The 4th Asian Triangle Heavy Ion conference (ATHIC2012)

Report of Contributions

https://indico.cern.ch/e/athic2012

Contribution ID: **3** Type: **not specified**

Chiral anomaly and local polarization effect from quantum kinetic approach

Thursday 15 November 2012 10:50 (30 minutes)

Induced vector and axial vector currents are derived from solving the quantum kinetic equations for spin-1/2 charged fermions in a constant external field via a consistent iterative scheme. Chiral current anomaly $\partial_\mu j_5^\mu = CE \cdot B$, vector current conservation $\partial_\mu j^\mu = 0$ and the energy-momentum conservation $\partial_\mu T^{\mu\nu} = QF^{\nu\rho} j_\rho$ are all natural consequences of the solutions. This provides an independent derivation of the chiral anomaly from kinetic approach. The induced chiral current from vorticity is argued to lead to a local polarization effect along the vorticity direction in heavy ion collisions.

Authors: Prof. GAO, Jian-hua (Shandong Univ); Prof. WANG, Qun (Univ of Science and Technology of China); Dr PU, Shi (Univ of Science and Technology of China); Prof. WANG, Xin-nian (Berkeley Lab); Prof. LIANG, Zuo-tang (Shandong Univ)

Presenter: Prof. WANG, Qun (Univ of Science and Technology of China)

Session Classification: Plenary IIB (Chair Hideki Hamagaki)

Contribution ID: **4** Type: **not specified**

QCD critical point, conserved and nonconserved charge fluctuations, and final state interactions

Friday 16 November 2012 10:50 (30 minutes)

We examine some of proposed experimental signals for the QCD critical point and QCD phase transition. We then argue that final interaction effects are very important in relating physical quantities around the critical point or in the quark-gluon plasma to experimental observables. Finally, we show that it is possible to reconstruct baryon number cumulants at chemical freezeout from observed proton number cumulants.

Keywords

QCD critical point, phase transition, conserved charge fluctuation, final state interaction

Author: ASAKAWA, Masayuki (Osaka University)

Co-author: Dr KITAZAWA, Masakiyo (Osaka University)

Presenter: ASAKAWA, Masayuki (Osaka University)

Session Classification: Plenary IIIB (Chair Xin-Nian Wang)

Contribution ID: **5** Type: **not specified**

Heavy Flavour Production measurement at LHC energies with the ALICE detector

Thursday 15 November 2012 14:20 (25 minutes)

ALICE is the dedicated heavy-ion experiment at the LHC. Its main physics goal is to study the properties of strongly-interacting matter at conditions of high energy density and high temperature expected to be reached in central Pb–Pb collisions. Charm and beauty quarks are well-suited tools to investigate this state of matter since they are produced in initial hard scatterings and are therefore generated early in the system evolution and probe its hottest, densest stage. ALICE recorded pp data at √s=7 TeV and 2.76 TeV and PbPb data at √sNN=2.76 TeV in 2010 and 2011. We will present the latest results on heavy flavour production measurement at both central and forward rapidity

Keywords

ALICE Heavy Flavour LHC

Author: Dr BALA, Renu (University of Jammu (IN))

Presenter: Dr BALA, Renu (University of Jammu (IN))

Session Classification: Parallel 1C (Chair Xu Cai)

Contribution ID: **6** Type: **not specified**

Hydrodynamic Approach to Relativistic Heavy Ion Collisions

Wednesday 14 November 2012 16:20 (30 minutes)

We review recent development of an integrated dynamical model to describe heavy ion reaction as a whole at ultrarelativistic energies. The model is
composed of fully (3+1) dimensional ideal hydrodynamic simulations
using the state-of-the-art equation of state from lattice QCD and
subsequent hadronic cascadings in the late stage. We also construct a new model to cover from low energy to high energy partons based of a relativistic hydrodynamic model with a source term and show some results of medium responses to energetic jets traversing the QGP.

Keywords

QGP, hydrodynamics, medium response, jets

Author: HIRANO, Tetsufumi (Sophia Univ)

Presenter: HIRANO, Tetsufumi (Sophia Univ)

Session Classification: Plenary IB (Chair Anju Bhasin)

Contribution ID: **7** Type: **not specified**

Direct photon production and QGP formation in pp collisions at LHC

Thursday 15 November 2012 15:30 (25 minutes)

After reviewing direct photon production from Heavy ion collisions at RHIC, we will discuss the question if QGP can be formed in pp collisions and detected with direct photon probe.

Keywords

QGP, direct photons

Author: Prof. LIU, Fu-Ming (Central China Normal Uni.)

Presenter: Prof. LIU, Fu-Ming (Central China Normal Uni.)

Session Classification: Parallel 2B (Chair Yongseok Oh)

Contribution ID: **8** Type: **not specified**

Overview of Heavy-Ion Results from CMS at LHC

Wednesday 14 November 2012 14:30 (30 minutes)

The heavy-ion collisions at the Large Hadron Collider (LHC) are expected to generate the partonic matter with unprecedented density and temperature. It will provide us an ideal environment to study the quantum chromodynamics (QCD), the theory of the strong interaction, in unexplored kinematic domain and the effect of high-density QCD matter on the particle production. The Compact Muon Solenoid (CMS) experiment at LHC is excellent for not only p+p collisions, but also heavy-ion collisions. The CMS has collected about 8 inverse microbarn in 2010 and about 160 inverse microbarn in 2011 for Pb+Pb collisions. The improved statistics allow us to analyze various rare probes as well as the bulk properties in detail. We will review the recent experimental data for Pb+Pb collisions obtained by the CMS collaboration.

Keywords

CMS, LHC, QCD, Heavy-ion collision

Author: HONG, Byungsik (Korea University (KR))

Presenter: HONG, Byungsik (Korea University (KR))

Session Classification: Plenary IA (Chair Yu-Gang Ma)

Contribution ID: **9** Type: **not specified**

Plasmino and Thermal mass in hQCD.

Friday 16 November 2012 11:20 (30 minutes)

We consider the self-energy of strongly interacting quarks and baryons in the medium using gauge/gravity duality of D4/D8 system. We study the mass generation of the thermal and/or dense medium and the collective excitations including plasmino, by considering the spectral function of fermion and its dispersion relation. The result is compared with those of the hard thermal loop method. For strongly interacting quarks in deconfined phase, there is no thermal mass generation for zero density; the plasmino excitation in confined system develops only in a window of density, which are different from the perturbative field theory result for weakly interacting system.

Author: SIN, Sang-Jin (H)

Presenter: SIN, Sang-Jin (H)

Session Classification: Plenary IIIB (Chair Xin-Nian Wang)

Contribution ID: **11** Type: **not specified**

Proton mass and the EoS for compressed baryonic matter

Wednesday 14 November 2012 17:40 (30 minutes)

While hadronic matter at high temperature and zero density can be assessed by lattice QCD and eperiments, so is being understood well, little is known of the EoS of matter at high density and very low temperture. The QCD phase diagram for low temperture and high density is in fact a more or less uncharted domain. I will discuss how to first probe the density regime just above the saturation density with RIB machines of the KoRIA type, then go to the temperature and density regime of FAIR that overlaps with the conditions met in merging and/or collapse of massive stars that could be measured in gravity wave and then ultimately to unravel that in which hadronic phase and strong-coupled quark phase coxist, giving rise to massive stars of ˜ 2.4 times solar mass. In this consideration, the effect of unbreaking chiral symmetry on the proton mass plays an important role. This development offers a promising new field of research for the Korean heavy-ion and astrophysics communities in conjuction with the construction of the RIB accelerator KoRIA and the esblishmend of the IBS (Insitute for Basic Science).

Keywords

proton mass, CBM, EoS, compact stars, KoRIA/IBS

Author: Prof. RHO, Mannque (CEA Saclay and Hanyang University)

Presenter: Prof. RHO, Mannque (CEA Saclay and Hanyang University)

Session Classification: Plenary IC (Chair Sourendu Gupta)

Contribution ID: **12** Type: **not specified**

Holographic Instanton Liquid and chiral transition

Friday 16 November 2012 15:05 (25 minutes)

In the presence of uniform D-instanton charges, quarks can be confined although gluons are not, because baryon vertices are allowed due to the net repulsive force on the on the probe D-branes. Since there is no scale in the geometry itself apart from the horizon size, there is no Hawking-Page transition. As a consequence, the D7 brane embedding can encode the effect of the the finite temperature as well as finite baryon density even for low temperature. The probe D-brane embedding, however, undergoes a chiral phase transition according to the temperature and density parameter. We studied such phase transitions and calculated the constituent quark mass, chiral condensation and the binding energy of baryons as function of the density. The baryon vertex melting is identified as the quark deconfinement. We draw phase diagram according to these transitions.

Keywords

AdS/CFT correspondence, Holographic QCD, Dense matter, QCD phase diagram

Author: SEO, Yunseok (H)

Co-authors: GWAK, Bogeun (Center for Quantum Spacetime, Seoul, Korea); LEE, Bum-Hoon (Sogang University); KIM, Minkyoo (Sogang University); SIN, Sang-Jin (H)

Presenter: SEO, Yunseok (H)

Session Classification: Parallel 5A (Chair Seyong Kim)

Contribution ID: **14** Type: **not specified**

Shear viscosity of hadron resonance gas and K-matrix formalism

Thursday 15 November 2012 14:20 (25 minutes)

In this work, we will present shear viscosity results which
include all possible resonances which are produced in hadronic sector. Shear viscosity will be deacreased as the number of resonances are increased. In the other side, entropy density is increased as the temperature move closer to the transition temperature. Shear viscosity is calculated by so called Chapman-Enskog approximation and cross-sections used in this calculation are taken from experiments, UrQMD model and K-Matrix formalism. One interesting results is we are able to approach the 1/4\pi limit for the ratio of shear viscosity to entropy density as we increases the number of resonances in the calculation.

Keywords

Transport Coefficients, Shear Viscosity, Hadron Resonances Gas, Equation of State

Author: Dr WIRANATA, Anton (Central China Normal University and Lawrence Berkeley National Lab)

Co-authors: KOCH, Volker (LBNL); WANG, Xin-Nian (Lawrence Berkeley National Laboratory)

Presenter: Dr WIRANATA, Anton (Central China Normal University and Lawrence Berkeley National Lab)

Session Classification: Parallel 1A (Chair Xiaochun He)

Contribution ID: **15** Type: **not specified**

Finite coupling correction to heavy quark potential and jet quenching parameter from AdS/CFT

Friday 16 November 2012 11:50 (30 minutes)

Heavy-quark potential and jet quenching parameter are quantities of importance for high energy heavy-ion collsion physics and the quark matter. The former can
probe the confinement mechanism in the hadronic phase and meson melting in the plasma phase while the later can measure the energy loss of the jet penetrating through the medium. Most of the previous studies from AdS/CFT are for large 't Hooft coupling and large N_c limites.
Our aim is to evaluate the sub-leading terms of strong expansion of heavy-quark potential and jet quenching parameter in N=4SYM plasma from AdS/CFT with world sheet fluctuations.
Applying the AdS/CFT correspondence, the expansion of the heavy-quark potential of the $calN$ supersymmetric Yang-Mills theory at large N_c is carried out to the sub-leading term in the large 't Hooft coupling at nonzero temperatures. The strong coupling corresponds to the semi-classical expansion of the string-sigma model, the gravity dual of the Wilson loop operator, with the sub-leading term expressed in terms of functional determinants of fluctuations. The contributions of these determinants are evaluated numerically. Meson melting will be discussed . We shall also present our new results about the subleading order correction to the jet quenching parameter from AdS/CFT from world sheet fluctuations.

Keywords

Heavy quark potential, jet quenching parameter , AdS/CFT, finite coupling

Authors: Prof. HOU, Defu (Central China Normal University); Mr ZHANG, Zi-qianf (Central China Normal University)

Co-author: Prof. REN, Hai-cang (Rockefeller University & Central China Normal University)

Presenter: Prof. HOU, Defu (Central China Normal University)

Session Classification: Plenary IIIB (Chair Xin-Nian Wang)

Contribution ID: **16** Type: **not specified**

Effects of initial state fluctuations on jet energy loss

Thursday 15 November 2012 17:55 (25 minutes)

The effect of initial state fluctuations on jet energy loss in relativistic heavy-ion collisions is studied in a 2+1 dimension ideal hydrodynamic model. Within the next-to-leading order perturbative QCD description of
hard scatterings, we find that a jet loses slightly more energy in the expanding quark-gluon plasma if the latter is described by the hydrodynamic evolution with fluctuating initial conditions compared to the case with smooth initial conditions. A detailed analysis indicates that this is mainly due to the positive correlation between the fluctuation in the production probability of parton jets from initial nucleon-nucleon hard collisions and the fluctuation in the medium density along the path traversed by the jet. This effect is larger in non-central than in central relativistic heavy ion collisions and also for jet energy loss that has a linear than a quadratic dependence on its path length in the medium.

