XIII Polish Workshop on Relativistic Heavy-Ion Collisions

Report of Contributions

Contribution ID: **1** Type: **not specified**

Constraining mechanisms of jet-medium interaction via simultaneous studies of energy loss and angular broadening effects

Saturday 6 January 2018 12:00 (30 minutes)

Energetic heavy quarks passing through the hot and dense medium of a quark-gluon plasma (QGP), represented by the resulting mesons, are viewed as a suitable probe for the interactions inside of the QGP, in particular the mechanisms of energy loss, as they are less likely to thermalize within the medium and are mostly created at early stages of the medium evolution.
However, models of both, purely collisional energy loss as well as combinations of collisional and radiative energy loss are equally successful for reproducing the nuclear modification factor R_{AA} and the elliptic flow v_2 [1]. To make progress for identifying the reaction mechanism, an alternative observable, the angular correlations between two mesons were investigated, in an attempt to discriminate between the two different mechanisms. Azimuthal correlations between pairs of heavy mesons, like D-$\bar{D}$ pairs, allow for distinguishing the energy-loss scenarios [2].

We continue these studies by investigating the angular correlations between pairs of heavy and light mesons (D and π), originating from a heavy quark jet. This is motivated
by the fact that the emitted gluon in radiative collisions hadronizes and these hadrons are correlated to the emitting heavy quark.
For this study we created a Monte-Carlo code for the parton splitting in the vacuum together with an effective medium model.
This program represents a consistent framework to study the influences of either collisional or radiative processes (as well as combinations thereof) on parton propagation, and, thus, on the correlations between the final mesons.
In particular, we focused on the angular broadening effects that result from the different types of jet-medium interaction – effects that are reflected by corresponding jet-observables as well: As new data for jet-shapes became available [3] this allowed for comparisons of the different effective models of in-medium energy loss with the experiment.

[1] P. B. Gossiaux, J. Aichelin, T. Gousset and V. Guiho,
J. Phys. G **37** (2010) 094019,doi:10.1088/0954-3899/37/9/094019, [arXiv:1001.4166 [hep-ph]].

[2] M. Nahrgang, J. Aichelin, P. B. Gossiaux and K. Werner,
J. Phys. Conf. Ser. **509** (2014) 012047, doi:10.1088/1742-6596/509/1/012047,
[arXiv:1310.2218 [hep-ph]].

[3] CMS Collaboration, CMS-PAS-HIN-16-020.

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Co-authors: GOSSIAUX, Pol (Subatech); AICHELIN, joerg (Subatech/CNRS); GOUSSET, Thierry (Subatech)

Presenter: ROHRMOSER, Martin (SUBATECH/Ecole des Mines de Nantes)

Session Classification: Session 2

Contribution ID: **2** Type: **not specified**

Transverse momentum correlations and fluctuations

Saturday 6 January 2018 14:30 (30 minutes)

We study the fluctuations and correlations of the average transverse momentum of particles emitted in heavy-ion collisions. The momentum fluctuations are related to event-by-event fluctuations of the size and entropy of the initial source. Hydrodynamic calculations using a Glauber model with quark degrees of freedom reproduce the data. We study correlation of the average transverse momentum in different rapidity bins. We propose a definition of the observable that can be directly related to correlations of the collective flow variables. The correlation as function of rapidity separation can serve to pin down possible sources of momentum fluctuations in the initial state and the dynamics.

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Presenter: BOZEK, Piotr (AGH University of Science and Technology)

Session Classification: Session 3

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

Heavy flavor directed flow as a probe of matter distribution in heavy-ion collisions

Saturday 6 January 2018 15:00 (30 minutes)

The breaking of longitudinal boost invariance in non-central relativistic heavy ion collisions due to asymmetric local participant densities gives rise to a tilt in the reaction plane in the thermalized medium. A direct consequence of this is the observed rapidity odd directed flow of charged particles. We study the v_1 of D mesons by evolving the charm quark phase space distribution within Langevin dynamics coupled to a hydrodynamic background. We find the charm v_1 to be several times larger than the observed charged particle v_1[1]. The v_1 slope at mid-rapidity is sensitive to the magnitude of the tilt of the initial thermalized medium. Thus, its measurement will allow us to extract the tilt which also sets the scale of longitudinal correlation.

