Workshop for young scientists with research interests focused on physics at FAIR

Report of Contributions

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

Study of Excited Ξ Baryons in Antiproton-Proton Collisions with the PANDA Detector

Wednesday, 17 February 2016 18:20 (25 minutes)

Understanding the excitation pattern of baryons is indispensable for a deep insight into the mechanism of non-perturbative QCD. Up to now only the nucleon excitation spectrum has been subject to systematic experimental studies while very little is known on excited states of double or triple strange baryons.

In studies of antiproton-proton collisions the PANDA experiment is well-suited for a comprehensive baryon spectroscopy program in the multi-strange and charm sector.
A large fraction of the inelastic pbar p cross section is associated to final states with a baryon-antibaryon pair together with additional mesons, giving access to excited states both in the baryon and the antibaryon sector.

In the present study we focus on excited Ξ states. For final states containing a ΞΞbar pair cross sections up to the order of μb are expected, corresponding to production rates of ~ 106/d at a Luminosity L=1031 cm-2 s-1 (5% of the full value).
A strategy to study the excitation spectrum of Ξ baryons in antiproton-proton collisions will be discussed. The reconstruction of reactions of the type pbar p → Ξ* Ξbar (and their charge conjugated) with the PANDA detector will be presented based on a specific exemplary reaction and decay channel.

Primary author: PÜTZ, Jennifer (Forschungszentrum Jülich(FzJü))

Co-authors: GILLITZER, Albrecht (FZ Juelich); Prof. RITMAN, James (FZ Juelich)

Presenter: PÜTZ, Jennifer (Forschungszentrum Jülich(FzJü))

Session Classification: Talks

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

Progresses on Light Hadron Spectroscopy at BESIII

Wednesday, 17 February 2016 17:10 (25 minutes)

The BESIII experiment at the electron positron collider BEPCII
in Beijing is successfully operating since 2008 and has collected large data samples in the tau-mass region, including the world's largest data samples at the J/psi and psi' resonances. In particular decays of these two resonances provide a rich
and clean environment to study hadrons consisting out of light quarks and search for exotics.

The collaboration has recently started a campaign to understand the nature of the X(1835) and Y(2175) resonances, which are debated to be exotic matter.
Important observations have also been archived in baryon spectroscopy, where the analyses benefit from the well defined initial state in e+e- collisions. Further, decays of eta' mesons are studied to deepen our knowledge of their structure and possible symmetry breaking effects in their decays.

In this presentation recent results of the light hadron physics program
will be highlighted.

Primary author: Mr YAN, Wencheng (University of Science and Technology of China)

Presenter: Mr YAN, Wencheng (University of Science and Technology of China)

Session Classification: Talks

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

Charm physics + XYZ states at BESIII

Monday, 15 February 2016 10:45 (25 minutes)

The BESIII Experiment at the Beijing Electron Positron Collider (BEPC2) collected large data samples for electron-positron collisions with center-of-mass above 4 GeV during 2013 and 2014. The analysis of these samples has resulted in a number of surprising discoveries, such as the discoveries of the electrically charged “Zc” structures, which, if resonant, cannot be accomodated in the traditional charm quark and anti-charm quark picture of charmonium. In this talk, we will review the current status of the analyses of the Zc structures, as well as a number of other interesting features in the new BESIII data samples.

Primary author: Mr FANG, shuangshi (IHEP)

Presenter: BOGER, Evgeny (JINR Dubna, Russia)

Session Classification: Talks

Contribution ID: **10** Type: **not specified**

Study of baryon form factor at BESIII / Form Factor measurements at BESIII

Wednesday, 17 February 2016 09:15 (25 minutes)

Using data samples collected with BESIII detector at BEPCII collider, we measure Born cross section of e+e- ⊠pp¯ at center-of-mass energies √s from 2232.4 to 3671.0 MeV. The effective electromagnetic form factor of the proton is deduced with assumption that electric and magnetic form factors are equal(GE=GM). The ratio |GE/GM|and |GM |are extracted by fitting polar angle distribution of proton for the data samples with larger statistics. For e+e- ⊠ΛΛ¯ process, the Born cross sections and effective form factors are measured at √s = 2.2324 GeV, 2.40 GeV, 2.80 GeV and 3.08 GeV. It is the first time that e+e- ⊠ΛΛ¯ proces is studied closed to ΛΛ¯ production thresh-old, and measured cross section is much larger than phase space expectations, which suggests that something more is at play beyond expected phase space behavior. For e+e- ⊠Λ_(c)^+ Λ¯_c^- process, the very weak energy dependence of cross section near threshold indicates that traditional theoretical prediction, which did not take account strong interaction, needs to be modified. With the large statistic of multiple decay modes, The ratio |GE/GM|and |GM |are extracted

Primary author: Dr LI, Cui (Uppsala University)

Presenter: Dr LI, Cui (Uppsala University)

Session Classification: Talks

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

Search for Search for etac production in e+e−>KsKpi

Tuesday, 16 February 2016 10:20 (25 minutes)

Pseudoscalar mesons (P) decaying into lepton-antilepton pairs can provide a signal to physics beyond the Standard Model. Within the Standard Model
P->l+l- proceeds via a two-photon intermediate state. Therefore it is a fourth order
electromagnetic process, and thus suppressed. Determinations of upper limits has previously been performed for pi0, eta and eta' decaying to lepton-antilepton pairs. However, until now, no attempt has been made to measure etac->e+e-. The Beijing Electromagnetic Spectrometer III (BESIII) detector at the Beijing Electron-Positron
Collider (BEPC-II) recently performed a beam energy scan resulting in a data set including ~60 pb-1 in the mass region of the etac. BESIII covers 93% of the 4pi solid angle and provides tracking, calorimetry, time of
ight information for particle identification,
and muon detection. BEPC-II is a double-ring electron-positron collider optimized for the charmonium region. The data recently collected at BESIII are uniquely suited for studying the etac->e+e- decay via the reverse process e+e−>etac. It is preferable
to study e+e−>etac since the signal is expected to be cleaner than in other modes of access, for example J/psi−>gamma etac. The statistics of e+e−>etac is expected to be better in
the new data set than in previously available data sets of J= . In this analysis the process e+e−> Ks Kpi is studied due to the large decay probability of etac->KsKpi.In this talk, the most recent results of this analysis will be presented.

Primary author: PETTERSSON, Joachim (Uppsala University(IKP-U))

Presenter: PETTERSSON, Joachim (Uppsala University(IKP-U))

Session Classification: Talks

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

Statistical uncertainties on the NN interaction and light nuclei

Monday, 15 February 2016 08:30 (45 minutes)

We review recent developments on the analysis of the Nucleon-Nucleon interaction with the corresponding propagation of statistical uncertainties originating from NN scattering experimental data. We also ponder on the consequences of this uncertainties on the predictive power of low energy chiral interactions and the required target numerical accuracy of nuclear structure calculations of light nuclei.