Author: Prof. ZHANG, Hanzhong (Institute of Particle Physics, Central China Normal University)

Co-authors: Prof. KO, Che Ming (Cyclotron Institute and Department of Physics and Astronomy, Texas A&M University); Dr SONG, Taesoo (Cyclotron Institute, Texas A&M University)

Presenter: Prof. ZHANG, Hanzhong (Institute of Particle Physics, Central China Normal University)

Session Classification: Parallel 3A (Chair Daicui Zhou)

Contribution ID: **17** Type: **not specified**

Mean field effects on elliptic flows in relativistic heavy ion collisions

Thursday 15 November 2012 11:20 (30 minutes)

Within the framework of a multiphase transport (AMPT) model that includes both initial partonic and final hadronic interactions, we show that including mean-field potentials in the hadronic phase leads to a splitting of the elliptic flows of particles and their antiparticles, providing thus a plausible explanation of the different elliptic flows between p and $\bar{p}$, K+ and K−, and π+ and π− observed in recent Beam Energy Scan (BES) program at the Relativistic Heavy-Ion Collider (RHIC). Comments on the mean-field effects in the partonic phase will also be presented.

Author: Mr SONG, Taesoo (Texas A&M University)

Presenter: Mr SONG, Taesoo (Texas A&M University)

Session Classification: Plenary IIB (Chair Hideki Hamagaki)

Contribution ID: **18** Type: **not specified**

KiAF for ALICE experiment

Friday 16 November 2012 15:30 (25 minutes)

The stability of KiAF is essential for the physics analysis of ALICE experiment. The establishment and prospect of KiAF is presented. The cooperation between Korea and Japan in ALICE computing facilities are also reported.

Authors: SEO, Jeewon (Pusan National University (KR)); AHN, Sang Un (Gangneung-Wonju National University (KR)); OH, Sun Kun (Gangneung-Wonju National University (KR)); SUGITATE, Toru (Hiroshima University (JP))

Presenter: OH, Sun Kun (Gangneung-Wonju National University (KR))

Session Classification: Parallel 5C (Chair Ming Shao)

Contribution ID: **19** Type: **not specified**

Simulation of detector elements for LAMPS at RISP

Friday 16 November 2012 17:30 (25 minutes)

Nuclear collisions using radioactive isotope beams provide a great opportunity to investigate the isospin-dependent propoerties of nuclear matter in sub- and supra-saturation densities. In the future Rare Isotope Science Project (RISP), formally known as Korea Rare Isotope Accelerator, the Large-Acceptance Multipurpose Spectrometer (LAMPS) was conceived primarily to explore the isospin-dependent nuclear equation-of-state (EoS), or the nuclear symmetry energy, with large neutron-proton asymmetry. In order to explore the observables that are sensitive to the isospin degrees of freedom, the reaction products need to be measured as precise as possible in large acceptance. In order to comply with this requirement, LAMPS consists of the upstream solenoid spectrometer, the downstream dipole spectrometer, and the high-precision neutron-detector array. The solenoid spectrometer consists of the solenoidal magnet, the cylindrical time-projection chamber (TPC), the silicon-CsI system, and the neutron detector. The dipole spectrometer consists of the dipole magnet and two arms with each being equipped by the tracking chambers and the time-of-flight wall. With this configuration we expect LAMPS effectively and precisely identify the reaction products and measure the momentum of the charged particles, neutrons, and various nuclear fragments in a wide momentum range. In this talk, I'll present the simulation results of each detector element.

Keywords

Nuclear Symmetry Energy, LAMPS

Author: JHANG, Genie (Korea University)

Co-author: LAMPS, collaboration (RISP)

Presenter: JHANG, Genie (Korea University)

Session Classification: Parallel 6A (Chair Hirotsugu Fujii)

Contribution ID: **20** Type: **not specified**

From the universe to relativistic heavy-ion collisions: CMBR fluctuations and flow anisotropies

Thursday 15 November 2012 17:05 (25 minutes)

We discuss a deep interconnection between the physics of initial state spatial anisotropies in relativistic heavy-ion collision
experiments (RHICE) and the anisotropies observed in cosmic microwave
background radiation (CMBR). This is due to the presence of
superhorizon fluctuations in both cases which, for CMBR case, have origin in the inflationary phase of the universe, while for RHICE these arise from very early thermalization. Using this we show how CMBR analysis tools can be used for RHICE to investigate the physics of the system during early transient stages of QGP phase. We discuss the possibility of observing features like CMBR acoustic peaks
in RHICE.

Keywords

CMBR, flow fluctuations, superhorizon, heavy-ion collisions

Author: Prof. SRIVASTAVA, Ajit (Institute of Physics, Bhubaneswar, India)

Presenter: Prof. SRIVASTAVA, Ajit (Institute of Physics, Bhubaneswar, India)

Session Classification: Parallel 3A (Chair Daicui Zhou)

Contribution ID: **21** Type: **not specified**

Computing Activities at Hiroshima

Friday 16 November 2012 15:55 (25 minutes)

At Hiroshima University, we operate a computing facility composed of around 150 XEON working nodes and 400TB disk servers under several EGEE/GLite3.2 head servers. Around 70% of resources is currently deployed at the ALICE Tiar-2 GRID, and the rest in a local CPU cluster where a batch system is opened to all colleagues in Japan for ALICE/PHENIX jobs as well as other research/educational purposes. I will present the status of the facility and discuss on furture plans for Asian communities.

Keywords

ALICE GRID computing

Author: SUGITATE, Toru (Hiroshima University (JP))

Presenter: SUGITATE, Toru (Hiroshima University (JP))

Session Classification: Parallel 5C (Chair Ming Shao)

Contribution ID: **22** Type: **not specified**

Holographic Plasmino in Strongly Coupled Medium

Friday 16 November 2012 15:30 (25 minutes)

We consider the self-energy of strongly interacting fermions in the medium using gauge/gravity duality of D4/D8 system. We study the mass generation of the thermal and/or dense medium and the collective excitations including plasmino, by considering the spectral function of fermion and its dispersion relation. The result is compared with those of the hard thermal loop method. For strongly interacting fermions in deconfined phase, there is no thermal mass generation for zero density; the plasmino excitation in confined system develops only in a window of density, which are different from the perturbative field theory result for weakly interacting system.

Keywords

plasmino, self-energy, strongly interacting

Authors: SIN, Sang-Jin (H); ZHOU, Yang (C); SEO, Yunseok (H)

Presenter: ZHOU, Yang (C)

Session Classification: Parallel 5A (Chair Seyong Kim)

Contribution ID: **23** Type: **not specified**

Baryon Number Fluctuations in RHIC Beam Energy Scan

Friday 16 November 2012 15:55 (25 minutes)

One of the main goals of the RHIC Beam Energy Scan (BES) Program is to search for the QCD Critical Point and the phase boundary in the QCD phase diagram. Higher moments of event-by-event net-proton multiplicity distributions have high sensitivity to the correlation length[1], and they are directly connected to the susceptibilities in the Lattice Gauge Theory (LGT) calculations and the Hadron Resonance Gas (HRG) model. Therefore, they are ideal tools to search for the QCD critical point[4]

In this talk, we will present various moments (variance [σ2], skewness[S] and kurtosis [κ], moment products (κσ2, Sσ) and intensive normalized cumulants of net-proton multiplicity distributions measured by the STAR detector at RHIC. The moment products (κσ2, Sσ) and intensive normalized cumulants are related to the volume independent susceptibility ratios. The data presented in this talk will include the measurements of centrality dependence for the net-protons and total-protons from Au+Au collisions at √sNN = 7.7, 11.5, 19.6, 27, 39, 62.4 and 200 GeV. These results have been compared with a Poisson baseline. It is observed that the moment products (κσ2, Sσ) and intensive normalized cumulants of net-proton distributions in the 0-5% most central Au+Au collisions show significant deviations from the Poisson expectations. Those results will be also compared with UrQMD model calculations.

[1] M. A. Stephanov, Phys. Rev. Lett. 102, 032301 (2009); Phys. Rev. Lett. 107,
052301 (2011); C. Athanasiou, et al., Phys. Rev. D 82, 074008 (2010).
[2] M. Cheng, et al., Phys. Rev. D79, 074505 (2009).
R. V. Gavai and S. Gupta, Phys. Lett. B 696, 459 (2011).
S. Gupta, X. Luo, B. Mohanty, H. G. Ritter, N. Xu, Science 332, 1525 (2011).
A. Bazavov, et al., (HotQCD Collaboration), arXiv:1203.0784
[3] F. Karsch and K. Redlich, Phys. Lett. B 695, 136 (2011).
[4] M. M. Aggarwal, et al., (STAR Collaboration), Phys. Rev. Lett. 105, 22302
(2010).

Keywords

Higher Moments, QCD critical Point, heavy ion collisions, QCD phase digram, Net-proton

Author: Dr LUO, Xiaofeng (Central China Normal University)

Presenter: Dr LUO, Xiaofeng (Central China Normal University)

Session Classification: Parallel 5B (Chair Sangyong Jeon)

Contribution ID: **24** Type: **not specified**

Kt-factorization and dijet production in pA collisions

Thursday 15 November 2012 13:30 (25 minutes)

A complete calculation of dijet production in various processes will be presented in this talk. It is well-known that k_t factorization is violated in dijet production in hadron-hadron collision. However, we found that one can reach an effective k_t factorization in pA collision by modifying the nucleus parton distribution. In addition, we find that there are two fundamental unintegrated gluon distributions in high density QCD. The first unintegrated gluon distribution, defined as the Fourier transform of the color-dipole amplitude, can be probed in the direct photon-jet correlation in pA collisions; whereas the second unintegrated gluon distribution, which measures the number density of gluons inside the target nucleus, can be directly measured in DIS dijet production. Dijet production cross section in pA collision depends on both gluon distributions through convolutions. We conduct two independent calculations (one is in CGC formalism and the other uses TMD approach.) for all of above processes. We find these two calculations agree perfectly. These calculations have shown important impacts on the present RHIC and LHC (upcoming pA run) as well as future EIC and LHeC. In the end, I will present a comprehensive comparison between our numerical results and the forward dihadron production data from STAR as well as some predictions for EIC.

Keywords

Dijet, low-x gluon distribution, factorization

Author: XIAO, Bowen (Central China Normal University)

Co-authors: MARQUET, Cyrille; DOMINGUEZ, Fabio (IPhT Saclay); YUAN, Feng (LBNL)

Presenter: XIAO, Bowen (Central China Normal University)

Session Classification: Parallel 1B (Chair Ju Hwan Kang)

Contribution ID: **25** Type: **not specified**

Demonstration of WLCG Tier1 Services for ALICE at KISTI-GSDC

Friday 16 November 2012 15:05 (25 minutes)

WLCG is a vital part of the recent success of CERN LHC experiments. KISTI-GSDC had prepared for participating in WLCG as Tier1 center based on its experience of successful operation of Tier2 and KiAF. In March 2012, WLCG approved KISTI-GSDC as a candidate of new Tier1 center for ALICE experiment and KISTI-GSDC became a full member of ALICE experiment. In this talk, the current status of KISTI-GSDC Tier1 center will be presented as well as the next milestones will be summarized.

Author: Dr AHN, Sang Un (Korea Institute of Science and Technology Information)

Co-authors: Dr BONNAUD, Christophe (Korea Institute of Science and Technology Information); Mr RICCIARDI, Gianni Mario (Korea Institute of Science and Technology Information); Dr JANG, Haeng Jin (Korea Institute of Science and Technology Information); Mr YOON, Heejun (Korea Institute of Science and Technology Information); Mr YEO, Il Yeon (Korea Institute of Science and Technology Information); Dr PARK, Sang Oh (Korea Institute of Science and Technology Information); Mr LEE, Seunghee (Korea Institute of Science and Technology Information); Dr AHN, Sul-Ah (Korea Institute of Science and Technology Information)

Presenter: Dr AHN, Sang Un (Korea Institute of Science and Technology Information)

Session Classification: Parallel 5C (Chair Ming Shao)

Contribution ID: **26** Type: **not specified**

Renewed look at η′ in medium

Friday 16 November 2012 13:30 (25 minutes)

We revisit the question of whether the U_A(1) symmetry is effectively restored in hot and dense medium. In particular, by generalizing the Witten-Veneziano formula to finite temperature, we investigate whether the mass of η′-meson will change in medium due to the restoration of chiral symmetry.