[1]. S. Chatterjee and P. Bożek (2017), arXiv:1712.01189 [nucl-th]

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Presenter: CHATTERJEE, Sandeep (AGH University of Science and Technology, Krakow)

Session Classification: Session 3

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

From electromagnetic effects to fire-streaks in heavy ion collisions

Saturday 6 January 2018 16:30 (30 minutes)

Our presentation will be based on our recent paper [1].

We construct a new, simple model of the heavy ion collision, local in the impact parameter plane. This model can be regarded as a new realization of the "fire-streak" approach, originally applied to studies of lower energy nucleus-nucleus reactions.

Starting from local energy and momentum conservation, we provide a full description of the centrality dependence of pion rapidity spectra in Pb+Pb collisions at $\sqrt{s_{NN}} = 17.3$ GeV. In particular, we also explain the broadening of this distribution when going from central to peripheral collisions.

The results of our calculations are compared to SPS experimental data. We discuss the resulting implications on the role of energy and momentum conservation for the successive stages of the A+A collision, and for the dynamics of subsequent particle production.

A specific space-time picture emerges, where the longitudinal evolution of the system strongly depends on the position in the impact parameter (b_x, b_y) plane. In non-central collisions we predict the existence of "streams" of excited matter moving very close to the spectator system in configuration (x, y, z) space.

This picture is consistent with our earlier findings on the longitudinal evolution of the system as deduced from electromagnetic effects on charged pion directed flow [2], and can provide an explanation for specific low-p_T phenomena seen in the fragmentation region of Pb+Pb collisions which we also address in this talk. We present our conclusions on the link between the initial stage of the A+A collision and the final state observables connected to strong and electromagnetic phenomena.

[1] A. Szczurek, M. Kielbowicz and A. Rybicki, Phys. Rev. C **95** (2017), 024908.

[2] A. Rybicki and A. Szczurek, Phys. Rev. C **87** (2013), 054909.

Primary author: KIELBOWICZ, Miroslaw Marek (Polish Academy of Sciences (PL))

Co-authors: RYBICKI, Andrzej (Polish Academy of Sciences (PL)); SZCZUREK, Antoni (Institute of Nuclear Physics)

Presenter: KIELBOWICZ, Miroslaw Marek (Polish Academy of Sciences (PL))

Session Classification: Session 4

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

Kaon femtoscopy using THERMINATOR model

Sunday 7 January 2018 11:25 (25 minutes)

Heavy-ion collision experiments are developed to study the properties of strongly interacting matter at high energies. The main aim is to investigate the Quark-Gluon Plasma (QGP), which consist of free quarks and gluons. Using the femtoscopic methods, the information about the space-time characteristics of the particle emitting source, like the radii of such source, is obtained. For needs of high energy physics, phenomenological models like THERMINATOR are used.

In this talk there are presented the theoretical like-sign kaon correlation functions in Au+Au collisions at $\sqrt{s_{NN}}$ of 200 GeV. The centrality and k_T dependences are studied.

Primary author: PAWŁOWSKA, Diana

Presenter: PAWŁOWSKA, Diana

Session Classification: Session 6

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

Non-identical particle femtoscopy in STAR

Sunday 7 January 2018 12:15 (25 minutes)

Heavy-ion collisions allow us to study the properties of nuclear matter –especially Quark-Gluon Plasma (QGP) state, where the quarks and gluons are deconfined. To study space-time parameters the method of femtoscopy is used. This method provides measuring the size of the particle-emitting source which is not measurable directly. From non-identical particles correlations, we can obtain information about the asymmetry in emission process between those two kind of particles.

In this talk I will present a status report of a STAR analysis of pion-kaon, pion-proton and kaon-proton correlations in Au+Au collisionss at $\sqrt{S_{NN}}$ = 39 GeV.

