interaction with the hot and dense medium created in heavy-ion collisions at SPS.

HK 31.2 Mi 14:30 F

Investigation of high–p_T phenomena in partonic transport simulations — •Oliver Fochler, Carsten Greiner, and Zhe Xu — Institut für Theoretische Physik, J. W. Goethe-Universität Frankfurt am Main, Max-von-Laue-Str. 1, 60438 Frankfurt am Main

We investigate high–p_T phenomena within the framework of a Monte Carlo parton cascade, consistently including inelastic $gg \leftrightarrow ggg$ processes by means of a stochastic approach. We present recent results on partonic energy loss in a static medium and on the nuclear modification factor R_{AA} in fully dynamic simulations of central nucleus–nucleus collisions. The approach allows for a direct inspection of the zero–interaction probability of observed jets and a resulting surface bias. Furthermore we discuss the incorporation of the Landau–Pomeranchuk–Migdal (LPM) effect into the transport model.

HK 31.3 Mi 14:45 F

Hydrodynamical Study of Jet Energy Loss — •Barbara Betz[1,2], Kerstin Paech[3], Etele Molnar[1], Dirk-Hermann Rischke[1,4], and Horst Stöcker[1,4] — [1]Institute for Theoretical Physics, Johann Wolfgang Goethe-University, Frankfurt, Germany — [2]Helmholtz Research School, GSI & Frankfurt, Germany — [3]Departement of Physics and Astronomy, Michigan State University, Michigan, USA — [4]Frankfurt Institute for Advanced Studies (FIAS), Frankfurt, Germany

An aspect of high-energy nuclear collision that has been under vigorous debate recently concerns the quenching of jets by the expanding hot and dense medium. Experimental data show an anomalous behaviour in the angular distribution of the particles created in the jet [1].

However, it is not entirely clear how the jet interacts with the medium and therefore we study a scenario within an ideal (3+1)d hydrodynamics approach [2] in which the jet deposits all of its energy and momentum during a very short time in a small spatial volume.

Clearly, the medium will strongly depend on the underlying equation of state and therefore will influcence the evolution of the jet through the medium.

[1] M. Gyulassy, P. Levai and I. Vitev, Nucl. Phys. B **594**, 371 (2001); H. Stöcker, Nucl. Phys. A **750** (2005) 121; F. Antinori and E. V. Shuryak, J. Phys. G **31**, L19 (2005).

[2] D. H. Rischke, S. Bernard and J. A. Maruhn, Nucl. Phys. A **595**, 346 (1995).

HK 31.4 Mi 15:00 F

Das CBM Experiment bei FAIR: Studium des QCD-Phasendiagramms bei hohen Baryonendichten — •Claudia Höhne für die CBM-Kollaboration — GSI, Darmstadt, Germany

Das Compressed Baryonic Matter (CBM) Experiment an der zukünftigen Beschleunigeranlage FAIR wird das QCD-Phasendiagramm bei moderaten Temperaturen aber großen Baryonendichten untersuchen. Diese Region des Phasendiagramms hat gerade in den letzten Jahren großes Interesse geweckt, da verschiedene interessante Phänomene der QCD experimentell untersucht werden können: Der erwartete Phasenübergang erster Ordnung zwischen hadronischer und partonischer Materie, der in einem kritischen Punkt endet, sowie Modifikationen von hadronischen Eigenschaften aufgrund der hohen Baryonendichten, die Aufschluß über die Restauration der chiralen Symmetrie geben. Obwohl es in der Vergangenheit Experimente in diesem Energiebereich gab und interessante Phänomene beobachtet wurden, ist es von größtem Interesse ein Experiment der nächsten Generation durchzuführen, um den Zugang zu seltenen Proben zu öffnen, die sensitiv auf die erzeugte Materie sind.

Das CBM Experiment wird sich auf diese Aspekte konzentrieren und in A+A Kollisionen Observable messen, die in diesem Energiebereich noch nicht studiert wurden: charm Produktion, Dileptonen, Fluktuationen und Korrelationen. In diesem Vortrag werden der geplante Experimentaufbau, wichtige Detektorentwicklungen und insbesondere Machbarkeitsstudien mit voller Detektorsimulation vorgestellt.

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HK 31.5 Mi 15:15 F

Three-baryon collisions in BUU — •Alexei Larionov, Kai Gallmeister, and Ulrich Mosel — Institut für Theoretische Physik, Universität Giessen, Germany

In central heavy-ion collisions at the future FAIR energies (5 – 40 A GeV), the highest compression of the baryonic matter is expected. As a consequence, the role of the many-baryon collisions becomes quite important. In the present work we study the influence of three-baryon collisions on the transverse mass spectra of produced particles. The calculations are based on the GiBUU model. The kaon transverse mass spectra get significantly harder due to the three-baryon collisions, that explains the discrepancies between earlier calculations and experimental data.

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HK 31.6 Mi 15:30 F

Application of Skyrme energy-density functional to heavy-ion fusion reactions — •Ning Wang[1], Zhuxia Li[2], Xizhen Wu[2], Min Liu[2], Enguang Zhao[3], and Werner Scheid[1] — [1]Institute of Theoretical Physics, Justus-Liebig-University Giessen, Germany — [2]China Institute of Atomic Energy, Beijing 102413, PR China — [3]Institute of Theoretical Physics, Chinese Academic of Science, Beijing 100080, PR China

The Skyrme energy-density functional has been applied to the study of heavy-ion fusion reactions[1]. Barriers for fusion reactions are calculated with the Skyrme energy-density functional within the extended semi-classical Thomas-Fermi method. Based on the fusion barrier obtained, we propose a parametrization of the empirical barrier distribution to take into account the multi-dimensional character of real barrier. We apply this distribution to calculate the fusion excitation functions in terms of barrier penetration concept. A large number of measured fusion excitation functions can be reproduced well. The competition between suppression and enhancement effects in the sub-barrier fusion caused by neutron shell-closure and excess neutron effects is studied. For heavy systems, the capture cross sections are calculated and suitable incident energies for the synthesis of super-heavy nuclei are investigated[2].

[1] Min Liu, Ning Wang, et al., Nucl. Phys. A 768 (2006) 80.

[2] Ning Wang, Xizhen Wu, et al., Phys. Rev. C 74 (2006) 044604.

HK 31.7 Mi 15:45 F

Proton-Proton physics with ALICE at the LHC — •Jan Fiete Grosse-Oetringhaus for the ALICE TRD-Collaboration — Institut für Kernphysik, Universität Münster, Germany and CERN, Geneva, Switzerland

The main goal of the ALICE experiment at LHC is to study strongly interacting matter at high energy densities, especially signatures and properties of the quark-gluon plasma. This goal manifests itself in a rich physics program. Although ALICE is mainly designed to study heavy-ion collisions, a dedicated program will concentrate on proton-proton physics.

The talk will introduce the capabilities of ALICE to contribute to the field of p+p physics at the LHC. Two unique properties are its low p_T cut-off and the excellent PID capabilities. The various topics of the proton-proton physics program, which will allow a close scrutiny of existing theoretical models, will be described. Furthermore, the interpretation of measurements of heavy-ion collisions necessitates the comparison to measurements of p+p collisions.

At startup, neither the LHC luminosity nor its energy will have their nominal values. Still several physics topics can be studied from the very beginning. These "day-1" physics topics will be presented as well as the effort that is already ongoing to be ready for the first collision.