Author: KWON, Youngshin

Co-authors: WOLF, Gyuri (KFKI RMKI); MORITA, Kenji (Kyot University); LEE, Su Houng (Y)

Presenter: KWON, Youngshin

Session Classification: Parallel 4B (Chair Eun-Joo Kim)

Contribution ID: **28** Type: **not specified**

MPPC for calorimetry application

Friday 16 November 2012 17:05 (25 minutes)

We discuss possibility of MPPC for calorimetry application in next generation. The MPPC (Multi-Pixel Photon Counter produced by Hamamatsu Photonics K.K.) is a single photon sensitive device which consists of a large number of Geiger-mode APDs. The MPPC is designed to be a good time resolution as well as high gain of 10ˆ5 ˜ 10ˆ6. It is expected a good photon detection efficiency of about 50% for blue and green lights. It is compact and works in magnetic field at lower bias voltages than standard APD's.
In high-energy nucleus-collisions, a huge amount of charged and neutral hadrons are produced, as well as photons and leptons. To measure photons in such a condition, an electromagnetic calorimeter is a useful device. However enormous hadrons may disturb the measurements. To measure a weak signal of photons, separation of the photons from neutral hadrons becomes critical. Therefore, the time resolution of calorimeter elements becomes important function for precise photon measurements. We have tested the MPPC (model S10362-33-025C with 14400 pixels per 3*3 mmˆ2) at room temperature for single photon energy resolutions at various operational bias voltages. We will present the performance as a function of bias voltage and operating temperature down to -25 degrees, and discuss feasibility of the MPPC for calorimetry application.

Keywords

calorimeter, photon, MPPC

Author: OKUBO, Tsubasa (Hiroshima University (JP))

Co-authors: SATO, Daichi (Hiroshima University (JP)); SEKIHATA, Daiki (Hiroshima University); SUGITATE, Toru (Hiroshima University (JP)); NAKAMIYA, Yoshihide (Hiroshima University (JP))

Presenter: OKUBO, Tsubasa (Hiroshima University (JP))

Session Classification: Paralles 6C (Chair Byungsik Hong)

Contribution ID: **29** Type: **not specified**

H-dibaryon properties from a QCD sum rule approach with explicit diquark fields

Thursday 15 November 2012 16:20 (25 minutes)

We investigate the properties of H-dibaryon using a QCD sum approach with explicit diquark fields. In our previous study, the phenomenological ud-diquark mass was obtained from the sum rule analysis for the Λ assuming that its structure is composed by a diquark and a spectator quark. In same way, we obtain the properties of qs-diquark from Ξ_{c;b} which are expected to have a good qs-diquark structure. Using the previously determined properties of diquarks, the mass of H-dibaryon is calculated when it is composed of three diquarks. We calculate the mass of H-dibaryon in both SU(3)_f symmetric and non-symmetric cases and attempt to compare with the results from lattice calculation and other models.

Keywords

H-dibaryon, QCD sum rule, di-quark

Author: Dr KIM, Kyungil (RISP/IBS)

Co-authors: Prof. JIDO, Daisuke (Yukawa Institute for Theoretical Physics); Prof. LEE, Su Houng (Yonsei University)

Presenter: Dr KIM, Kyungil (RISP/IBS)

Session Classification: Parallel 2B (Chair Yongseok Oh)

Contribution ID: **30** Type: **not specified**

Heavy quark production at forward rapidity in d+Au collisions at sqrt(s) = 200 GeV

Thursday 15 November 2012 15:55 (25 minutes)

The measurement of single muons from the semi-leptonic decay of heavy quark (D and B) mesons is a well-developed method in PHENIX experiment. Previous PHENIX results from p+p and Cu+Cu collisions at sqrt(s) = 200 GeV have reported the suppression of heavy quark production in central Cu+Cu collisions at rapidity = 1.65. The measurement of heavy quark production at forward(backward) rapidity using d+Au data and comparison with heavy quark results at mid-rapidity are crucial for improved understanding of cold nuclear matter effects during the collision. The detailed analysis method as well as current status will be presented.

Keywords

Heavy quark, Cold nuclear matter, d+Au collisions

Author: LIM, Sanghoon (Yonsei University)

Presenter: LIM, Sanghoon (Yonsei University)

Session Classification: Parallel 2C (Chair Kenta Shigaki)

Contribution ID: **31** Type: **not specified**

Dilepton production from strong fields in heavy-ion collisions

Thursday 15 November 2012 17:30 (25 minutes)

We discuss a new mechanism of dilepton production in heavy-ion collision. In high-energy heavy-ion collisions, there appear two different strong gauge fields. One is the ordinary electromagnetic field, and the other is the color Yang-Mills (gluon) field. In both cases, the strength of the fields is extraordinarily large, and in particular, there are strong magnetic fields and strong color magnetic fields. In the presence of such strong magnetic fields, quarks/antiquarks with electric/color charges will emit radiations of photons (synchrotron radiation), as well as dileptons when the emitted photon is off shell. We compute the spectrum of dilepton created in these processes. This must be added to the ordinary contribution of the dilepton cross sections. (This is a collaboration with Drs. Yoshimasa hidaka, and Kirill Tuchin)

Keywords

dileptons, strong magnetic fields

Author: ITAKURA, Kazunori (KEK)

Presenter: ITAKURA, Kazunori (KEK)

Session Classification: Parallel 3C (Chair Chang Ho Hyun)

Contribution ID: **32** Type: **not specified**

Cold and Hot Nuclear Matter Effects on J/psi Production

Thursday 15 November 2012 15:30 (25 minutes)

We investigated the cold and hot nuclear matter effects on J/psi productions in HIC in a detailed transport approach. The hot nuclear effect is included in the collisions terms of the J/psi transport equation, and the cold nuclear effect is reflected in the initial condition of the transport. While the cold nuclear effect reduces the J/psi yield significantly, it changes the J/psi transverse momentum distribution slightly.

Keywords

J/psi production, cold effects, hot effects, regeneration

Author: ZHOU, Kai (Tsinghua University)

Co-authors: XU, Nu (LBNL); ZHUANG, Pengfei (Tsinghua University)

Presenter: ZHOU, Kai (Tsinghua University)

Session Classification: Parallel 2C (Chair Kenta Shigaki)

Contribution ID: **33** Type: **not specified**

Recent Results from PHENIX

Wednesday 14 November 2012 15:50 (30 minutes)

Studying the property of quark-gluon plasma has been the focal point of research in the field of relativistic heavy ion collisions over the past three decades. The Relativistic Heavy Ion Collider (RHIC) at the Brookhaven National Laboratory started taking data in 2000. The PHENIX Collaboration at RHIC has carried out a comprehensive study of particle production that includes baseline measurement in p+p collisions, and the measurement from d+Au, Cu+Cu, Au+Au, Au+Au and U+U collisions at multiple energies. This talk will focus on the most recent and exciting results from PHENIX.

Keywords

Quark-gluon plasma, heavy ion collision

Author: Prof. HE, Xiaochun (Georgia State University)

Presenter: Prof. HE, Xiaochun (Georgia State University)

Session Classification: Plenary IB (Chair Anju Bhasin)

Contribution ID: **34** Type: **not specified**

Birefringent photon spectrum from a nonlinear interaction with strong magnetic field

Thursday 15 November 2012 15:55 (25 minutes)

In recent years, an extremely strong magnetic field, induced by colliding nuclei, has been attracting attention both from experimental and theoretical points of view. The magnitude of this magnetic field in RHIC and LHC is much stronger than the critical magnetic field, above which nonlinear interaction between charged particles (electrons, muons, etc) and the strong magnetic field becomes significant. Since the magnetic field decays rapidly as the
remnants of two nuclei receed, the nonlinear effects could be visible only in a very short period after the collision. Electromagnetic probes such as photons and leptons are believed to carry the information of the primordial matter in the collisions. However, such probes are themselves affected by the strong magnetic field which is also present just after the collision.Thus, to get the correct information, we have to quantitatively estimate to what extent the properties of probes are modified.

We have investigated how a photon spectrum is modified by the strong
magnetic field, on the basis of a rigorous theoretical calculation of the vacuum-polarization tenors in the presence of the external magnetic field. We will present implications to experiments, which include characteristic energy and azimuthal angle dependences of the direct photon spectrum.

Keywords

strong magnetic field, direct photon

Author: HATTORI, Koichi

Co-author: ITAKURA, Kazunori (KEK)

Presenter: HATTORI, Koichi

Session Classification: Parallel 2B (Chair Yongseok Oh)

Contribution ID: **35** Type: **not specified**

Baryon number probability distribution in quark-meson model based on functional renormalization group approach

Friday 16 November 2012 17:05 (25 minutes)

We discuss the probabiblity distribution of the baryon number $P(N)$ in the present of chiral phase transition. First, we clarify the relation of $P(N)$ with the phase structure in complex chemical potential based on the Landau theory of phase transition. Then, we compute $P(N)$ and resultant cumulants, which are expected to be sensitive to critical behavior, in the quark-meson model with critical fluctuaions being taken into account through the functional renormalization group. We discuss influences of the fluctuations by comparing the results with the mean-field calculations and hadron gas model.

Keywords

Chiral phase transition, baryon number fluctuation, Functional renormalization group

Author: MORITA, Kenji (Kyot University)

Co-authors: Prof. FRIMAN, Bengt (GSI); Prof. REDLICH, Krzysztof (University of Wroclaw); SKOKOV, Vladimir (Brookhaven national laboratory)

Presenter: MORITA, Kenji (Kyot University)

Session Classification: Parallel 6B (Chair Ulugbek Yakhshiev)

Contribution ID: **36** Type: **not specified**

Correlations between jets and neutral bosons

Thursday 15 November 2012 14:20 (25 minutes)

Jet modification and energy loss play important roles in exploring the novel properties of the hot and dense quark-gluon plasma. The correlations between back-to-back photon-jet and Z0-jet pairs have been regarded as the golden channels for jet quenching study in relativistic heavy-ion collisions. I will present recent progress on the study of jet modification and photon production, and discuss the potential of photon/Z0-jet correlations for the tomographic study of parton energy loss in high energy nucleus-nucleus collisions.

Author: QIN, Guang-You (Duke University)

Presenter: QIN, Guang-You (Duke University)

Session Classification: Parallel 1B (Chair Ju Hwan Kang)

Contribution ID: **37** Type: **not specified**

Quark-gluon plasma shear viscosity at RHIC and the LHC

Thursday 15 November 2012 13:30 (25 minutes)

In this talk, we will review recent progress on extracting the QGP viscosity at RHIC and LHC energies, obtained from viscous hydrodynamics and viscous hydrodynamics + hadron cascade (VISHNU) hybrid model, which includes the following aspects:

a) Using VISHNU [1], We extract the QGP shear viscosity at RHIC energies from the integrated elliptic flow data with a reliable uncertainty estimate. We show that, with the QGP viscosity extracted in [2], VISHNU yields an excellent description of all soft-hadron data from Au+Au collisions at top RHIC energy [3].

b) Extrapolating to Pb+Pb collisions at the LHC, and comparing with recent experimental results, we show that the LHC data are again well described by VISHNU, with approximately the same constant QGP viscosity as at RHIC energies [4] We then discuss the recent investigations of the temperature dependent QGP shear viscosity [4,5].

c) We discuss the recent development on initialization models (such as color charge fluctuations, initial flow fluctuations, etc.[6]), and evaluate their influence on the extracted value of the QGP viscosity [7].

d) We discuss recent viscous hydrodynamic calculations from different groups (including simultaneously fitting v_2 and v_3 at LHC energies, higher-order flow harmonics at ultra-central collisions, event plan correlations and the systematic \chi^2 fitting of the experimental data [8]), and then discuss the future prospects of the VISHNU calculations for even precise extraction of the QGP shear viscosity.

References:

[1] H. Song, S. Bass and U. Heinz, Phys. Rev. C83, 024912 (2011).

[2] H. Song, S. Bass, U. Heinz, T. Hirano and C. Shen, Phys. Rev. Lett. 106, 192301 (2011).