Primary author: Dr NAVARRO PEREZ, Rodrigo (Lawrence Livermore National Laboratory)

Co-authors: Dr RUIZ ARRIOLA, Enrique (University of Granada); Dr AMARO, Jose Enrique (University of Granada)

Presenter: Dr NAVARRO PEREZ, Rodrigo (Lawrence Livermore National Laboratory)

Session Classification: Talks

Contribution ID: **13** Type: **not specified**

The f0(500) meson: its role at nonzero density and at nonzero temperature

Monday, 15 February 2016 18:25 (25 minutes)

We discuss some properties of QCD at nonzero density and nonzero temperature. At nonzero density we describe the emergence of inhomogeneous quark-antiquark condensate in the framework of QCD effective models. We show that such an inhomogenous condensate is favored at high enough density. In particular, we use an effective hadronic model which makes use of chiral symmetry and includes a light tetraquark/moelcular state, the resonance f0(500). At nonzero temperature we investigate the effect that light scalar mesons have in a thermal gas. We show indeed that these states, such as f0(500) and the k states, have a negligible influence on the bulk properties of an hadronic gas because of subtle cancellations occurring between attraction and repulsion.

Primary author: Dr GIACOSA, Francesco (Frankfurt University)

Presenter: Dr GIACOSA, Francesco (Frankfurt University)

Session Classification: Talks

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

Effective Field Theory Investigations of the ”XYZ” Puzzle

Monday, 15 February 2016 11:10 (25 minutes)

Quantum Chromodynamics (QCD), the theory of strong interactions, predicts several types of bound states. Among them are mesons (quark-antiquark) and baryons (quark-quark-quark), which have been the only states observed in experiments for years. However, in the last decade many states that do not fit this picture have been identified. There is growing evidence that at least some of the new charmonium- and bottomonium-like states, the so-called “XYZ” mesons, are new forms of matter such as quark-gluon hybrids, mesonic molecules, and tetraquarks. Many questions related with this topic should be solved in the next decade and Europe is situated in a privileged position with two major experiments scheduled: run II LHCb@CERN and PANDA@GSI.

In support of the experimental effort, Europe should also play a leading role in its theoretical counterpart. The state-of-the-art theoretical tools for analysing heavy quarkonium systems are lattice regularized QCD and Effective Field Theories (EFTs). Concerning lattice QCD studies, the path to be followed seems to be still long: calculations of excited states have been only recently pioneered and the full treatment of bottomonium on the lattice seems to be tricky. In this contribution, we intend to present our recently Humboldt awarded research project which aims to develop novel EFTs that, characterizing the conventional quarkonia, also facilitate the the systematic and model-independent description of the “XYZ” states taking into account their possible exotic structure.

Primary authors: Dr SEGOVIA, Jorge (Technische Universität München); BRAMBILLA, Nora Brambilla (TUM)

Presenter: Dr SEGOVIA, Jorge (Technische Universität München)

Session Classification: Talks

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

Phenomenological study of exclusive binary light particle production from antiproton-proton annihilation at FAIR/PANDA

Wednesday, 17 February 2016 09:40 (25 minutes)

Exclusive binary annihilation reactions induced by antiprotons of momentum from 1.5 to 15 GeV/c can be extensively investigated at FAIR/PANDA [1]. The hadronization process (how a hadron is built from the quantum vacuum created by the pp annihilation and how does it mass, and quantum numbers arise) is the most fundamental problem in QCD. We are specially interested in the channel of charged pion pairs. Whereas this very probable channel constitutes the major background for other processes of interest in the PANDA experiment, it carries unique physical information on the quark content of proton, allowing to test different models (quark counting rules, statistical models,..). However, models as QCD-quark counting rules can not predict absolute cross sections of such exclusive processes. Experimental data are such scarce that no precise and complete angular distributions are available in a large energy range, particularly in the range of PANDA. To study the binary reactions of light meson formation, we are developing an effective Lagrangian model based on Feynman diagrams which takes into account the virtuality of the exchanged particles. Regge factors [2] and form factors are introduced with parameters which may be adjusted on the existing data, which only partially overlap the PANDA energy region. The formalism is built in a suitable way to be easily implemented in an event generator. We will present the first steps of a global analysis of different reactions of antiproton-proton to $\pi 0\ \pi 0$, $\pi +\ \pi -$, $\gamma\gamma$, $\eta\eta$, $\pi 0\ \gamma$, $\eta\ \pi 0$. The final goal is a coherent interpretation of these reactions for reliable predictions of cross sections, energy and angular dependences in the PANDA kinematical range.

Primary author: Ms WANG, Ying (CNRS/IN2P3/Institut de Physique Nucléaire d'Orsay, Université Paris-Sud, France)

Presenter: Ms WANG, Ying (CNRS/IN2P3/Institut de Physique Nucléaire d'Orsay, Université Paris--Sud, France)

Session Classification: Talks

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

Concept and design of an alignment monitoring system for the CBM RICH mirrors

Monday, 15 February 2016 16:45 (25 minutes)

The Compressed Baryonic Matter (CBM) experiment at the future FAIR (Facility for Antiproton and Ion Research) complex will investigate the phase diagram of strongly interacting matter at high baryon density and moderate temperatures in A+A collisions from 4-35 AGeV.
One of the key detector components required for this CBM physics program is the RICH (Ring Imaging CHerenkov) detector, which is developed for efficient and clean electron identification and pion suppression. The detector will be made of a CO2 gaseous radiator, MAPMT photodetectors and a spherical mirror, consisting of about 80 trapezoidal glass mirror tiles used as focussing elements with spectral reflectivity down to the UV range.
An important aspect to guarantee a stable operation of the RICH detector is the alignment of the mirrors. A method using recorded data and originally developed and inspired by the HERA-B experiment will be employed to assess mirror alignment of the RICH mirror system. For a sufficient number of accumulated events hitting a particular mirror tile, measurements of Cherenkov distances and angles on the PMT plane may reveal potential misalignments of the considered tile. Results based on simulated events and the limits of the method will be presented and discussed.
In parallel CLAM (Continuous Line Alignment Monitoring), an alignment procedure developed by the COMPASS experiment, is also planned to be used for the alignment of the mirror system. A downscaled version has been implemented in the CBM RICH prototype detector and tested at the CERN PS/T9 beamline. Using a grid and target dots made of retro-reflective material, it is possible to align the mirrors and monitor their displacements over time by analyzing photographic images of the grid reflected on the mirror. Data and results of image processing will be reviewed and discussed as well.
If possible mirror misalignment is revealed, it can be subsequently included and rectified by correction routines. These routines should mostly increase the ring reconstruction as well as the ring-track matching efficiencies. Finding for each mirror tile ID, its corresponding influence area on the PMT plane, along with corrections in the track extrapolation will allow a direct utilization of the misalignment information on the PMT hits. Results given by first correction routines will be presented.

