HK 19: Physik mit schweren Ionen

Zeit: Dienstag 17:00–18:30 Raum: F

HK 19.1 Di 17:00 F

Dielectron Detection Capabilities of HADES at SIS100/300 — •Benjamin Bannier for the HADES-Collaboration — Institut für Strahlenphysik, FZ Dresden-Rossendorf, PF 510119, 01314 Dresden

The HADES experiment at SIS18 at GSI/Darmstadt is a dedicated experiment for studying medium modifications of hadrons, i.e. the light vector mesons ρ, ω and ϕ, in pA, πA and AA collisions. Specifically, dileptonic decays of these vector mesons provide an direct probe for the properties of hadronic matter at high nuclear densities.

The future FAIR facility at GSI/Darmstadt with SIS100/300 will provide heavy-ion beams with energies of up to 45 AGeV. It is planned to operate the HADES detector at these higher energies. In this work the principle possibilities of detecting dielectrons with an unmodified HADES detector are studied. Simulations of dielectron production for several beam energies have been performed using the UrQMDv1.3p1 transport code together with the PLUTO++ phase space generator. Future measurements of dileptons with HADES at FAIR are shown to be within reach of the current setup.

HK 19.2 Di 17:15 F

Theoretical analysis of dilepton spectra in low energy heavy ion collisions — •Katharina Schmidt, Harald Kempf, Sascha Vogel, and Marcus Bleicher — Institut für Theoretische Physik, J.W.G-Universität, Frankfurt am Main

Heavy ion collisions are one way to transform nuclear matter into stages of ultrahigh temperatures and densities. Detailed theoretical investigations of the involved resonances, vector mesons and and dileptons are necessary in order to understand the dynamics and properties of the early and late stages of a heavy ion collision. In this talk we present a theoretical investigation of the recent data of the HADES collaboration at SIS-energies with the help of a hadron-string transport approach, the Ultra-relativistic Quantum Molecular Dynamics (UrQMD) model. It is shown that even without explicit implementation of in-medium effects modifications of dilepton and resonance spectra are possible. Finally we discuss the mass spectrum and possible mass shifts of vector mesons in these reactions.

HK 19.3 Di 17:30 F

Strategies for electron pair reconstruction in CBM[+] — •Tetyana Galatyuk, Supriya Das, and Claudia Höhne for the CBM-Collaboration — Gesellschaft für Schwerionenforschung mbH, Planckstr. 1, 64291 Darmstadt, Germany

Lepton pairs emitted out of the hot and dense stage of relativistic heavy ion collisions are established probes to study the electromagnetic structure of hadrons under extreme conditions. The reconstruction of low-mass vector mesons by means of their electromagnetic decay is one of the experimental goals of the planned Compressed Baryonic Matter (CBM) experiment at the future facility FAIR. We present our strategies to reduce the combinatorial background in electron pair measurements in central Au+Au collisions at 25 *A*GeV with the CBM experimental setup. A special challenge of the current concept is the fact that electron identification is not provided in front of the magnetic field.

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HK 19.4 Di 17:45 F

Nachweis von Vektormesonen durch Messung von Myonenpaaren im CBM Experiment an FAIR — •Anna Kiseleva[1,2], Sergey Gorbunov[1,3], Ivan Kisel[3] und Iouri Vassiliev[1] für die CBM-Kollaboration — [1]GSI, Darmstadt, Deutschland — [2]PNPI, Gatchina, St.Petersburg, Russland — [3]Kirchhoff-Institut für Physik, Universität Heidelberg, Deutschland

Die Untersuchung der Eigenschaften von Hadronen in dichter Kernmaterie ist ein zentraler Forschungsschwerpunkt des geplanten "Compressed Baryonic Matter"(CBM) Experiments an der zukünftigen Beschleunigeranlage FAIR. Als besonders vielversprechende Sonden gelten Vektormesonen, die in Elektron-Positron- oder Myonen-Paare zerfallen. Im Rahmen des CBM-Projekts wird untersucht, inwieweit eine Kombination aus Absorbern (Kohlenstoff/Eisen/Wolfram) und ortsempfindlichen Detektoren zum Nachweis der Myonen geeignet ist. Die Ergebnisse der Simulationen zur Messung von Vektormesonen (ω, ρ, ϕ, J/ψ) in Au+Au Stößen bei 15, 25 und 35 AGeV für zwei verschiedene Absorberkonzepte werden vorgestellt. Gefördert durch EU-FP6 HADRONPHYSICS.

HK 19.5 Di 18:00 F

Dilepton production from an anisotropic quark gluon plasma — Adrian Dumitru[1], Michael Strickland[2], and •Mauricio Martinez[3] — [1]Institut für Theoretische Physik, Johann Wolfgang Goethe Universität, Frankfurt am Main, Germany — [2]Frankfurt Institute for Advanced Studies, Johann Wolfgang Goethe Universität, Frankfurt am Main, Germany — [3]Helmholtz Research School, Johann Wolfgang Goethe Universität, Frankfurt am Main, Germany

We calculate the leading-order dilepton production resulting from the annihilation process $q\bar{q} \to l^+ l^-$ assuming a quark-gluon plasma which is anisotropic in momentum space. Such momentum-space anisotropies are generated by the rapid longitudinal expansion of the initial pre-hadronic fireball. Although hydrodynamic models assume fast isotropization, there is currently no independent way to determine the level of anisotropy experimentally. Due to their weak interaction with the surrounding matter electromagnetic observables, such as dilepton production provide an ideal tool for determining such information.

HK 19.6 Di 18:15 F

Resonance studies in heavy ion collisions: A critical overview — •Sascha Vogel and Marcus Bleicher — Institut für Theoretische Physik, J.W.G-Universität, Frankfurt am Main

In order to probe different stages of a heavy ion collision, resonances have proven to be a unique tool. Due to rescattering effects resonance studies using hadronic decay products are ideal in order to probe the late stage of a heavy ion collision, i.e. close to freeze-out. Recent studies also have shown that such analyses can give an estimate about the time span between chemical and kinetic freeze-out. On the contrary, resonances that decay into di-leptons probe the integrated collision, since the leptonic decay products do not interact with the hadronic medium. When comparing both approaches one can learn something about the early phase and extract informations about in-medium modifications of e.g. vector mesons.

In this talk an overview about various resonance and dilepton studies within a transport approach and statistical models is given. The main focus will be on the highest RHIC energy of $\sqrt{s} = 200$ AGeV.