[3] H. Song, S. Bass, U. Heinz, T. Hirano and C. Shen, Phys. Rev. C83, 054910 (2011).

[4] H. Song, S. Bass and U. Heinz, Phys. Rev. C83, 054912 (2011).

[5] C. Shen, U. Heinz, P. Huovinen and H. Song, Phys. Rev. C84, 044903 (2011); H. Niemi, G. S. Denicol, P. Huovinen, E. Molnar and D. H. Rischke, Phys. Rev. Lett. 106, 212302 (2011).

[6] B. Muller and A. Schafer, Phys. Rev. D85, 114030 (2012); B. Schenke, P. Tribedy and R. Venugopalan, arXiv:1202.6646 [nucl-th]; L. Pang, Q.Wang and X. -N.Wang, arXiv:1205.5019 [nucl-th].

[7] H. Song, arXiv:1207.2396 [nucl-th].

[8] Z. Qiu, C. Shen and U. Heinz, Phys. Lett. B707, 151 (2012); Z. Qiu and U. W. Heinz, arXiv:1208.1200 [nucl-th]; R. Soltz, et. al, arXiv:1208.0897 [nucl-th]; M. Luzum, QM2012 talk.

Keywords

QGP, hydrodynamics, viscosity

Author: Dr SONG, Huichao (The Ohio State University)

Presenter: Dr SONG, Huichao (The Ohio State University)

Session Classification: Parallel 1A (Chair Xiaochun He)

Contribution ID: **38** Type: **not specified**

Study of low p_T non-photonic electrons production in 200 GeV

Thursday 15 November 2012 17:05 (25 minutes)

The properties of the hot and dense nuclear matter produced at RHIC can be investigated in multiple ways by production of heavy quarks. Heavy flavor are produced in early stage of the collision and the mechanisms of their interaction with nuclear matter are not yet well understood. This can be studied by non-photonic (single) electrons coming from semi-leptonic decays of heavy flavor hadrons. In year 2010, STAR has collected a large sample of Au+Au events from minimum bias and central triggers with the full barrel Time-Of-Flight detector installed. This allows high statistics analysis of NPE production in the low p_T region.
In this talk we report analysis status on low p_T non-photonic electron from heavy flavor decays in 200 GeV Au+Au collisions from STAR.

Keywords

non-photonic electron, heavy flavor, STAR

Author: OH, Kunsu (Pusan National University (KR))

Co-author: STAR, Collaboration (BNL)

Presenter: OH, Kunsu (Pusan National University (KR))

Session Classification: Parallel 3C (Chair Chang Ho Hyun)

Contribution ID: **39** Type: **not specified**

Searches for Exotic Phenomena/Particles at RHIC

Saturday 17 November 2012 09:00 (30 minutes)

Nucleus-nucleus collisions at RHIC created a strongly interacting Quark-Gluon Plasma at extremely high temperature and energy density. The collision dynamics at such a high energy density and the hadronization of the dense partonic matter at RHIC provide intriguing scenarios for possible formation of exotic phenomena and/or particles. I will present recent STAR results on searches for possible local parity violations and for di-hyperons at RHIC.

Keywords

Exotics, Local Parity Violation, di-hyperon

Author: HUANG, huan (UCLA)

Presenter: HUANG, huan (UCLA)

Session Classification: Plenary IVA (Chair Chang-Hwan Lee)

Contribution ID: **40** Type: **not specified**

Rho and Eta production in heavy ion collisions

Friday 16 November 2012 13:55 (25 minutes)

The large tansverse momentum specta of vector mesons such as Rho and Eta in Au+Au at 200 GeV and Pb+Pb collisions at 2.76 TeV are calculated within the NLO perturbative QCD improved parton model. We employed the broken SU(3) model to determine the quark and gluon fragmentation functions of octet vector mesons in a simple way with an SU(3) breaking parameter. And we are using the higher-twist approach to modified these fragmentation functions to incorporate the jet queching effect when propagating through the hot and dense medium. The jet transport parameter that controls medium modification is proportional to the initial parton density and the coefficient is fixed by the RHIC data on suppression of large pT hadron spectra.

Keywords

jet, large transverse momentum, vector meson production

Author: DAI, Wei (CCNU)

Co-author: ZHANG, Ben-Wei (Central China Normal University)

Presenter: DAI, Wei (CCNU)

Session Classification: Parallel 4B (Chair Eun-Joo Kim)

Contribution ID: **41** Type: **not specified**

Exotics from heavy ion collisions

Saturday 17 November 2012 09:30 (30 minutes)

We investigate the possibilities of identifying exotic hadrons in relativistic heavy ion collisions by studying the production yields of a selected set of exotic hadron candidates. We find that the yields of exotic hadrons are strongly dependent on their structures; we show that the hadron yield is typically an order of magnitude smaller compared to the statistical model prediction when it is a compact multi-quark state, and larger by a factor of two or more for a loosely bound hadronic molecule. We thereby suggest that studying the yields of exotic hadrons in relativistic heavy ion collision offers a promising solution to the problem of identifying hadronic molecular states and exotic hadrons with multiquark components [1, 2].

[1] S. Cho et al. [ExHIC Collaboration], Phys. Rev. Lett. 106, 212001 (2011)
[2] S. Cho et al. [ExHIC Collaboration], Phys. Rev. C 84, 064910 (2011)

Primary Authors : Sungtae Cho, Takenori Furumoto, Tetsuo Hyodo, Daisuke Jido, Che Ming Ko, Su Houng Lee, Marina Nielsen, Akira Ohnishi, Takayasu Sekihara, Shigehiro Yasui, Koichi Yazaki [ExHIC Collaboration]

Author: Dr CHO, Sungtae (Yonsei University)

Presenter: Dr CHO, Sungtae (Yonsei University)

Session Classification: Plenary IVA (Chair Chang-Hwan Lee)

Contribution ID: **42** Type: **not specified**

Two-particle correlations with a neutral trigger in pp and Pb-Pb collisions with ALICE

Friday 16 November 2012 17:30 (25 minutes)

The two-particle azimuthal correlation is one of the promising probes for investigating the properties of the high-density medium formed in heavy-ion collisions at high energy. The γ+jet channel is considered the "golden channel" for studying jet fragmentation and parton energy loss due to the nature of the photon. The jet fragmentation can be estimated from the charged hadron and the photon $\vec{p}_{\mathrm{T}}$ via the imbalance parameter $x_E \equiv \frac{\vec{p}_{\mathrm{T}}^{\gamma} \cdot \vec{p}_{\mathrm{T}}^{h}}{|\vec{p}_{\mathrm{T}}^{\gamma}|^2}$.
The two-particle correlations are measured in ALICE using statistical subtraction of the estimated meson decay photon contribution. We present the recent results extracted from γ-hadron and π^0-hadron correlations measured in pp collisions at $\sqrt{s_{NN}} = 7$ TeV, triggered by the ALICE electromagnetic calorimeter, and the status of a similar analysis in Pb-Pb collisions at $\sqrt{s_{NN}} = 2.76$ TeV.

Author: Prof. ZHOU, Daicui (Central China Normal University CCNU (CN))

Co-author: ZHU, Xiangrong (Central China Normal University CCNU (CN))

Presenter: Prof. ZHOU, Daicui (Central China Normal University CCNU (CN))

Session Classification: Parallel 6B (Chair Ulugbek Yakhshiev)

Contribution ID: **43** Type: **not specified**

(Cancelled) Correlation lengths in the QCD plasma

Thursday 15 November 2012 17:55 (25 minutes)

We present improved lattice computation of correlation
lengths in flavour non-singlet meson and baryon channels in finite
temperature QCD. We find that the correlation lengths rapidly approach
ideal gas values above the QCD crossover temperature, Tc. The approach
is from above for all the meson and nucleon channels. We also find that parity partners become
degenerate a little above Tc, with the onset of
degeneracy depending weakly on the quark mass. We also discuss some
tests of models of medium modification of hadrons below Tc.

Keywords

screening mass, approach to ideal gas limit, chiral symmetry restoration, medium modification of hadrons

Authors: KARTHIK, Nikhil (TIFR, Mumbai); GUPTA, Sourendu (TIFR)

Presenter: KARTHIK, Nikhil (TIFR, Mumbai)

Session Classification: Parallel 3B (Chair Nikolai Kochelev)

Contribution ID: **44** Type: **not specified**

Di-electron Production in Heavy-ion Collisions

Thursday 15 November 2012 11:50 (30 minutes)

The electromagnetic probes such as photons and dileptons do not participate in the strong interactions during the space-time evolution of the created system in the heavy-ion collisions. Thus they contain the undistorted information of the hot-dense medium and hence are used as signatures for probing the medium properties. Theoretical predictions believe that the dileptons from thermal emission are different from those produced in hadronic freeze-out, thus studying the behavior of dileptons reaction with medium versus different colliding energies is consider as an ideal tool to trace the possible partonic-hadronic transition in the QCD phase diagram. In experiment, it is very difficult to measure such a signal of the thermal dileptons due to dominant sources from hadronic process. Thus it is crucial to understanding how the background sources behave in a colliding beam energy scan (BES).

In this talk we focus on the model calculations of dielectrons from vector meson decays and heavy quark dynamic correlations. The dielectron mass spectra, effective temperature, and possible medium modifications versus colliding energies will be discussed. The dilepton elliptic flow (v2) in 200 GeV Au+Au collisions will also be shown. The comparison with recent RHIC BES measurements will be presented.

Keywords

di-lepton, heavy-ion collisions, QGP, Beam Energy Scan (BES)

Author: Prof. ZHANG, Yifei (University of Science and Technology of China)

Presenter: Prof. ZHANG, Yifei (University of Science and Technology of China)

Session Classification: Plenary IIB (Chair Hideki Hamagaki)

Contribution ID: **45** Type: **not specified**

Future Perspectives of the ALICE Experiment and ALICE detector upgrades

Friday 16 November 2012 16:40 (25 minutes)

A major long-term goal of the ALICE experiment is to understand the detailed properties of the hot and dense QCD medium created in ultra-relativistic heavy ion collisions. The ALICE experiment has measured many observables over wide kinematic ranges (many particle species, p_T, and rapidity) in Pb-Pb collisions at $\sqrt{s_{NN}} = 2.76$˜TeV. In the future, measurements towards the detailed characterization of the medium will be focused on the rare probes, in particular observables involving heavy quarks, quarkonia, low mass dileptons, jet medium interactions, and exotic hadrons, which are difficult to be accessed under the current running conditions. The potential of unique low-x measurements is also investigated in the future for the detailed understanding of the color dynamics of dense gluon field and initial conditions of the medium.
The experimental approach taken by ALICE is to provide high rate capability (50kHz collision rate in Pb-Pb corresponding to L=6x10ˆ{27} cm-2s-1) inspecting all events by upgrading several detector systems, electronics, and DAQ system.
In this talk, major highlights of the proposed studies for the ALICE upgrade will be discussed and the current status of the detector upgrade projects will be presented.

Author: GUNJI, Taku (University of Tokyo (JP))

Presenter: GUNJI, Taku (University of Tokyo (JP))

Session Classification: Parallel 6A (Chair Hirotsugu Fujii)

Contribution ID: **46** Type: **not specified**

Neutral pion measurements in Pb+Pb collisions at $\sqrt{s_{NN}}$ = 2.76 TeV with ALICE at the LHC

Friday 16 November 2012 14:20 (25 minutes)

The theory of strong interactions, quantum chromodynamics (QCD), predicts a phase transition at high temperature. A new era in the study of QCD matter opened with the first collisions of Pb ions in November 2010 at the Large Hadron Collider (LHC) at CERN.
Study of partonic energy loss is planned with high-pT neutral pion in a wide momentum range using the PHOton Spectrometer (PHOS) at the ALICE experiment. The PHOS is a high-resolution electromagnetic spectrometer covering a limited acceptance domain at central rapidity.
Particular interest is in the path length dependence of the energy loss, which can be studied by measuring azimuthal direction of the emitted neutral pion with respect to the reaction plane. Interesting results on this subject were reported in the study at RHIC, and better understanding of the energy loss mechanism in the strongly interacting QCD matter will be attained in the study at LHC by making measurement in a much wider momentum range.
In this presentation, I will report current status of the analysis of neutral pion yield with respect to centrality and reaction plane in Pb+Pb collisions at $\sqrt{s_{NN}}$ = 2.76 TeV.