Primary author: BENDAROUACH, Jordan (Justus-Liebig-Universität Gießen(JuLGi-2PI))

Presenter: BENDAROUACH, Jordan (Justus-Liebig-Universität Gießen(JuLGi-2PI))

Session Classification: Talks

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

Peformance of Prototypes for the barrel part of the PANDA Electromagnetic Calorimeter

Tuesday, 16 February 2016 16:45 (25 minutes)

The electromagnetic calorimeter (EMC) of the PANDA detector at the future FAIR facility will be used to study proton - antiproton interaction. The EMC of the target spectrometer with its expected excellent performance and efficiency for electromagnetic probes over a wide energy range from 10 MeV up to 15 GeV, will be one of the central components to achieve the physical goals. The barrel part of the EMC will consist of more than 11,000 lead tungstate (PWO-II) crystals operated at -25℃ to achieve the required performance and efficiency.
The contribution will compare the performance of the most recent prototypes of the PANDA barrel EMC. The first large scale prototype PROTO60 consisting of a 6x10 matrix of tapered crystals read-out with a single quadratic LAAPD was tested at various accelerator facilities over the complete envisaged energy range fulfilling the requirements of the TDR of the PANDA EMC in terms of energy, position and time resolution. To realize the final barrel geometry and to test the final front end electronics, a second prototype PROTO120 has been constructed. It represents a larger section of a barrel slice, containing the most tapered crystals and contains the close to final components for the PANDA EMC. The readout is performed with two rectangular large area APDs per crystal, which are read out separately via the specially developed APFEL-ASIC, providing a large dynamic range, low power consumption and optimized signal shaping. The performance of both prototypes will be compared with a focus on the analysis procedure including the signal extraction, noise rejection, calibration and the energy and position resolution. In addition, the influence of the non-uniformity of the crystal on the energy resolution will be discussed.

The project has been supported by BMBF, HIC4FAIR, GSI and EU.

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Presenters: Mr ROSENBAUM, Christoph (II. Physikalisches Institut, Justus-Liebig-Universität Gießen); Mr DIEHL, Stefan (II. Physikalisches Institut, Justus-Liebig-University Giessen)

Session Classification: Talks

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

Development of track and event reconstruction algorithms for the PANDA Detector at FAIR

Monday, 15 February 2016 18:00 (25 minutes)

The future PANDA experiment at FAIR has a rich and broad physics program. Hyperon production and the study of their properties is one of them. Antihyperon-hyperon pairs can be produced in antiproton-proton collisions through the annihilation of at least one light (u, d) antiquark-quark pair and the creation of sbar s antiquark-quark pairs.
Ground state hyperons can only decay through the weak interaction and thus have long life-times. Because of this, the hyperon decay vertices will be displaced from the interaction point. Therefore, the point of origin of the track is unknown and this sets a high demand on reconstruction algorithms that can resolve these tracks.
One algorithm capable of reconstructing tracks with displaced vertices is the SttCellTrackFinder. The SttCellTrackFinder uses only information from the Straw Tube Tracker (STT) of PANDA to reconstruct the transverse momentum of charged tracks. Parallel straws that were hit by a traversing charged particle are first grouped to each other through neighboring relations. A circle fit is then performed in the group of hits in the xy–plane. There are also skewed straws in the STT which will be used to extract the longitudinal momentum component. By matching the hits from the skewed straws with the circles obtained from the SttCellTrackFinder, the z-component is obtained.
In high luminosity mode, the mean time between events can be as short as 100 ns which is shorter than the drift times in the STT of up to 250 ns. A continuously sampling data acquisition scheme without hardware triggers is planned for PANDA, where events are reconstructed from time gaps in the stream of hits from one or more subdetectors with good time resolution.
The status of the development of the tools for the reconstruction of the longitudinal momentum with the STT as well as algorithms for reconstructing events will be presented.

Primary author: Mr IKEGAMI ANDERSSON, Walter (Uppsala University(IKP-U))

Presenter: Mr IKEGAMI ANDERSSON, Walter (Uppsala University(IKP-U))

Session Classification: Talks

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

On the nature of k0*(800)

Tuesday, 16 February 2016 11:35 (25 minutes)

We study the broad light scalar kaonic resonance k0*(800) as a dynamically generated state. Namely, we show that this resonance emerges when investigating the heavier quark-antiquark scalar state k0(1430) dressed by quantum fluctuations with one kaon and one pion circulating in the loops. We analyse the spectral function in the whole kaonic sector up to 1.8 GeV and determine the position of the poles on the complex plane: k0*(1430) corresponds to a standard 'seed' state, while k0(800) corresponds to a 'companion' additional pole.

Primary author: Ms SOLTYSIAK, Milena (Jan Kochanowski University)

Co-author: Dr GIACOSA, Francesco (Frankfurt University)

Presenter: Ms SOLTYSIAK, Milena (Jan Kochanowski University)

Session Classification: Talks

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

Poincare invariance in NRQCD and pNRQCD

Wednesday, 17 February 2016 16:45 (25 minutes)

We present the calculations on the relations between Wilson coefficients in non-relativistic QCD and potential non-relativistic QCD by using non-linear field transformations to implement Poincar\'e invariance in them. The results confirm the known relations and it can further be used to derive the constraints between the coefficients of the higher order terms in the expansions. Similarly, its implementation to the soft-collinear effective theory will briefly be introduced as an outlook.

Primary author: Mr HWANG, Sungmin (TU München)

Co-author: Mr BERWEIN, Matthias (TU München)

Presenter: Mr HWANG, Sungmin (TU München)

Session Classification: Talks

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

(Anti-)strangeness in heavy ion collisions

Tuesday, 16 February 2016 17:10 (25 minutes)

We study the production of (anti-) strange and multi-strange hadrons in heavy ion collisions from FAIR/NICA to RHIC energies within the Parton-Hadron-String Dynamics (PHSD) microscopic transport approach, which contains the partonic and hadronic dynamics. We observed traces from the QGP by looking at a verity of 'bulk' observables like the excitation functions of particle yields, pt- and rapidity distributions, centrality dependencies of yields, etc. By showing the channel decomposition for the strangeness production we demonstrate how with increasing energy the production by the QGP dominates the hadronic production. However, the production of a deconfined state of matter does not explain the strangeness enhancement seen experimentally at FAIR/NICA energies, which could be attributed to the approximate restoration of chiral symmetry in the hadronic phase. We show the corresponding PHSD results for strange mesons and baryons including the phase transition and chiral symmetry restoration.

Primary author: Mr MOREAU, Pierre (Frankfurt Institute for Advanced Studies, Johann Wolfgang Goethe Universität)

Presenter: Mr MOREAU, Pierre (Frankfurt Institute for Advanced Studies, Johann Wolfgang Goethe Universität)

Session Classification: Talks

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

The PANDA Experiment at FAIR

Tuesday, 16 February 2016 09:15 (45 minutes)

The advent of new accelerators technologies, like the use of intense and stored antiprotons beams, will set an inflection point in what we know today
as Modern Physics. In particular, the PANDA experiment at the FAIR facility in Darmstadt, (Germany), will help to elucidate many of the still obscure aspects of the strong interaction, and consequently build a link between nuclear and hadron physics. At PANDA, the interaction of antiprotons beams at momenta up to 15 GeV/c on a fixed target will provide a broad research program that includes among others: high-precision spectroscopy of charmonium states ; search of new states in the QCD meson spectrum; in-medium modications of charmed mesons; high precision gamma-spectroscopy of doubly strange hypernuclei; time-like form factors and Drell-Yan processes and CP violation studies.
To achieve this ambitious physics program, the PANDA detector has been conceived as a general-purpose and versatile detector. The main objectives in the design of the PANDA detector are to achieve 4-pi acceptance, high resolution for tracking, particle identication and calorimetry, high rate capabilities and a versatile readout and events selection. To obtain a good momentum resolution the detector will be split into two spectrometers: The target spectrometer (TS), based on a superconducting solenoid magnet surrounding the interaction point, and dedicated to measure high pT tracks, and the forward spectrometer (FS), based on a dipole magnet, for detecting particles emitted at forward angles. The present status and perspectives of the PANDA experiment will be shown in the present talk. In addition, the production and identication of doubly strange hypernuclei will also be shortly reported.

