HK 56: Heavy Ion Collisions and QCD Phases IX

Zeit: Freitag 14:00–15:30 Raum: HZO 60

Gruppenbericht HK 56.1 Fr 14:00 HZO 60

Hard probe measurements with the ALICE detector in Tübingen — •Martin Völkl for the ALICE-Collaboration — Universität Tübingen

Hard probes are useful tools in the investigation of QCD effects. In heavy-ion collisions they are produced almost exclusively at the early times of the interaction and their production cross section is accessible to perturbative calculations. The investigations in Tübingen currently focus on the measurement of beauty quarks and the identified fragmentation functions of jets. Both provide complementary information: The single particle measurement answers the questions about the exchange of energy of a hard parton with the system, while the measurement of fragmentation functions provides information about how the energy of the original parton appears in the final state. This provides an insight into whether the particle production in jets is modified in p–Pb collisions via cold-nuclear-matter effects or how beauty quarks participate in the collective expansion of the system in Pb–Pb collisions. In this report, the current status and results of the analyses will be presented.

HK 56.2 Fr 14:30 HZO 60

Transport coefficients in a generalized quasiparticle model — •Thorsten Steinert — Institut für Theoretische Physik, JLU Giessen, 35392 Giessen, Germany

The QCD equation of state as predicted by lattice QCD calculations (lQCD) is well reproduced in terms of effective quasiparticle models. We present a generalised quasiparticle model where the partonic propagators explicitly depend on the three-momentum with respect to the medium. Within this extended model we reproduce simultaneously the equation of state and the susceptibilties as provided by lQCD. We calculate the shear and bulk viscosity as well as the electric conductivity and compared them to default quasiparticle models and available lattice data. We discuss the behavior of the transport coefficients as a function of finite chemical potential.

HK 56.3 Fr 14:45 HZO 60

Electric conductivity of a hadron gas — •Jan Hammelmann[1,2], Juan Torres-Rincon[4], Jean-Bernard Rose[1,2], Moritz Greif[2], and Hannah Petersen[1,2,3] — [1]Frankfurt Institute for Advanced Studies, D-60438 Frankfurt am Main, Germany — [2]Institut für Theoretische Physik, Goethe-Universität, D-60438 Frankfurt am Main, Germany — [3]GSI Helmholtzzentrum für Schwerionenforschung GmbH, D-64291 Darmstadt, Germany — [4]Department of Physics and Astronomy, Stony Brook University, US-11794 Stony Brook, USA

The electric conductivity of a hadron gas is calculated within the hadronic transport approach SMASH (Simulating Many Accelerated Strongly-interacting Hadrons). Microscopic non-equilibrium models are well suited to calculate transport coefficitents that synthesize the information on the many-particle dynamics. The temperature dependence of the electric conductivity is extracted using the Green-Kubo formalism for $T \sim 100 - 200$ MeV. The results for the electric conductivity show good agreement compared to analytic results from literature [Phys.Rev.D 93, 096012 (2016)] for systems with small number of particle species and simple interactions. Furthermore, the influence of a finite lifetime of resonances on the electric conductivity is investigated. After validating the approuch results for the electric conductivity of a more realistic hadron gas including more particle species are presented.

HK 56.4 Fr 15:00 HZO 60

Jet-hadron correlations in Pb–Pb collisions at $\sqrt{s_{\mathrm{NN}}}$ = 5.02 TeV — •Jiyoung Kim for the ALICE-Collaboration — Physikalisches Institut, Universität Heidelberg

A Large Ion Collider Experiment (ALICE) is dedicated to study properties of Quark Gluon Plasma (QGP), which is created in ultra relativistic heavy ion collision. Jets are used as a probe to explore the strong-interacting matter, since they interact with the QGP and lose a part of their energy while passing through the medium. A quantitative understanding of the mechanisms of energy loss and the interaction of parton and medium is not yet established. Model calculations suggest the formation of Mach cones as a result of the interaction between high energetic partons and the QGP.

We present an analysis of azimuthal correlations of inclusive hadrons and identified protons with respect to the axis of charged jets in Pb–Pb collisions at $\sqrt{s_{\mathrm{NN}}}$ = 5.02 TeV with the ALICE detector. Jet-hadron correlations allow to study medium response including the Mach cone effect. Moreover, Jet-proton correlations allow to disentangle signals from the medium and from jet fragmentation by using different proton abundances in both cases. We present correlation functions fully corrected for acceptance and tracking efficiency.

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HK 56.5 Fr 15:15 HZO 60

Reconstruction of short lived particle spectra with KF Particle Finder — •Maksym Zyzak[1], Ivan Kisel[1,2,3], Pavel Kisel[1,3,4], and Iouri Vassiliev[1] for the CBM-Collaboration — [1]GSI Helmholtzzentrum für Schwerionenforschung — [2]Frankfurt Institute for Advanced Studies — [3]Goethe-Universität Frankfurt — [4]Joint Institute for Nuclear Research

Short-lived particles that have very small production probability or small branching ratio are of particular interest in the future heavy-ion experiment CBM at FAIR. Such particles can be reconstructed and investigated only through their decay products. The KF Particle Finder package was developed for reconstruction of short-lived particles in the CBM experiment. Currently its reconstruction scheme contains more than 100 decay channels.

Large multiplicities of charged particles produced in heavy ion collisions lead to combinatorial background in the reconstructed spectra of short-lived particles. KF Particle Finder provides the machinery to correctly take into account the background and obtain the signal spectra. It allows to collect efficiency plots, extract efficiency corrected spectra and perform their multi-differential analysis. The rich functionality of KF Particle Finder makes it a universal platform for physics analysis.