Author: TSUJI, Tomoya (University of Tokyo (JP))

Presenter: TSUJI, Tomoya (University of Tokyo (JP))

Session Classification: Parallel 4B (Chair Eun-Joo Kim)

Contribution ID: **47** Type: **not specified**

Sequential melting of quarkonia in quark-gluon fluid at RHIC and LHC

Thursday 15 November 2012 13:55 (25 minutes)

We study properties of the quark-gluon plasma from sequential melting of quarkonia in heavy ion collisions at RHIC and LHC.
A quarkonium travels through the quark gluon fluid and dissociates when temperature is larger than dissociation temperature which varies among quarkonium species. Dynamics of the quark gluon fluid is described by relaticistic hydrodynamics with the latest equation of state from the lattice QCD simulations. Through comparison of our results with RHIC data, we constrain the dissociation temperature of J/psi. We also predict survival probability of quarkonia at high pT at LHC.

Author: NAGAOKA, Tomomi (Ochanomizu University)

Co-authors: Prof. HAMAGAKI, Hideki (University of Tokyo (JP)); GUNJI, Taku (University of Tokyo (JP)); HIRANO, Tetsufumi (Sophia Univ); HATSUDA, Tetsuo (Unknown)

Presenter: NAGAOKA, Tomomi (Ochanomizu University)

Session Classification: Parallel 1C (Chair Xu Cai)

Contribution ID: **48** Type: **not specified**

Partonic collectivity at RHIC

Thursday 15 November 2012 09:30 (30 minutes)

Azimuthal anisotropy v_2 is one of the key observables in order to study the properties of the Quark Gluon Plasma in the early stage of heavy ion collisions. Systematic measurements of v_2 as a function of transverse momentum, centrality as well as system size are important to further constrain the partonic equation of state and
transport coefficients.

In this talk, I will review the latest results of v_2 for inclusive and identified hadrons at RHIC, and discuss what we have learned.

Author: Dr MASUI, Hiroshi (LBNL)

Presenter: Dr MASUI, Hiroshi (LBNL)

Session Classification: Plenary IIA (Chair Enke Wang)

Contribution ID: **49** Type: **not specified**

Initial state fluctuations in hydrodynamic simulations

Thursday 15 November 2012 09:00 (30 minutes)

It is increasingly becoming important that we understand the event-by-event physics of heavy ion collisions to understand the physics of Quark-Gluon-Plasma.
In this talk, I will describe how initial state fluctuations can be used to learn more about the Quark-Gluon Plasma evolution in heavy ion collisions.

Keywords

Hydrodynamics, Initial state flucutations

Authors: Mr RYU, Sangwook (McGill University); JEON, Sangyong (McGill University)

Co-authors: Dr SCHENKE, Bjoern (Brookhaven National Lab); GALE, Charles (McGill University)

Presenter: JEON, Sangyong (McGill University)

Session Classification: Plenary IIA (Chair Enke Wang)

Contribution ID: **50** Type: **not specified**

Complex Heavy Quark Potential at Finite Temperature from Gauge/Gravity Duality

Friday 16 November 2012 14:20 (25 minutes)

We study the complex potential between a heavy quark and an anti-quark at finite temperature in large Nc and large 'tHooft coupling limit through the gauge/gravity duality[1]. The complex potential at separation r is obtained from a direct analytic continuation of the thermal Wilson loop which is always real in the Euclidean metric. We confirm that there is an imaginary part at finite temperature, which grows as a function of r. We also compare our result with the one from the recent lattice QCD simulation[2].
The gauge/gravity duality suggests the importance of competition between the real part and the imaginary part of the potential for the strongly coupled quark gluon plasma.
References
[1] K. Nawa, T. Hayata and T. Hatsuda, in progress.
[2] A. Rothkopf, T. Hatsuda and S. Sasaki, Phys. Rev. Lett. 108, 162001 (2012).

Keywords

Complex heavy quark potential, Gauge/gravity duality, Quark-gluon plasma

Author: Dr NAWA, Kanabu (Theoretical Research Division, Nishina Center, RIKEN)

Co-authors: HATSUDA, Tetsuo (Unknown); HAYATA, Tomoya (University of Tokyo)

Presenter: HAYATA, Tomoya (University of Tokyo)

Session Classification: Parallel 4A (Chair Youngman Kim)

Contribution ID: **52** Type: **not specified**

Nuclear Modification Factor and Elliptic Flow of Muons from Open Heavy Flavor Decays at Forward Rapidity in Pb-Pb Collisions at 2.76 TeV with ALICE

Thursday 15 November 2012 14:45 (25 minutes)

Heavy-flavor particles are considered as one of the promising probes to investigate the properties of the high-density medium produced in ultrarelativistic heavy ion collisions. The study of the suppression of the heavy-flavor production via the nuclear modification factor is used to investigate the energy loss mechanism of heavy quarks in the medium. The measurement of the collective flow of heavy flavors provides insight on the possible thermalization of heavy quarks in the medium.

The Heavy-flavor production at forward rapidity (2.5<y<4) is measured in the single muon decay with the ALICE muon spectrometer. We present the latest results on the Pt-differential nuclear modification factor Raa and elliptic flow of muons from heavy-flavor deacys in Pb–Pb collisions at 2.76 TeV.

Author: ZHU, Jianhui (Central China Normal University CCNU (CN))

Co-authors: ZHOU, Daicui (Central China Normal University CCNU (CN)); BASTID, Nicole (Univ. Blaise Pascal Clermont-Fe. II (FR)); CROCHET, Philippe (Univ. Blaise Pascal Clermont-Fe. II (FR)); ZHANG, Xiaoming (Univ. Blaise Pascal Clermont-Fe. II (FR))

Presenter: ZHU, Jianhui (Central China Normal University CCNU (CN))

Session Classification: Parallel 1C (Chair Xu Cai)

Contribution ID: **54** Type: **not specified**

Elliptic flow of strange and multi-strange particles in Pb-Pb collisions at $\sqrt{s_{NN}}$ = 2.76 TeV measured with ALICE

Thursday 15 November 2012 15:55 (25 minutes)

The elliptic flow is an important observable to probe the properties
of the system created in heavy-ion collisions. As the collectivity
is built up throughout the collision evolution, information about space-momentum correlations developed during the partonic phase can be masked later by interactions during the hadronic one. Multi-strange particles are believed to have smaller hadronic cross-sections and therefore their elliptic flow is expected to be more sensitive to the quark-gluon plasma phase than to the hadronic one. In this talk, we present the elliptic flow of strange and multi-strange particles (K^0_s, Λ, Ξ, Ω, ϕ) measured at midrapidity by ALICE in Pb-Pb collisions at $\sqrt{s_{NN}} = 2.76$
TeV. We compare our results to hydrodynamic model calculations and the measurements at RHIC energies.

Keywords

elliptic flow, strange and multistrange particles, Pb-Pb collisions, ALICE

Author: YIN, Zhong-Bao (Central China Normal University CCNU (CN))

Presenter: YIN, Zhong-Bao (Central China Normal University CCNU (CN))

Session Classification: Parallel 2A (Chair Feng Liu)

Contribution ID: **55** Type: **not specified**

$\omega \to \pi^0\ \pi^+\ \pi^-$ in pp collisions at 7TeV with ALICE

Friday 16 November 2012 15:30 (25 minutes)

The ω meson is a promising probe to investigate the properties of the Quark-Gluon Plasma (QGP). It is well known that the yield of high-pT particles is suppressed in nucleus-nucleus collisions relative to that in pp collisions. The effect is attributed to energy loss of parent partons or perhaps of hadrons after freeze-out. Since π^0 and ω mesons have the same quark contents (u and d) but different masses, the comparison of the suppression between π^0 and ω can provide information whether the energy loss occurs at the parton level or not.
In this talk, we discuss the measurement of the ω meson reconstructed in the $\pi^0\pi^+\pi^-$ channel in pp collisions at sqrt(s) = 7 TeV over a wide pT range as a baseline for the nuclear suppression. At high pT the measurement can be further extended by a photon triggered dataset. We discuss the trigger performance, and report the latest status of the analysis.

Author: YANO, Satoshi (Hiroshima University (JP))

Co-author: ALICE, collaboration (CERN)

Presenter: YANO, Satoshi (Hiroshima University (JP))

Session Classification: Parallel 5B (Chair Sangyong Jeon)

Contribution ID: **56** Type: **not specified**

Di-hadron correlation and initial fluctuation

Thursday 15 November 2012 14:45 (25 minutes)

Large initial fluctuations lead to harmonic flows (v_n) and other final observations in relativistic heavy-ion collisions. Di-hadron azimuthal correlation consists of all contributions from harmonic flows, hot spots, and jet-medium excitations, which are isolated by using different initial conditions within AMPT model. However γ-hadron azimuthal correlation can only be caused by jet-medium interactions, a comparative study of di-hadron and γ-hadron correlations can reveal more dynamics about jet-medium interactions and initial fluctuations.

Author: MA, Guo-Liang (Shanghai INstitute of Applied Physics (SINAP), CAS)

Co-author: WANG, Xin-Nian (Lawrence Berkeley National Laboratory)

Presenter: MA, Guo-Liang (Shanghai INstitute of Applied Physics (SINAP), CAS)

Session Classification: Parallel 1B (Chair Ju Hwan Kang)

Contribution ID: **57** Type: **not specified**

Perspectives of search for ultra-strong magnetic field via direct virtual photon measurement with ALICE at the LHC

Thursday 15 November 2012 17:05 (25 minutes)

A very strong magnetic field is expected to be created in relativistic heavy-ion collisions. The magnetic field is created in non-central collisions and the maximum strength reaches the order of 10¹⁴ T at the CERN-LHC energies and of 10¹³ T at the BNL-RHIC. The strength is far greater than of a magnetar which is known for the strongest magnetic field (˜10¹¹ T) in the universe.
Various interesting phenomena are discussed with the ultra-strong magnetic field production, for example, chiral magnetic effects, synchrotron radiation, and non-linear behaviors of QED, e.g. photon splitting and real photon decaying into di-leptons.
The ultra-strong magnetic field is, however, not yet directly detected. A new approach to detect the field via direct virtual photon measurement is proposed. Polarization measurement of direct virtual photon is a good probe to directly detect the magnetic field.
In this presentation, theoretical estimate of the effects of the magnetic field and status of data analysis are reported for the strong magnetic field detection via direct virtual photon measurement with ALICE at the LHC.

Author: TSUJI, Asako (Hiroshima University (JP))

Co-author: ALICE, Collaboration (CERN)

Presenter: TSUJI, Asako (Hiroshima University (JP))

Session Classification: Parallel 3B (Chair Nikolai Kochelev)

Contribution ID: **58** Type: **not specified**

Measurement of electrons from heavy flavour decays in Pb-Pb collisions at ¥$sqrts_{NN}$ = 2.76 TeV with ALICE

Friday 16 November 2012 10:00 (30 minutes)

In heavy-ion collisions, charm and bottom (heavy flavour) quarks are produced primarily in the initial, hard partonic interactions. They successively interact with the hot and dense Quark-Gluon Plasma (QGP) expected to be formed in such collisions.
Therefore, measurements of heavy flavour production provide relevant information on the properties of the QGP.

This talk presents measurements by the ALICE Collaboration of electrons from heavy flavour decays at central rapidity in Pb-Pb collisions at ¥$sqrts_{NN}$ = 2.76 TeV.
Electrons are identified using several detectors of the ALICE central barrel.
The nuclear modification factor and the azimuthal anisotropy (v_2) of inclusive electrons from heavy flavour decays as a function of transverse momentum will be presented.

Keywords

heavy flavour

Author: SAKAI, Shingo (Lawrence Berkeley National Lab. (US))

Presenter: SAKAI, Shingo (Lawrence Berkeley National Lab. (US))

Session Classification: Plenary IIIA (Chair Su Houng Lee)

Contribution ID: **59** Type: **not specified**

Recent Quarkonia results from CMS

Thursday 15 November 2012 13:30 (25 minutes)

Quarkonia are important probe for diagnosing and characterizing the quark-gluon plasma since they are produced at early stage and propagate through the medium. The Compact Muon Solenoid (CMS) detector at the LHC is powerful to measure muon pairs from quarkonia in the high-multiplicity environment of nucleus-nucleus collisions. During the 2011 heavy-ion run period, CMS has recorded about 150 inverse microbarns of the integrated luminosity, which is about a factor of twenty more events compared with the 2010 HI data. With improved high statistics, CMS has analyzed the nuclear modification factors of prompt, non-prompt J/Psi from B meson, Psi(2S) and separated three upsilon states (1S, 2S, 3S) in PbPb collisions at sqrt(S_NN) = 2.76 TeV with fine binning. We will present the recent results on the quarkonium production in PbPb collisions taken in 2011.