Primary author: Dr SANCHEZ-LORENTE, Alicia (Helmholtz-Institute Mainz)

Presenter: Dr SANCHEZ-LORENTE, Alicia (Helmholtz-Institute Mainz)

Session Classification: Talks

Contribution ID: **27** Type: **not specified**

A Three-Flavor Chiral Effective Model with Four Baryonic Multiplets within the Mirror Assignment

Tuesday, 16 February 2016 18:25 (25 minutes)

In the framework of the extended Linear Sigma Model we study four baryonic multiplets introduced via the mirror assignment, which allows chirally invariant mass terms. We first investigate formal features of a three-flavor treatment of the problem and then study the reduction to the two flavor case. In the latter, four baryonic doublets are present: the nucleon $N(939)$ and the Roper $N(1440)$ with positive parity, as well as the resonances $N(1535)$ and $N(1650)$ with negative parity. We determine the parameters of the model via a fit to known masses and decay properties of the aforementioned states, showing a good agreement of theory with data.

Primary author: OLBRICH, Lisa (german)

Co-authors: Prof. RISCHKE, Dirk (Goethe University); Dr GIACOSA, Francesco (Frankfurt University); Dr ZÉTÉNYI, Miklós (Wigner Research Center of Budapest)

Presenter: OLBRICH, Lisa (german)

Session Classification: Talks

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

Directed and Elliptic Particle Flow and Reaction Plane reconstruction performance in the CBM experiment

Wednesday, 17 February 2016 10:50 (25 minutes)

Particle flow and reaction plane reconstruction performance using the Projectile Spectator Detector (PSD) in the CBM experiment at the future FAIR facility will be presented. The PSD is a compensating lead-scintillator calorimeter designed to measure the energy distribution of the forward going projectile nucleons and nuclei fragments (spectators) produced close to the beam rapidity. The main purpose of the PSD is to provide experimental estimates of heavy-ion collision centrality and reaction plane orientation. Directed and elliptical proton flow is studied for Au+Au collisions using five heavy-ion collision event generators: iQMD, UrQMD, DCM-QGSM, LA-QGSM and HSD. Reaction plane reconstruction performance was investigated for produced particles transported with the GEANT Monte-Carlo through realistic CBM detector geometry. Simulations are performed for the range of beam energies between 1 and 30 AGeV, which covers the expected beam energy range of the SIS100 and the SIS300 accelerator rings at FAIR. Performance of the reaction plane determination is shown with the PSD as a standalone detector and in a combination with other CBM subsystems. Results are compared with the experimental data from HADES, FOPI, AGS E877, E895 and STAR. Results on higher order harmonics of particle flow are also overviewed for 1.23AGeV energy compared with FOPI and HADES experimental data.

Primary author: MIKHAYLOV, Vasily (Nuclear Physics Institute of CAS)

Co-authors: KUGLER, Andrej (Nuclear Physics Institute of CAS); SELYUZHENKOV, Ilya (GSI, Darmstadt); Dr TLUSTY, Pavel (Nuclear Physics Institute of CAS); Dr KUSHPIL, Vasilij (Nuclear Physics Institute of CAS)

Presenter: MIKHAYLOV, Vasily (Nuclear Physics Institute of CAS)

Session Classification: Talks

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

Hidden neutrons in HADES data

Thursday, 18 February 2016 11:15 (25 minutes)

The HADES experiment at GSI Helmholtzzentrum f\"{u}r Schwerionenforschung in Darmstadt (Germany) is fix target experiment using SIS-18 accelerator to study collisions of protons, heavy-ions or secondary pions with target nuclei. HADES is designed to study reactions with di-electrons in final state but it provides also very accurate measurement of charged hadrons.

The pion induced reactions provide unique oportunity to study exclusive reactions with neutrons in the final state. Using the inclusive channel $\pi^- + \mathrm{p} \rightarrow \pi^- + \pi^+ + \mathrm{n}$ we can optimize the selection criteria for neutron hits in TOF/RPC. Different ways of usage of MDC as veto is discused. Dedicated simulations are compared with preliminary results of real data analysis for reaction channels with two neutral particles in the final state.

Primary author: Mr CHLAD, Lukáš (Nuclear Physics Institute ASCR)

Co-author: KUGLER, Andrej (Nuclear Physics Institute ASCR)

Presenter: Mr CHLAD, Lukáš (Nuclear Physics Institute ASCR)

Session Classification: Talks

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

$B\bar{B}$ four-quark systems from lattice QCD

Monday, 15 February 2016 11:35 (25 minutes)

There are several mesons whose $q\bar{q}$ quark-structure is doubted or even excluded. Therefore it is interesting to look for alternative structures for those candidates. Four-quark systems are a possible explanation. One way to approach four-quark models quantitatively is by means of lattice QCD.
We study the heavy-light four-quark system $b\bar{b}l\bar{l}$ ($B\bar{B}$) on the lattice. The heavy (anti-)quarks $b\bar{b}$ are addressed in the static approximation. We consider the experimentally interesting case of isospin $I_z = +/-1$, i.e. the light (anti-)quarks $l\bar{l}$ have different flavours. One aim is to investigate whether the attractiveness of the four-quark potentials is sufficient to host a bound state. For that purpose, the potential is plugged into the Schrödinger equation. The energy eigenvalues provide an insight into whether one can find a bound state or not. The crucial task in the process is to ensure that the computed potential is not a bottomonium and a light meson instead of a four-quark system.