Keywords

quarknoia, quarkonium, CMS, LHC, suppression, nuclear modification factor

Author: KIM, Hyunchul (Korea University (KR))

Presenter: KIM, Hyunchul (Korea University (KR))

Session Classification: Parallel 1C (Chair Xu Cai)

Contribution ID: **60** Type: **not specified**

Study of higher harmonics based on (3+1)-dimensional relativistic viscous hydrodynamics

Thursday 15 November 2012 10:00 (30 minutes)

Currently a possible origin of "Mach-Cone-like structure" is regarded as triangular flow and higher harmonics which are produced through event-by-event fluctuated initial states, which is a push to implement effects of event-by-event fluctuations in the initial conditions of relativistic hydrodynamic models.
When the hydrodynamic simulation is performed with initial conditions with the event-by-event fluctuation, shock-wave capturing schemes should be used to describe the hydrodynamic expansion correctly.
Here we develop a fast numerical scheme for causal relativistic hydrodynamics with dissipation for analyses of relativistic high energy collisions, which is based on Ref. [1]. This shock-wave capturing scheme for solving relativistic viscous hydrodynamic equation suffers less artificial dissipative effect and is more suitable for physical viscosity analyses, compared to SHASTA, Kurganov-Tadmor (KT) and rHLLE schemes which are mainly used in current analyses based on hydrodynamic models.
Using the relativistic viscous hydrodynamic model first we evaluate the viscosity effect in collective flow such as elliptic flow, triangular flow and higher harmonics. In particular, we investigate the time evolution of them and discuss the relation between the initial geometry and final states.

Author: NONAKA, Chiho (Nagoya University)

Co-authors: Dr TAKAMOTO, Makoto (Max-Planck Institute for Nuclear Physics); AKAMATSU, Yukinao (Nagoya University)

Presenter: NONAKA, Chiho (Nagoya University)

Session Classification: Plenary IIA (Chair Enke Wang)

Contribution ID: **61** Type: **not specified**

The measurement of Elliptic flow of Identified particles in Pb-Pb collisions at 2.76 TeV with ALICE detectors

Thursday 15 November 2012 16:20 (25 minutes)

The study of the properties of strongly-interacting nuclear matter at extreme temperature and energy densities, Quark-Gluon Plasma (QGP) predicted by Quantum Chromo Dynamics is one of the important subjects in ultrarelativistic nuclear collisions. The measurement of azimuthal anisotropy has given crucial knowledge of the produced medium such as the equation of state (EOS), and the difference between baryon and meson elliptic flow at intermediated pT has been associated with the existence of a phase with partonic degrees of freedom in the initial stages of heavy-ion collisions. Furthermore v2 through wide pT range will serve the essential base line to study other topics, such as the measurement of jet fragmentation into identified particles. In the talk, I will present the elliptic flow result of identified particles separated by combined PID method based on TPC and TOF detectors in ALICE experiment with full data sets including 2011 data.

Author: KIM, Minwoo (Yonsei University (KR))

Presenter: KIM, Minwoo (Yonsei University (KR))

Session Classification: Parallel 2A (Chair Feng Liu)

Contribution ID: **62** Type: **not specified**

Do Compositions of light scalar mesons have any effect on chiral symmetry restoring transition?

We study the QCD phase diagram in a two flavour chiral quark-diquark
model and regard tetraquark state as made up of diquark-antidiquark. For parameter fixing we consider two scenarios where, in one case f(600) and another heavy meson around 1.3 GeV is considered to be quarkonium and tetraquark states respectively. In another case the opposite assignments is considered. We then study the chiral symmetry restoration with two scalar condensates, namely the conventional chiral and tetraquark condensates and review how above mentioned two scenarios affect the phase structure of QCD.

Author: MUKHERJEE, Tamal Kumar (IHEP, CAS)

Co-author: HUANG, Mei (IHEP, CAS)

Presenter: MUKHERJEE, Tamal Kumar (IHEP, CAS)

Contribution ID: **63** Type: **not specified**

Quark pair productions in pA collisions from CGC with running coupling BK evolution

Thursday 15 November 2012 17:55 (25 minutes)

We study the parton saturation effects on heavy quark production in proton-nucleus collisions at collider energies, using the CGC formula proposed by Blaizot-Gelis-Venugopalan (Nucl.Phys.A743:57-91,2004). Previously it was numerically evaluated using the unintegrated gluon distribution from the McLerran-Venugopalan model including the x-evolution effect with the Balitsky-Kovchegov equation(Fujii-Gelis-Venugopalan, Nucl.Phys.A780:146-174,2006).

Here we extend the phenomenological study by including the running coupling effect in the x-evolution. We will investivate the saturation effects on the quark and quark pair spectra, and the quarkonium spectrum as well, at the RHIC and LHC energies.

Keywords

Heavy quark, pA collision, CGC

Author: WATANABE, Kazuhiro (The University of Tokyo)

Co-author: FUJII, Hirotsugu (University of Tokyo)

Presenter: WATANABE, Kazuhiro (The University of Tokyo)

Session Classification: Parallel 3C (Chair Chang Ho Hyun)

Contribution ID: **65** Type: **not specified**

Enhancement of flow anisotropies due to magnetic field in relativistic heavy-ion collisions

Thursday 15 November 2012 17:30 (25 minutes)

It is known that the presence of background magnetic field in cosmic plasma distorts the acoustic peaks in CMBR. This primarily results from different types of waves in the plasma with velocities depending on the angle between the magnetic field and the wave vector. We consider the consequences of these effects in relativistic heavy-ion collisions where very strong magnetic fields arise during early stages of the plasma evolution. We show that flow coefficients can be significantly affected by these effects when the magnetic field remains strong during early stages due to strong induced fields in the conducting plasma. In particular, the presence of magnetic field can lead to enhancement in the elliptic flow coefficient v_2.

Keywords

elliptoc flow, magnetic field, CMBR

Author: Ms SAUMIA, P. S. (Institute of Physics)

Co-authors: Prof. SRIVASTAVA, A.M. (Institute of Physics); Mrs MOHAPATRA, R. K. (Institute of Physics)

Presenter: Ms SAUMIA, P. S. (Institute of Physics)

Session Classification: Parallel 3B (Chair Nikolai Kochelev)

Contribution ID: **66** Type: **not specified**

Study of identified particle higher harmonics azimuthal anisotropy in 200GeV Au+Au collisions at RHIC-PHENIX experiment

Thursday 15 November 2012 13:55 (25 minutes)

Particle species dependence of transverse momentum distribution and azimuthal anisotoropy have been studied actively because they reveal information about the QGP generated in high energy heavy ion collisions.
From the study of elliptic event anisotropy v_{2}, we have understood that azimuthal anisotropy is generated by initial participant geometry, with a role for the QGP property η/s (the ratio of shear viscosity(η) to entropy density(s)).
In recent years, higher harmonics azimuthal anisotropies v_{n≥3} are in focus because they are expected to be more sensitive to initial participant geometry and η/s than will be v_{2}.
Particle dependence of v_{n≥3} is obtained the same as v_{2}, the observed similarities and differences of identified particles v_{n} will be shown and discussed.
The parameters such as freeze-out geometry and expansion velocity as well as temperature at the freeze-out will also be extracted based on the Blast-Wave model and compared with other measurements like HBT and spectra.

Keywords

azimuthal anisotropy

Author: MIZUNO, Sanshiro (University of Tsukuba (JP))

Presenter: MIZUNO, Sanshiro (University of Tsukuba (JP))

Session Classification: Parallel 1B (Chair Ju Hwan Kang)

Contribution ID: **67** Type: **not specified**

The η dependence of charged particle v_n using the Silicon Vertex detector at RHIC-PHENIX

Thursday 15 November 2012 15:30 (25 minutes)

In heavy-ion collisions, measurement of azimuthal anisotropy in emitted particle momentum distribution is a one of the important themes for the investigation of Quark Gluon Plasma (QGP). For this measurements, we need to be able to measure the reference reaction/event planes direction with good accuracy.

In 2011 the Silicon Vertex detector (VTX) was installed in the RHIC-PHENIX experiment. The VTX is composed of four layers, in which the inner two layers are built with pixel detectors and the outer two layers are built with strip detectors. The VTX can reconstruct charged particle tracks and identify hadrons that include c/b-quark. The reaction plane reconstructed using the VTX is expected to have good resolution due to the wide η acceptance of the detector, -1 to +1. One of the main purposes of VTX detector is to enable the measurement of the second and higher-order azimuthal anisotropy (v2,v3) of heavy quarks.

In this presentation, we will discuss the performance of the VTX detector in reaction plane resolution, as well as event plane correlations between different harmonic orders and between silicon and non-silicon detectors which have different η acceptance. The η dependence of higher order anisotropy will also be shown as part of a detailed investigation of non-flow effect as a function of η-gap.

Keywords

VTX, flow,

Author: Mr NAKAGOMI, Hiroshi (Univ. of Tsukuba)

Presenter: Mr NAKAGOMI, Hiroshi (Univ. of Tsukuba)

Session Classification: Parallel 2A (Chair Feng Liu)

Contribution ID: **68** Type: **not specified**

Strangeness production in heavy-ion collisions

Friday 16 November 2012 15:05 (25 minutes)

Strange hadron production is a sensitive probe to the reaction dynamics of nucleus-nucleus collisions. The enhancement of their yields in A+A collisions relative to that in p+p at the same energy has long been regarded as one of the signatures of Quark-Gluon Plasma formation in these collisions. The measurement of their nuclear modification factors, baryon to meson ratios and elliptic flow are also excellent tests of recombination/coalescence models. In particular, the multi-strange particles, Ω and ϕ, are golden probes to the early deconfined phase due to their small cross sections in the hadronic rescattering phase.
We will present an overview of the recent strangeness measurements in heavy ion collisions experiments at RHIC and LHC. The physics implications on the collision dynamics will also be discussed.

Author: ZHU, Xianglei (Tsinghua University)

Presenter: ZHU, Xianglei (Tsinghua University)

Session Classification: Parallel 5B (Chair Sangyong Jeon)

Contribution ID: **70** Type: **not specified**

Research and Development of the VHMPID detector for ALICE experiment

Friday 16 November 2012 16:40 (25 minutes)

The Very High Momentum Particle Identification (VHMPID) detector represents a possible upgrade for the ALICE experiment at LHC. It has been conceived to extend hadron identification on a track-by-track basis in 5 GeV/c $<$ p $<$ 25GeV/c momentum range. The VHMPID is a ring imaging Cherenkov detector with pressurized gaseous radiator coupled to CsI-based photon detector. We will present the detector development status and some results from the beam tests at PS, CERN.

Keywords

VHMPID

Author: YI, Jungyu (Pusan National University (KR))

Co-author: VHMPID, Collaboration (ALICE, CERN)

Presenter: YI, Jungyu (Pusan National University (KR))

Session Classification: Paralles 6C (Chair Byungsik Hong)

Contribution ID: **71** Type: **not specified**

STAR endcap upgrade for eSTAR

Friday 16 November 2012 13:55 (25 minutes)

It's proposed that the Relativistic Heavy-Ion Collider (RHIC) will be upgraded to form an Electron-Ion Collider (EIC) in the coming decade. At the first stage, the existing two main detectors at RHIC - PHENIX and STAR - will be upgraded correspondingly to better conduct the physics program at an EIC (called ePHENIX and eSTAR). STAR, with outstanding detector power in its barrel part, will focus on the upgrade at the endcap region.
Several conceptual detectors have been proposed for the upgrade at the eSTAR endcap region, including an inner tracker with capability of detecting Cherenkov radiation, a transition radiation detector (TRD) based on GEM readout, an endcap time-of-flight (TOF) detector, and a forward electro-magnetic calorimeter (EMC). An upgrade of the inner-sector readout of the time projection chamber (iTPC) will also have impact on eSTAR.
Perliminary R&D on these detctor concepts have already begun. Simulation studies are undergoing to clarify their impacts on eSTAR physics and the requirements for the detectors. We will introduce the progress on the simulation part, especially for the TRD and iTPC. The status of crystal R&D for the forward EMC will also be given.

Keywords

eSTAR, upgrade, endcap, detector

Author: SHAO, Ming (Univ. of Sci. and Tech. of China)

Presenter: SHAO, Ming (Univ. of Sci. and Tech. of China)

Session Classification: Parallel 4C (Chair In-Kwon Yoo)

Contribution ID: **72** Type: **not specified**

Development of a RICH detector for CBM

Friday 16 November 2012 17:30 (25 minutes)

The Compressed Baryonic Matter (CBM) experiment at the Facility for Antiproton and Ion Research (FAIR) in Darmstadt is preparing a fixed target heavy-ion experiment for the investigation of baryonic matter at highest net-baryon densities. An essential observable of the physics program will be a precise measurement of low-mass vector mesons via their leptonic decay channel, in which a gaseous Ring imaging CHerenkov (RICH) detector will play a key role for identifying the decay electrons. The research and development of the CBM-RICH detector will be introduced and the performance of a prototype detector being real size in the most important dimension, i.e. the length, from a testbeam at the SPS-T9 beamline at CERN will be presented.

Keywords

RICH, CBM

Author: SONG, Jihye (Pusan National University (KR))

Presenter: SONG, Jihye (Pusan National University (KR))

Session Classification: Paralles 6C (Chair Byungsik Hong)

Contribution ID: **73** Type: **not specified**

Large Acceptance Multipurpose Spectrometer at RISP

Friday 16 November 2012 17:05 (25 minutes)

The Rare Isotope Science Project (RISP) was established in December 2011 in order to carry out the technical design and the establishment of the accelerator complex for the rare isotope science in Korea. The rare isotope accelerator at RISP will provide both stable and rare isotope heavy-ion beams with the energy ranges from a few MeV/nucleon to a few hundreds of MeV/nucleon for the researches in fields of basic and applied science.
Large Acceptance Multipurpose Spectrometer (LAMPS) at RISP is a heavy-ion collision experimental facility for studying nuclear symmetry energy by using rare isotope beams. Two different experimental setups of LAMPS are designed for covering entire energy range at RISP. One is for a low energy (< 18.5 MeV/nucleon) heavy-ion collision experiment for day-1 experiments. The other is for completing an event reconstruction by detecting the all particles produced from high energy heavy-ion collisions within large acceptance detector to measure particle spectrum, yield, ratio and collective flow of pions, protons, neutrons, and intermediate fragments at the same time. In this talk, the detail physics and design of LAMPS at RISP will be discussed.

Author: KIM, Young Jin (Institute for Basic Science)

Co-author: LAMPS, Collaboration (RISP)

Presenter: KIM, Young Jin (Institute for Basic Science)

Session Classification: Parallel 6A (Chair Hirotsugu Fujii)

Contribution ID: **74** Type: **not specified**

Basic Collective Properties of Quark-Gluon Plasma

Friday 16 November 2012 13:30 (25 minutes)

We consider the quark gluon system at extreme high temperature. The relativistic system has collective phenomena known as a quark-gluon plasma. We study the basic properties of the exotic QCD system based on the classical color potential.

Keywords

QGP, color potential, collective phenomena

Author: Prof. SHIN, Ghi R. (Andong National University)

Presenter: Prof. SHIN, Ghi R. (Andong National University)

Session Classification: Parallel 4A (Chair Youngman Kim)

Contribution ID: **75** Type: **not specified**

MUSIC+UrQMD : A hybrid model for heavy ion collision

Thursday 15 November 2012 13:55 (25 minutes)

We present a hybrid model of hydrodynamics and Boltzmann transport model for heavy ion collision. Even though hydrodynamics is successful in explaining experimental results such as particle spectra and geometric flows, it is incomplete in the sense that hadronic secondary collisions and decays after freeze-out are not fully taken into account. We discuss development of MUSIC+UrQMD model by us, its implications on properties of QGP matter and further improvements.

Author: RYU, Sangwook (McGill University)

Co-authors: Dr SCHENKE, Bjoern (Brookhaven National Lab); GALE, Charles (McGill University); YOUNG, Clint (McGill University); JEON, Sangyong (McGill University)

Presenter: RYU, Sangwook (McGill University)

Session Classification: Parallel 1A (Chair Xiaochun He)

Contribution ID: **76** Type: **not specified**

Status of High-Energy Nuclear Collisions and Future Directions

Wednesday 14 November 2012 14:00 (30 minutes)

The most important goal for the high-energy nuclear collisions is to study the emergent properties of nuclear matter with QCD degrees of freedom. In this talk, I will to make an attempt to review the recent progress in the field. The focus will be given to recent RHIC/LHC experimental results although related theoretical calculations will be discussed. I will also discuss the future directions.

Keywords

high-energy nuclear collision, emergent property, QCD, RHIC, LHC

Author: Prof. XU, Nu (CCNU/LBNL)

Presenter: Prof. XU, Nu (CCNU/LBNL)

Session Classification: Plenary IA (Chair Yu-Gang Ma)

Contribution ID: **77** Type: **not specified**

Low energy charmonium-hadron scattering in lattice QCD

Thursday 15 November 2012 16:20 (25 minutes)

We investigate low energy J/psi-phi scattering and search for narrow resonances.The J/psi-phi channel is considered to be an interesting system, since three narrow resonances have been reported in recent experiments, namely, Y(4140) and Y(4274) by CDF collaboration, and X(4350) by Belle collaboration. These resonances seem to be relatively stable despite being above open charm thresholds, since their upper bounds of the widths are less then 10-30 MeV. In particular, Y(4140) is located close to the J/psi-phi threshold.
We study the J/psi-phi interaction at low energies by using extended Luscher formula with partially twisted boundary conditions, which allows us to calculate s-wave and p-wave phase shifts at any small value of the scattering momentum even in a single finite volume. We perform our simulations with the relativistic heavy quark action for charm quarks in 2+1 flavor dynamical lattice QCD using the PACS-CS gauge configurations with a lattice cut-off of 1/a = 2.2 GeV.

Keywords

Heavy Flavor, Jet Quenching, QGP

Author: Dr OZAKI, Sho (Yonsei University)

Co-authors: LEE, Su Houng (Yonsei University); CHO, Sungtae (Yonsei University)

Presenter: Dr OZAKI, Sho (Yonsei University)

Session Classification: Parallel 2C (Chair Kenta Shigaki)

Contribution ID: **78** Type: **not specified**

Quarkonium measurements with the STAR experiment

Friday 16 November 2012 09:30 (30 minutes)

The main goal of relativistic heavy-ion collision is to search for the Quark-gluon Plasma (QGP) and to study its properties. Quarkonium suppression in heavy-ion collisions due to color-screening of quark and anti-quark has been proposed as a signature of QGP formation. But other mechanisms such as the cold nuclear matter effect, heavy quark recombination and hot wind dissociation are likely to contribute to the measured quarkonium yield in heavy-ion collisions. Measurements of different quarkonium states at different collision systems and centralities provide an important tool to decouple some of the mechanisms and extract the color-screening effects.
In this talk, we will summarize the recent STAR measurements of quarkonium production at mid-rapidity ($|y| < 1$)in $p + p$, d+Au and Au+Au collisions at $\sqrt{s_{\rm NN}} = 200$ GeV.

Author: Dr TANG, Zebo (University of Science and Technology of China)

Presenter: Dr TANG, Zebo (University of Science and Technology of China)

Session Classification: Plenary IIIA (Chair Su Houng Lee)

Contribution ID: **79** Type: **not specified**

Results from the RHIC Beam Energy Scan Program

Wednesday 14 November 2012 17:10 (30 minutes)

We will present the results from the Beam Energy Scan (BES) program at the Relativistic Heavy-Ion Collider (RHIC). In this program, Au ion collisions at center of mass energies
of 7.7, 11.5, 19.6, 27 and 39 GeV allowed RHIC to extend the study of the QCD phase diagram from baryonic chemical potential values of 20 MeV to about 400 MeV. Results related to freeze-out properties, partonic versus hadronic
interactions, novel symmetries of QCD and search for QCD critical point will be discussed.

Keywords

QCD phase diagram, Quark Gluon Plasma

Author: Prof. MOHANTY, Bedangadas (National Institute of Science Education and Research)

Presenter: Prof. MOHANTY, Bedangadas (National Institute of Science Education and Research)

Session Classification: Plenary IC (Chair Sourendu Gupta)

Contribution ID: **80** Type: **not specified**

Asymmetrical nuclear EOS study with CEE

Saturday 17 November 2012 11:20 (30 minutes)

For the equation of state (EOS) of neutron rich nuclear matter, what has been most uncertain is the symmetry energy term related to the energy cost of converting protons into neutrons in nuclear medium. Particularly at suprasaturation densities, the convincing density dependence of the symmetry energy is not yet available neither experimentally nor theoretically. Nuclear reactions, especially heavy-ion reactions induced by heavy neutron-rich beams sub-GeV/u, can produce dense nuclear matter with large N/Z asymmetry and thus provide an opportunity to probe the symmetry energy in terrestrial laboratories. In this talk, I will first review the latest theoretical and experimental progress in constraining the density dependence of the nuclear symmetry energy and its implications to the research of neutron stars, using heavy ion collisions below 1 GeVu. I will then introduce the newly proposed experiment, the CSR External Experiment (CEE) on the Cooling Storage Ring at the Heavy Ion Research Facility at Lanzhou, China(HIRFL-CSR).

Keywords

symmetry energy, nuclear equation of state, CEE, HIRFL-CSR

Author: Prof. XIAO, Zhigang (Tsinghua University)

Presenter: Prof. XIAO, Zhigang (Tsinghua University)

Session Classification: Plenary IVB (Chair Tetsuo Hatsuda)

Contribution ID: **81** Type: **not specified**

Quarkonium Regeneration in Heavy Ion Collisions at LHC

Friday 16 November 2012 09:00 (30 minutes)

We discuss the quarkonium production in heavy ion collisions at LHC energy, including both initial production before the QGP formation and the regeneration inside the QGP phase. Instead of the quarkonium yield, the quarkonium transverse momentum distribution is sensitive to the production dynamics and can be considered as a sensitive signature of the QGP formation.

Keywords

Quarkonium regeneration, Transverse momentum, QGP formation, Heavy ion collisions

Author: Dr ZHOU, Kai (Tsinghua Univ.)

Co-authors: Prof. XU, Nu (LBNL); Prof. ZHUANG, Pengfei (Tsinghua Univ.)

Presenter: Prof. ZHUANG, Pengfei (Tsinghua Univ.)

Session Classification: Plenary IIIA (Chair Su Houng Lee)

Contribution ID: **82** Type: **not specified**

Recent progresses in viscous hydrodynamics and the shear viscosity of the QGP

Thursday 15 November 2012 14:45 (25 minutes)

One of the most important finding in the recentyears at both Relativistic heavy ion collider (RHIC) and at Large Hadron Collider (LHC) is the existence of a strongly interacting almostperfect nuclear fluid which is produced in high energy heavy ion collision. BothLattice QCD and string theoretical calculation of the transport properties of theQCD matter at high density and temperature shows that the ratio of shear viscosityto entropy density (η/s) of the QCD matter reaches a very low value whichis believed to be the lowest among allknown fluids. However, these theoretical calculations contain largeuncertainties. One can also estimate the value of transport coefficients(shear, bulk viscosity) of QCD matter by means of phenomenological model studye.g, relativistic viscous hydrodynamics. However, the extracted value of $\eta/s$from viscous hydrodynamics relies on some strong assumption about the initialconditions as well as other input parameters used in the model. In this talk Iwill mainly focus on the recent progresses in the field of viscous hydrodynamicsto extract the value of η/s from the experimental data. I will also discusssome open problems related to viscous hydrodynamics which immediately needs attention in order to preciselyestimate the value of η/s from experimental data.

Keywords

QGP viscosity, relativistic hydrodynamics

Author: Mr ROY, Victor (National Institute of Science Education and Research)

Presenter: Mr ROY, Victor (National Institute of Science Education and Research)

Session Classification: Parallel 1A (Chair Xiaochun He)

Contribution ID: **83** Type: **not specified**

Beam Energy Scan on Hypertriton Production and Lifetime Measurement at STAR

Friday 16 November 2012 16:40 (25 minutes)

The hyperon-nucleon(Y-N) interaction is of great physical interest because it introduces a new quantum number strangeness in nuclear matter. It is predicted to be the decisive interaction in some high-density matter systems, such as neutron stars [1]. RHIC, the Relativistic Heavy Ion Collider, provides an ideal laboratory to study Y-N interaction because hyperons and nucleons are abundantly produced at high energy nucleus-nucleus collisions. The lifetime and decay modes of the hypertriton, the lightest hypernucleus, which consists of a proton, a neutron and the lightest hyperon Lambda, and the antimatter hypertriton discovered at RHIC[2], provide valuable insights into the Y-N interaction.