Primary author: Ms PETERS, Antje (Goethe-Universität Frankfurt am Main)

Co-authors: Dr KRZYSZTOF, Cichy (Goethe-Universität Frankfurt am Main); Prof. WAGNER, Marc (Johann Wolfgang Goethe-Universität Frankfurt am Main); BICUDO, Pedro (IST, Lisboa)

Presenter: Ms PETERS, Antje (Goethe-Universität Frankfurt am Main)

Session Classification: Talks

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

Bottomonium physics at Y(4S, 5S, 6S) energies with the Belle detector

Monday, 15 February 2016 10:20 (25 minutes)

The structure of heavy mesons located above the thresholds for the open flavour production as been largely discussed in the recent years. The observation of charged exotic states highlighted the importance of the light quark degrees of freedom in the description of both quarkonia and bottomonia. We will report the most recent experimental measurements performed by the Belle collaboration around the Y(4S), Y(5S) and Y(6S) energy, including the measurement the the ratio $\frac{\sigma(e^+e^- -> b\bar{b})}{\sigma(e^+e^- -> \mu^+\mu^-)}$ in the Y(5S) an Y(6S) energy, the search for neutral states near the B^0

Primary author: Mr TAMPONI, Umberto (INFN and University of Torino)

Presenter: Mr TAMPONI, Umberto (INFN and University of Torino)

Session Classification: Talks

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

Dilepton production with SMASH – a new transport model

Thursday, 18 February 2016 16:45 (25 minutes)

In this talk we present the SMASH model, a next-generation hadronic transport implementation that is designed to describe the non-equilibrium evolution of hadronic matter in heavy-ion collisions. After laying out the basic principles and ingredients of the model, we discuss a few benchmark results that illustrate the correct behaviour of the code. We then present first dilepton spectra obtained with SMASH in the few-GeV energy range of GSI/FAIR, where the dynamics of hadronic matter is dominated by the production and decay of various resonance states. We show that many of the resonance-coupling effects that contribute to the in-medium spectral function of the rho meson arise quite naturally in the transport approach – not only in heavy-ion collisions, but in fact already in elementary pp collisions. Finally we also show some results from "coarse-grained" transport simulations, where one directly combines the transport dynamics with externally-provided in-medium spectral functions, and compare the results from both methods.

Primary author: Dr WEIL, Janus (FIAS)

Co-authors: OLIINYCHENKO, Dmytro (FIAS); Dr PETERSEN, Hannah (Frankfurt Institute for Advanced Studies); Mr STAUDENMAIER, Jan (FIAS); Mr ENDRES, Stephan (Frankfurt Institute for Advanced Studies / University of Frankfurt); Mr STEINBERG, Vinzent (FIAS)

Presenter: Dr WEIL, Janus (FIAS)

Session Classification: Talks

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

The CBM Transition Radiation Detector in Principle and First Time-Based Data Analysis

Tuesday, 16 February 2016 11:10 (25 minutes)

The Compressed Baryonic Matter project (CBM) at the upcoming SIS100 heavy-ion accelerator at the FAIR (Darmstadt, Germany) will explore the QCD phase diagram in so far unknown regions of moderate temperatures and high baryonic densities for the hadronic freeze-out. Thus, the experiment is expected to gain progress in the understanding of the phase transition between hadronic matter and a quark-gluon plasma. The particle identification capabilities of detector experiments are crucial for such analyses, and the CBM Transition Radiation Detector (TRD) delivers an excellent electron-pion separation for momenta above 1.5 GeV/c as well as a high position resolution for track matching. The unprecedented particle rates in CBM set high requirements on the rate capabilities of the detectors, which will be demonstrated on the close-to-final CBM TRD prototypes. After this general introduction, we will focus on the event analysis and especially the principles of time-based analysis of TRD data (CERN Super Proton Synchrotron beamtime, 2014), which requires spatial and time clustering of the measured event data.

Primary author: KÄHLER, Philipp (Westfälische Wilhelms-Universität Münster(UMs-IKP))

Presenter: KÄHLER, Philipp (Westfälische Wilhelms-Universität Münster(UMs-IKP))

Session Classification: Talks

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

Quarkonium Hybrids with Nonrelativistic Effective Field Theories

Wednesday, 17 February 2016 17:55 (25 minutes)

We use nonrelativistic effective field theories to obtain from QCD the Schrödinger equations describing quarkonium hybrids and the static interaction potential in the region from small to intermediate quark-antiquark distance. The nonperturbative parameters appearing in the potential are fixed by the lattice calculation of the gluelump mass and the hybrid static energy, the rest is calculated in perturbation theory. We solve the coupled Schrödinger equations, taking into account the so-called Λ-doubling terms and defining an appropriate renormalon-free scheme. We obtain predictions for quarkonium hybrid multiplet masses in the cgcbar, bgcbar, and bgbbar sectors and we compare to the experimental data. The effect of the Λ-doubling terms is a breaking of the degeneracy between spin symmetry multiplets with opposite parity. Reducing the error in the gluelump mass lattice calculation would allow us to reduce the error in our predictions. We discuss the relation of our description with the so-called Born-Oppenheimer approximation used in QCD to define the hybrid static energies and we compare our results on the hybrid masses with lattice and sum rules calculations.

from upcoming publication (report no. TUM-EFT 45/14)
M. Berwein, N. Brambilla, J. Tarrus Castella, A. Vairo

Primary author: BERWEIN, Matthias (TU München)

Presenter: BERWEIN, Matthias (TU München)

Session Classification: Talks

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

From dripline to dripline: Nuclear astrophysics in the laboratory

Wednesday, 17 February 2016 08:30 (45 minutes)

Nuclear astrophysics is the study of the origin of the elements, nuclear energy generation in space, and the nature of ultradense matter. Experimental nuclear astrophysics studies require access to nuclides across nearly the whole nuclear chart, from the proton dripline to the neutron dripline. In order to reach these extremes, cutting-edge rare isotope facilities such as FAIR are required. I will present an overview of the current status of experimental work in nuclear astrophysics, focusing on selected highlights from the rare isotope facilities GSI, NSCL, RIKEN, and HIRFL. Open research questions will be discussed through the lens of physics opportunities for NUSTAR at FAIR. Connections to recent advances in nuclear structure will also be discussed.

Primary author: Dr MEISEL, Zach (University of Notre Dame)

Presenter: Dr MEISEL, Zach (University of Notre Dame)

Session Classification: Talks

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

Lattice QCD and physics at FAIR

Tuesday, 16 February 2016 08:30 (45 minutes)

Simulations of dense quark matter are hampered by the sign problem, invalidating the usual importance sampling based methods of lattice QCD, and preventing the determination of the location of the critical point on the QCD phase diagram. Possible workarounds and solutions to the problem are discussed, with emphasis on the review of the recent successes of the Complex Langevin approach, based on the analytic properties of the QCD action.

Primary author: Dr SEXTY, Denes (Uni Wuppertal)

Presenter: Dr SEXTY, Denes (Uni Wuppertal)

Session Classification: Talks

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

Flow harmonics of Au-Au collisions at 1.23 AGeV with HADES

Monday, 15 February 2016 17:10 (25 minutes)

HADES provides a large acceptance combined with a high mass-resolution and therefore allows to study dielectron and hadron production in heavy-ion collisions with unprecedented precision. With the high statistics of seven billion Au-Au collisions at 1.23 AGeV recorded in 2012 the investigation of high-order flow harmonics is possible.

Collective flow phenomena are a sensitive probe for the properties of extreme QCD matter. However, their interpretation relies on the understanding of the initial conditions e.g. the eccentricity of the fireball created in the nuclear overlap region. Based on Glauber Monte Carlo calculations the primordial anisotropic configuration of the colliding nuclei were examined w.r.t. the reaction centrality and event-by-event flow observables and fluctuations are deduced and compared to the measured data.

At low energies v1 and v2, related to directed and elliptic flow, are measured for pions, charged kaons, protons, neutrons and fragments at the BEVALAC and SIS18, but so far high-order harmonics have not been studied. Multi-particle azimuthal correlation technique can be utilized to disentangle the contribution from collective and nonflow process involved in the dynamical evolution of heavy-ion reactions.

Supported by BMBF (05P15RFFCA), HGS-HIRe and HIC for FAIR.

Primary author: Mr KARDAN, Behruz (IKF, Goethe-Universität Frankfurt)

Presenter: Mr KARDAN, Behruz (IKF, Goethe-Universität Frankfurt)

Session Classification: Talks

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

Verification of passive cooling techniques in the Super-FRS beam collimators

Thursday, 18 February 2016 10:25 (25 minutes)

The Super FRagment Separator (Super-FRS) at the FAIR facility will be the largest in-flight separator of heavy ions in the world. The separation principle is based on the use of beam collimators to stop the unwanted ions. In one of the most common situations, the heavy ions are produced by a fission reaction of a primary Uranium-238 beam (1.5 GeV/u) hitting a Carbon-12 target. In this situation, some of the produced ions are highly charged states of Uranium-238. Those ions can reach the collimators with energies of up to 1.3 GeV/u and a power of up to 500 W. Under these conditions, a cooling system is required to prevent damage to the collimators and to the corresponding electronics. Due to the highly radioactive environment, both the collimators and the cooling system must be suitable for robot handling. Therefore, an active cooling system is undesirable because of the increased possibility of malfunctioning and other complications. By using thermal simulations (performed with NX9 of Siemens PLM), the possibility of passive cooling is explored. The validity of these simulations is tested by independent comparison with other simulation programs and by experimental verification. With this validation, reasonable estimates can be made on the true effectiveness of passive cooling of the beam collimators. This information is used to ensure stable and safe operation of the Super-FRS beam collimators. Some results and conclusions will be presented in this contribution.

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Co-authors: Dr RIGOLLET, Catherine E. (KVI-CART, University of Groningen); Mr TIMERSMA, Harry J. (KVI-CART, University of Groningen); Mr SMIT, Henk A. J. (KVI-CART, University of Groningen); Dr MOEINI, Hossein (KVI-CART, University of Groningen); Dr GELLANKI, J (KVI-CART, University of Groningen); Mr LINDEMULDER, Michel F. (KVI-CART, University of Groningen); Dr NAJAFI, Mohammad Ali (KVI-CART, University of Groningen); Prof. KALANTAR-NAYESTANAKI, Nasser (KVI-CART, University of Groningen); Mr KUIKEN, Oscar J. (KVI-CART, University of Groningen)

Presenter: Mr DOUMA, Christiaan Alwin (KVI-CART, University of Groningen)

Session Classification: Talks

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

Large-scale configuration interaction description of the structure of nuclei around 100Sn

Thursday, 18 February 2016 09:40 (25 minutes)

In this talk I would like to give a brief review on our recent studies regarding the structure of nuclei around 100Sn. I will first introduce the collectivity properties in Sn and Te isotopes and the possible role played by the cross-shell excitation and the quadrupole-quadrupole correlation. In particular, I will also show that the seniority symmetry is dynamically conserved in j=9/2 shells irrespective of type of interaction. This may be a unique phenomenon for nuclear physics, which is characterized by large spin-orbit coupling. Moreover, I will show for systems with equal number of protons and neutrons, the seniority coupling is broken and, as a result, a new form of spin-aligned proton-neutron pair coupling is favored. The effect of such couplings on alpha and other decay properties will also be discussed.

References:
M Doncel, T Bäck, DM Cullen, D Hodge, C Qi et al. Physical Review C 91 (6), 061304 (2015)
H Jiang, C Qi, Y Lei, R Liotta, R Wyss, YM Zhao, Phys. Rev. C 88 (4), 044332 (2013)
AN Andreyev, M Huyse, P Van Duppen, C Qi, …, Phys. Rev. Lett. 110, 242502 (2013)
T. Bäck, C. Qi et al. , Phys. Rev. C 87, 031306(R) (2013).
C. Qi, Z. Xu, Phys. Rev. C 86, 044323 (2012).

Primary author: Dr QI, Chong (Royal Institute of Technology (KTH))

Presenter: Dr QI, Chong (Royal Institute of Technology (KTH))

Session Classification: Talks

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

A custom probe station for microstrip detector quality assurance of the CBM

Thursday, 18 February 2016 18:25 (25 minutes)

The CBM experiment at FAIR will investigate the properties of nuclear matter at extreme conditions created in ultrarelativistic heavy-ion collisions. Its core detector — the Silicon Tracking System (STS) — will allow to reconstruct charged particle tracks with high precision and determine their momentum. The detection of rare probes requires the STS to be capable to measure at interaction rates of up to 10 MHz for Au-Au collisions. The track multiplicity will reach up to 700 within the detector aperture covering the polar angle 2.50 and 250. The high track density as well as stringent requirements for the momentum resolution (~1%) require a setup with high granularity and low material budget.
The STS will be constructed of about 1300 double-sided silicon microstrip sensors with total area of ~4 m^2 and has ~2.1 million readout channels. The microstrip sensors with 58 µm pitch and up to 124×62 mm^2 area will have pad size of 180×60 µm^2.
Commercially available probe stations have several drawbacks with respect to the application for STS silicon sensors. Therefore, a custom probe station is being developed at Tübingen University. One of the main requirements is a high accuracy and a repeatability better than 1 µm to allow an automatic successive positioning on all 1024 pads of a sensor, as well as a positioning range in accordance with the size of STS sensors. The probe station is controlled via dedicated software developed at Tübingen University. It allows automated alignment of a sensor under test, precise positioning, stepping through channels with measurements of several sensor parameters at each step. The construction of the probe station and first measurements will be presented.

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Co-authors: Dr LYMANETS, Anton (Tuebingen University); SCHMIDT, Hans Rudolf (Eberhard Karls Universität Tübingen(UT-PIT))

Presenter: PANASENKO, Iaroslav (Eberhard Karls Universität Tübingen(UT-PIT))

Session Classification: Talks

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

Ground state studies of charmonium via radiative transitions at BESIII

Tuesday, 16 February 2016 10:45 (25 minutes)

Charmonium spectroscopy is an ideal tool to systematically study the strong interaction between the fundamental building blocks of matter, quarks and gluons. From a theoretical and experimental point of view, charmonium is considered as one of the most controllable two-quark systems. Hence, precision measurements of the properties of charmonia allow a thorough study of the non-perturbative features of the strong interaction, such as confinement and the dynamic generation of the mass of hadrons. Although all predicted charmonium states below the open-charm threshold have been observed experimentally, our knowledge is surprisingly sparse on the spin singlet S-wave states, including the charmonium ground state, the ηc. Even for the basic properties of this state, such as the mass and lifetime, large discrepancies between various experiments have been observed. Recently, the M1 radiative transition $\psi' \rightarrow \gamma\eta_c$ with 6 exclusive decay modes was studied using the largest data sample of ψ' collected with the BESIII detector. For the first time, a large distortion of the line-shape of the ηc was observed which was attributed to an interference between the ηc and a non-resonant background. The presence of such an interference could explain the discrepancies observed between older experiments. In this work, we study the ηc line shape using world's largest data sample of ψ' events which is collected in e+e- annihilations with the BESIII detector at the BEPCII storage ring in Beijing, China, with the aim to provide a detailed study on the origin of the line-shape distortion.