The strangeness population factor S3, defined as $\frac{^3_\Lambda H/^3He}{\Lambda/p}$, is a good representation of the local correlation between baryon number and strangeness[2]. It is predicted that S3 has a different behavior in QGP and pure hadron gas[3,4] thus can be used as a tool to distinguish Quark-Gluon Plasma (QGP) from a pure hadronic phase.

The RHIC beam energy scan program in 2010-2011 allowed STAR to collecte data from Au+Au collisions over a broad range of energies. This provides an opportunity to study the beam energy dependence of S3. In addition, due to the beam energy independence of our lifetime measurement method, with increased statistics of present datasets, an improved result of lifetime measurement of hypertriton can be obtained.

In this talk, the hypertriton analysis results for Au+Au collisions at $\sqrt{s_{NN}}$ = 7.7, 11.5, 19.6, 27, 39 and 200 GeV will be presented. With the excellent particle identification of Time Projection Chamber, we are able to reconstruct $^3_\Lambda H(^3_{\bar{\Lambda}}\bar{H})$ via its two-body decay channel to ^3He and $\pi^-(\overline{^3He}$ and $\pi^+)$. The combined $^3_\Lambda H$ plus $^3_{\bar{\Lambda}}\bar{H}$ raw yield is about 600 and its significance can reach 9.6σ. With this increased statistics, our lifetime measurement will be presented and the beam energy dependence of S3 will also be discussed.

[1] J. M. Lattimer, M. Prakash, Science {\bf304}, 536 (2004)

[2] B. I. Abelev {\it et al.}(STAR Collaboration), Science {\bf328}, 58 (2010)

[3] S. Zhang {\it et al.}, Phys. Lett. B. {\bf 684}, 224 (2010)

[4] J. Steinheimer {\it et al.}, Phys. Lett. B. {\bf 714}, 85 (2012)

Keywords

hypertriton, strangeness population factor, beam energy scan, lifetime

Author: Ms ZHU, Yuhui (Shanghai Institute of Applied Physics, CAS)

Presenter: Ms ZHU, Yuhui (Shanghai Institute of Applied Physics, CAS)

Session Classification: Parallel 6B (Chair Ulugbek Yakhshiev)

Contribution ID: **84** Type: **not specified**

ALICE recent results and future plans

Wednesday 14 November 2012 15:00 (30 minutes)

A few selected results obtained by ALICE from the two first LHC heavy-ion runs in 2010 and 2011 will be presented. These results will be discussed in the context of our understanding of the dynamics of heavy-ion collisions at the LHC and the dynamics of nuclear matter at extreme temperatures. The future scientific program that is aiming to establish a Standard Model for heavy-ion physics will be presented.

Keywords

ALICE, heavy-ion physics, QGP, upgrade program

Author: Dr YVES, Schutz (CERN/IN2P3)

Presenter: Dr YVES, Schutz (CERN/IN2P3)

Session Classification: Plenary IA (Chair Yu-Gang Ma)

Contribution ID: **85** Type: **not specified**

STAR HLT upgrade and Physics opportunity

Friday 16 November 2012 13:30 (25 minutes)

The continued increase in RHIC luminosity imposes a challenge for STAR data acquisition, offline computing and data analysis. A High Level Trigger (HLT) provides us with the capability to reduce the amount of data written to tape by selecting desired events while still maintaining a high sampling rate to fully utilize the delivered luminosity for wide range of triggers. In this talk we will present STAR's HLT layout and outline our future upgrade plan. We will highlight our recent physics achievement from the STAR HLT operation and discuss new physics opportunities in the future high luminosity era.

Keywords

Relativistic Heavy Ion Collisions, High Level Trigger, STAR

Author: Dr TANG, Aihong (BNL)

Presenter: Dr TANG, Aihong (BNL)

Session Classification: Parallel 4C (Chair In-Kwon Yoo)

Contribution ID: **90** Type: **not specified**

Status Updates on STAR Computing Farm at KISTI

Friday 16 November 2012 14:20 (25 minutes)

KISTI and STAR collaboration have been tightly co-working together to open a new Tier 1 service at KISTI. KISTI has been recently upgraded its STAR computing farm to 1024 cores, which is entirely dedicated to STAR community. In this talk, this smooth transition from the old farm to the new one will be covered including system configuration and topology. In addition to this, KISTI' s activities for community support and supporting plan for STAR computing will be covered in detail.

Keywords

KISTI STAR Farm, STAR Tier 1, STAR Supporting Plan

Author: Dr NOH, Seo-young (Korea Institute of Science and Technology Information)

Co-author: Dr JANG, Haengjin (Korea Institute of Science and Technology Information)

Presenter: Dr NOH, Seo-young (Korea Institute of Science and Technology Information)

Session Classification: Parallel 4C (Chair In-Kwon Yoo)

Contribution ID: **91** Type: **not specified**

Rare Isotope Science Project

Saturday 17 November 2012 11:50 (30 minutes)

Rare Isotope Science Project (RISP) is established in the Institute for Basic Science to lead the construction of heavy ion accelerator complex for the researches in the various fields with rare isotopes in Korea. The technical design of accelerator systems and experimental apparatus is in progress. The status and prospects of the project is reported.

Author: Prof. KIM, Sun Kee (Institute for Basic Science/ Rare Isotope Science Project)

Presenter: Prof. KIM, Sun Kee (Institute for Basic Science/ Rare Isotope Science Project)

Session Classification: Plenary IVB (Chair Tetsuo Hatsuda)

Contribution ID: **92** Type: **not specified**

Physics of Neutron stars

Saturday 17 November 2012 10:50 (30 minutes)

The underlying quark structure of hadrons suggets the possibility of a quark-hadron phase transition at high tempereature and/or density. Since a compact object like neutron star (NS) provide the natural scenario of high density, the suggestion for the existence of quark core inside such massive compact objects was put forward by Ivanenko and Kurdgelaidze in 1969 . The existence of 3-flavour quark star or strange star (QS), made up of u, d and s quarks, was suggested by Itoh in 1970. In general, the two flavour matter cannot be more stable compared to nucleonic matter. The presence of s quarks, along with u and d quarks, provides an additional Fermi well which would result in the lowering of the energy of the 3- flavour quark matter or strange quark matter (SQM) compared to 2- flavour quark matter. Since s quark has larger mass, the situation would be more favourable at higher densities. Such possibilities were recognized by Bodmer (1971) and led Witten (1984) to conjecture that SQM may be the true ground state of strongly interacting matter at high densities

One of the major difficulties in the theoretical calculations in these areas of research is the fact that the Quantum Chromodynamics (QCD) perturbative series shows poor convergence except for very small coupling at very high temperatures (αs < 0.5, T ~ 105 Tc). The perturbative treatment at high density also fails. The lattice calculations are still not reliable in the high density regime applicable to NS. Hence the high density systems are studied using the QCD inspired phenomenological models. Numerous model calculations have predicted a stable quark matter system within finite parameter ranges at finite temperature and/or density.

Presently, the major technical advancements in both ground as well as satellite based observations are producing huge amounts of data. There exists a large amount of observational data on mass-radii of NS which puts a constraint on the equation of state.

The upcoming Compressed Baryonic Matter experiment at FAIR, GSI, and Germany is expected to shed some light on the nature of high density matter expected to be present in the interior of Neutron Star

The conversion of Neutron star to a stable quark star may occur through two steps: namely Neutron star to two flavour quark star and then to three flavour strange quark star through weak interactions. One of the important aspects of the physics of Neutron stars is the role of magnetic field. We have found that the presence of a high magnetic field may affect the phase transition expected to occur inside Neutron stars.

I will be discussing the various issues related to the effect of magnetic field inside Neutron Stars along with the understanding of Neutron Star physics expected from CBM experiments.

Keywords

Neutron Star, quark star, equation of state, magnetic field

Author: Prof. GHOSH, Sanjay K. (Bose Institute)

Presenter: Prof. GHOSH, Sanjay K. (Bose Institute)

Session Classification: Plenary IVB (Chair Tetsuo Hatsuda)

Contribution ID: **93** Type: **not specified**

QCD at finite temperature under magnetic field

Friday 16 November 2012 13:55 (25 minutes)

In this talk, I report recent progresses on the nonperturbative QCD at finite temperature under external magnetic field. QCD phase transition, chiral magnetic effects, magnetic catalysis, and QGP transport coefficients are explored in terms of the instanton vacuum configuration consistently. We also discuss future perspective on this direction via effective chiral theories.

S.i.Nam, Phys.Rev. D86, 033014 (2012)
S.i.Nam, C.W.Kao, Phys.Rev. D83, 096009 (2011)
S.i.Nam, C.W.Kao, Phys.Rev. D82, 096001 (2010)
S.i.Nam, Phys.Rev. D82, 045017 (2010)

Author: Dr NAM, Seung-il (Korea INstitute for Advanced Study (KIAS), Republic of Korea)

Presenter: Dr NAM, Seung-il (Korea INstitute for Advanced Study (KIAS), Republic of Korea)

Session Classification: Parallel 4A (Chair Youngman Kim)

Contribution ID: **94** Type: **not specified**

Blast-wave model calculation of V2 including resonance decay

Thursday 15 November 2012 17:30 (25 minutes)

Blast-wave model is used to fit the elliptic flow coefficient measured at RHIC energies by allowing the variation in the radii and expansion velocities as a function of angles in the transverse plane. Decay contribution from high-lying resonances to each hadron species is included which may help saturating v2 at high Pt. In the viscous relativistic hydrodynamic calculation, viscosity acts as a control parameter of the relative magnitude radius in the x-y direction, while that of the transverse expansion is controlled by the initial geometry.

Authors: LEE, Kang Seog (Chonnam National University); Dr CHOI, Suk (Chungnam National University)

Presenter: LEE, Kang Seog (Chonnam National University)

Session Classification: Parallel 3A (Chair Daicui Zhou)

Contribution ID: **95** Type: **not specified**

Current status and future prospects of fundamental physics at J-PARC

Saturday 17 November 2012 10:00 (30 minutes)

The J-PARC is a high-intensity proton-accelerator complex which covers material and life science, as well as nuclear and particle physics. The entire complex is recovered from the damage by the earthquake in March, 2011, and in operation with a steadily increase of beam power and quality. We describe the current status and future prospects of the fundamental physics at J-PARC, which includes hadron, neutrino and muon science.

Author: Prof. NAOHITO, Saito (KEK-IPNS / J-PARC)

Presenter: Prof. NAOHITO, Saito (KEK-IPNS / J-PARC)

Session Classification: Plenary IVA (Chair Chang-Hwan Lee)

Contribution ID: **99** Type: **not specified**

Opening (In-Kwon Yoo)

Wednesday 14 November 2012 13:50 (10 minutes)

Session Classification: Opening (In-Kwon Yoo)

Contribution ID: **100** Type: **not specified**

Closing (Chang-Hwan Lee & Next Host)

Saturday 17 November 2012 12:20 (10 minutes)

Session Classification: Closing (Chang-Hwan Lee & Next Host)

Contribution ID: **101** Type: **not specified**

Application of AdS/CFT potential on the meson mass using two-body Dirac equations

Friday 16 November 2012 15:55 (25 minutes)

Indirect evidence of the quark gluon plasma state is found continuingly. As equations of state for relativistic matters are related to the energy density and temperature, research is needed for dissociation temperature of the meson. A basic stage research for obtaining insight into the dissociation of masons using the AdS/CFT potential that depends on the finite temperature is in progress. AdS/CFT potential and QCD-type potential are applied to the Schr"odinger-like equations obtained from the relativistic two-body Dirac equations for generalized mass-shell constraint with two free spin-half particles. When compare two potentials, AdS/CFT potential have one less parameters and work out closer value of quark masses. So I confirm availability of AdS/CFT potential as tools for obtaining information about the dissociation temperature of meson.

Authors: Mr KIM, Byeong-Noh (Inha Universtiy); Prof. YOON, Jin-Hee (Inha University)

Presenter: Mr KIM, Byeong-Noh (Inha Universtiy)

Session Classification: Parallel 5A (Chair Seyong Kim)