Primary author: Ms HADDADI, Zahra (For the BESIII collaboration) (KVI-CART)

Presenter: Ms HADDADI, Zahra (For the BESIII collaboration) (KVI-CART)

Session Classification: Talks

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

STAR Fixed Target Results

Wednesday, 17 February 2016 10:25 (25 minutes)

The RHIC Beam Energy Scan (BES-I) program, which covers center-of-mass energies 7.7 GeV – 62.4 GeV, was proposed to look for the turn-off of signatures of the quark gluon plasma (QGP), search for a possible QCD critical point, and study the nature of the phase transition between hadronic and partonic matter. RHIC BES-I has shown that the partonic interactions are dominant at center-of-mass energies above 20 GeV. Several interesting observables, including v1 of protons and Lambdas, v2 of all identified hadrons, and net-proton higher moments, show interesting behavior below 20 GeV and could suggest a transition to a hadron dominated regime. Data from energies lower than 7 GeV could help determine whether these behaviors are indicative of phase transitions or criticality. The goal of the STAR Fixed-Target Program is to extend the collision energy range in BES II with the same detector to lower energies than is feasible at RHIC with colliding beams. In 2014 STAR inserted a gold target into the beam pipe and conducted a Au + Au test run at center-of-mass energy 3.9 GeV. In 2015 an additional Au + Au test run at center-of-mass energy 4.5 GeV, as well as an Al + Au test run at a center-of-mass energy of 4.9 GeV, were conducted. First physics results from Au + Au and Al + Au fixed-target collisions will be presented; these results include inclusive spectra, azimuthal anisotropies, and Bose-Einstein correlations. These results demonstrate that STAR has good particle identification capabilities for this fixed target configuration and can efficiently reconstruct fixed target events. The results will be compared with published results from the AGS. The implications for the fixed target program after the completion of the inner TPC (iTPC) and endcap time-of-flight (eTOF) detector upgrades will also be discussed.

Primary author: Ms MEEHAN, Kathryn (UC Davis)

Presenter: Ms MEEHAN, Kathryn (UC Davis)

Session Classification: Talks

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

Fluid dynamic propagation of initial baryon number perturbations on a Bjorken flow background

Baryon number density perturbations offer a possible route to experimentally measure baryon number susceptibilities and heat conductivity of the quark gluon plasma. We study the fluid dynamical evolution of local and event-by-event fluctuations of baryon number density, flow velocity and energy density on top of a (generalised) Bjorken expansion. To that end we use a background-fluctuation splitting and a Bessel-Fourier decomposition for the fluctuating part of the fluid dynamical fields with respect to the azimuthal angle, the radius in the transverse plane and rapidity. We examine how the time evolution of linear perturbations depends on the equation of state as well as on shear viscosity, bulk viscosity and heat conductivity for modes with different azimuthal, radial and rapidity wave numbers. Finally we discuss how this information is accessible to experiments in terms of the transverse and rapidity dependence of correlation functions for baryonic particles in high energy nuclear collisions.

Primary author: Dr MARTINEZ GUERRERO, Mauricio (The Ohio State University)

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Presenter: Dr MARTINEZ GUERRERO, Mauricio (The Ohio State University)

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

Early Stages of Relativistic Heavy Ion Collisions: Coupling Relativistic Transport Theory to Decaying Color-Electric Flux Tubes

Wednesday, 17 February 2016 11:15 (25 minutes)

We model early times dynamics of relativistic heavy ion collisions by an initial color electric field which decays to a plasma by the Schwinger mechanism. The dynamical evolution of the color field is coupled to the dynamics of the many particles system produced by the decay, which is described by relativistic kinetic theory at fixed viscosity to entropy density ratio η/s. The backreaction of the plasma on the color field is taken into account by solving self-consistently the kinetic and the field equations. We study isotropization and thermalization of the system produced by the field decay for a static box and for a 1+1D expanding geometry. We find that, regardless of the viscosity of the
produced plasma, the initial color electric field decays within 1 fm/c; however, in the case η/s is large, oscillations of the field are effective along the entire time evolution of the system, affecting the late times evolution of the ratio between longitudinal and transverse pressure. We have also investigated the effect of turning from the relaxation time approximation to the Chapman-Enskog one, finding that this improvement affects mainly the early times evolution of the physical quantities.

Primary author: Mrs OLIVA, Lucia (INFN-LNS, University of Catania)

Co-authors: Mr PUGLISI, Armando (University of Catania, INFN-LNS); Dr SCARDINA, Francesco (University of Catania, INFN-LNS); Dr RUGGIERI, Marco (University of Catania); Dr PLUMARI, Salvatore (University of Catania, INFN-LNS); Prof. GRECO, Vincenzo (University of Catania, INFN-LNS)

Presenter: Mrs OLIVA, Lucia (INFN-LNS, University of Catania)

Session Classification: Talks

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

XYZ: the case of $Z_c(3885)/Z_c(3900)$

Monday, 15 February 2016 09:15 (45 minutes)

In this talk, the recent experimental and theoretical advances in the knowledge of the spectrum and structure of XYZ states will be reviewed, with special emphasis on the case of the $Z_c(3885)/Z_c(3900)$

Primary author: Dr ALBALADEJO SERRANO, Miguel (IFIC, U. Valencia)

Presenter: Dr ALBALADEJO SERRANO, Miguel (IFIC, U. Valencia)

Session Classification: Talks

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

An overview of meson phenomenology from the DSBSE approach

Thursday, 18 February 2016 10:50 (25 minutes)

The Dyson-Schwinger-Bethe-Salpeter-equation approach provides a covariant framework to study mesons, and more generally hadrons, in QCD. I'll discuss both the role of truncations in numerical studies based on this approach, as well as recent results [1-4] for spectroscopy and properties of heavy and light quarkonia with both conventional and exotic-vector quantum numbers.

[1] Phys.Rev.D91:034013,2015
[2] Phys.Rev.D91:114004,2015
[3] Phys.Rev.D92:054030,2015
[4] arXiv:1508.07183 [hep-ph]

Primary author: Dr KRASSNIGG, Andreas (Univ. Graz)

Presenter: Dr KRASSNIGG, Andreas (Univ. Graz)

Session Classification: Talks

Contribution ID: **51** Type: **not specified**

Dilepton reconstruction in Au+Au collisions at 1.23A GeV with HADES

Thursday, 18 February 2016 09:15 (25 minutes)

Virtual photon decays to lepton pairs are considered as an ideal probe to access information of all stages of heavy-ion collisions. However, this probe is very rare and is surrounded by a high track density environment produced in heavy-ion collisions. This complicates the track reconstruction and makes identification of lepton pairs challenging.
Events of Au+Au collisions at a beam energy of 1.23A GeV were recorded with the HADES experiment in 2012. The first measurement of electron pairs in Au+Au complete the systematics of virtual photon production in NN/pA/AA collisions in the SIS18 energy range.

In case of lepton identification a Ring Imaging Cherenkov detector is essential. Its main purpose is the separation of electrons and positrons from large background of charged hadrons produced in heavy-ion collisions. In order to further improve the purity and efficiency of an electron sample, a new backtracking algorithm using information provided by tracking detectors could be applied. This new approach offers gains in efficiency for leptons and especially for detection of partially reconstructed pairs with small opening angle. In this contribution the strategy of the backtracking approach is presented. The new identification procedure is applied for lepton identification in Au+Au collisions at 1.23A GeV. The reconstructed dilepton spectra will be discussed.

Primary author: Mr SELLHEIM, Patrick (HADES)

Presenter: Mr SELLHEIM, Patrick (HADES)

Session Classification: Talks

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

Quench calculations for the superconducting dipole magnet of the CBM experiment at FAIR

Tuesday, 16 February 2016 18:00 (25 minutes)

The scientific mission of the Compressed Baryonic Matter (CBM) experiment is the study of the nuclear matter properties at the high baryonic densities in heavy ion collisions at the Facility of Antiproton and Ion Research (FAIR) in Darmstadt. The 5.15 MJ superconducting dipole magnet will be used in the silicon tracking system of the CBM detector. It provides a magnetic field integral of 1 Tm which is required to obtain a momentum resolution of 1% for the track reconstruction. The 3D quench calculations that determine the conductor design, coil design and the quench detection/protection system parameters will be presented.

Primary author: Dr KURILKIN, Pavel (JINR)

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Presenter: Dr KURILKIN, Pavel (JINR)

Session Classification: Talks

Contribution ID: **53** Type: **not specified**

Disentangling PANDA's timebased data stream

Thursday, 18 February 2016 17:10 (25 minutes)

One of the physics highlights of the future PANDA experiment is to search for exotic states that have been predicted by theory, and whose properties are governed by the presence of valence gluons. Such exotic states can be formed directly and copiously in proton-antiproton annihilations. The challenge lies in reducing the enormous background yield while preserving a high efficiency for the detection of exotic hadrons. As the detector response of background events is very similar to that of the decay of the exotic states, the use of a conventional triggered readout scheme, where a limited number of subdetectors generates a trigger signal that engages the readout of the complete detector, is ruled out. Therefore, a new type of intelligent readout is being developed, where kinematic constraints are imposed online on reconstructed events. The high 20 MHz interaction rate can lead to overlapping detector response signals, creating so-called pile-up signals. Therefore, a different simulation approach is required, where events are no longer simulated sequentially, but are allowed to produce pile-up signals by letting simulated response signals interact with other signals in the same detector element for a set period of time. This means that the timestamp of each event (or even each hit produced by an event) plays a key role in the process, which is why this type of simulation is referred to as "timebased". Disentangling these overlapping signals and assigning them to the proper events may prove difficult. For the Electromagnetic Calorimeter, impinging particles create groups of hits in the detector, called clusters. To find the energy of these particles, the information from the hits in each cluster has to be recombined. Ideally, each hit in a cluster should belong to the event that spawned it, but this depends on the efficiency of the disentangling procedure. Some results of tests of the timebased simulation code and a macro for disentangling and recombining hits into clusters will be presented.

Primary author: Mr TIEMENS, Marcel (Kernfysisch Versneller Instituut (University of Groningen))

Presenter: Mr TIEMENS, Marcel (Kernfysisch Versneller Instituut (University of Groningen))

Session Classification: Talks

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

Overview of the Beam Energy Scan Program at RHIC

Thursday, 18 February 2016 08:30 (45 minutes)

The Beam Energy Scan (BES) program was carried out at RHIC with the main goals to find signatures for the disappearance of the QGP, a QCD phase transition, and for a critical point. An overview of various observables studied by STAR and PHENIX to identify those structures in the QCD phase diagram will be presented. Furthermore, I will give an outlook on the BES phase II program which is anticipated for the years 2019-2020 and possible connections to the future CBM experiment at FAIR.

Primary author: Dr THAEDER, Jochen (Lawrence Berkeley National Laboratory)

Presenter: Dr THAEDER, Jochen (Lawrence Berkeley National Laboratory)

Session Classification: Talks

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

Preliminary results of pion induced reaction with carbon and polyethylene targets obtained by HADES-GSI in 2014

Wednesday, 17 February 2016 18:45 (25 minutes)

In the summer of 2014, HADES conducted measurements with secondary pion-beam using different targets. The program is devoted to measure dielepton radiation from baryonic resonances. In particular we investigated a sub-threshold coupling of rho to baryonic resonances in the second resonance region (N(1520), N(1535)). Most of the beam time was dedicated to measurement of e+e- production from PolyEthylene target at pion beam momentum of 0.69 GeV/c. The contribution from pion-proton can be separated from contribution of pion-carbon interaction by means of kinematic constraints. Therefore it was possible to measure at the same time exclusive pi-p->e+e-n and inclusive e+e- production. In addition we run part of the time with pure carbon target to allow precise background subtraction. The normalization of spectra has been done using elastic scattering of pion on proton. In this contribution I will also discuss the cocktail simulations of pion-Dalitz-decay, delta-Dalitz-decay and resonance N1520 using PLUTO and compare the results to experimental data.

Primary author: Mr RODRIGUEZ RAMOS, Pablo (Nuclear Physics Institute, ASCR)

Presenter: Mr RODRIGUEZ RAMOS, Pablo (Nuclear Physics Institute, ASCR)

Session Classification: Talks

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

The CGEM-IT of the BESIII experiment: project update and test results in magnetic field

Thursday, 18 February 2016 18:00 (25 minutes)

The BESIII experiment is a multi-purpose detector operating on the electron-positron collider BEPCII in Beijing. Since 2008, the world's largest sample of J/psi, psi' were collected. Due to increasing luminosity, the inner drift chamber is showing signs of ageing. In 2014, an upgrade was proposed by the Italian collaboration based on the Cylindrical Gas Electron Multiplier (CGEM) technology, developed within the KLOE-II experiment, but with several new features and innovations.
In this talk, an overview of the project will be presented. Preliminary results of a beam test will be shown, with particular focus on the detector performance in magnetic field, with different configuration of electric field and of gas mixture. An introduction to a new readout mode, the microTPC readout, will be also presented.
The project has been recognized as a Significant Research Project within the Executive Programme for Scientific and Technological Cooperation between Italy and P.R.C. for the years 2013-2015, and more recently has been selected as one of the project funded by the European Commission within the call H2020-MSCA-RISE-2014.

Primary author: Mr MEZZADRI, Giulio (Università degli Studi di Ferrara and INFN)

Presenter: Mr MEZZADRI, Giulio (Università degli Studi di Ferrara and INFN)

Session Classification: Talks