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Session Classification: Session 6

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

Angular correlations of identified hadrons in the STAR BES data

Saturday 6 January 2018 17:00 (30 minutes)

The angular correlation function (CF) indicates the correlation of particles in the relative pseudo-rapidity and relative azimuthal angle. It is used to study the properties of strongly interacting matter at relativistic energies. Recent results from the ALICE experiment at the LHC show unexpected structures of CF in the proton-proton and antiproton-antiproton correlations. Also results from the STAR experiment at RHIC on directed flow show discrepancy between net-baryons and net-mesons trends of (dv_1/dy). These examples of observations suggest that study of CF of identified particles can provide more insight into nuclear matter properties, in comparison with measurements of unidentified particles.

The STAR capability of identifying particles at mid-rapidity, paired with the data from broad energy range of Au+Au collisions in the Beam Energy Scan program, provides opportunity to investigate the phase diagram of strongly interacting matter through the CF analysis. In this talk recent STAR experimental results from Au+Au collisions at $\sqrt{s_{NN}} = 7.7 - 200$ GeV from the RHIC's Beam Energy Scan will be presented.

Primary author: LIPIEC, Andrzej (Warsaw University of Technology)

Presenter: LIPIEC, Andrzej (Warsaw University of Technology)

Session Classification: Session 4

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

What can we learn from femtoscopic and angular correlations of identified particles in ALICE?

Sunday 7 January 2018 11:00 (25 minutes)

Two-particle correlations have proven to be a robust tool which allow the exploration of many physics phenomena present in high-energy particle collisions. In this talk we would like to focus on two techniques, namely femtoscopy and angular correlations, covering their most recent results from the ALICE experiment.

Femtoscopic correlations which arise from quantum statistics and final-state interactions, probe the space-time characteristics of particle production. Typically, these measurements for pions, kaons, and protons are used to measure the size and test the hydrodynamic evolution of the system. However, the femtoscopic formalism is also sensitive to the amplitude of the wave function for a particle pair, which is directly related to the, in some cases poorly known, interaction cross section. In this talk we review recent results from ALICE femtoscopy studies including the following combinations of particles: $\mathrm{K}^0_\mathrm{S}\mathrm{K}^\pm$, all combinations of Λ and $\bar{\Lambda}$ with K^+, K^- and K^0_S, all combinations of proton (antiproton) and Λ ($\overline{\Lambda}$) baryons.

In this talk, we also report the measurements of angular correlations of identified particles (for pions, kaons, protons, Λ, and respective antiparticles) in the relative pseudorapidity ($\Delta\eta$) and azimuthal angle ($\Delta\varphi$) space in pp collisions at $\sqrt{s} = 7$ TeV. The first look at other collision systems and energies will also be shown. Surprisingly, for baryon pairs where both particles have the same baryon number, a near-side anti-correlation structure is observed instead of a typical near-side peak originating from mini-jets. This surprising effect is also present for other collision systems and energies. We will also present how those correlations are connected to the femtoscopic measurements described above.

Primary author: GRACZYKOWSKI, Lukasz Kamil (Warsaw University of Technology (PL))

Presenter: GRACZYKOWSKI, Lukasz Kamil (Warsaw University of Technology (PL))

Session Classification: Session 6

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

Centrality dependence of freeze-out temperature fluctuations in Pb-Pb collisions at the LHC

Sunday 7 January 2018 10:00 (30 minutes)

Many data in the High Energy Physics are, in fact, sample means. It is shown that when this exact meaning of the data is taken into account and the most weakly bound states are removed from the hadron resonance gas, the whole spectra of pions, kaons and protons measured at midrapidity in Pb-Pb collisions at $\sqrt{s_{NN}} = 2.76$ TeV can be fitted simultaneously. The invariant distributions are predicted with the help of the single-freeze-out model in the chemical equilibrium framework. The method is applied to the measurements in centrality bins of Pb-Pb collisions and gives acceptable fits for all but peripheral bins. The comparison with the results obtained in the framework of the original single-freeze-out model is also presented.

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Presenter: PROROK, Dariusz (Institute of Theoretical Physics University of Wroclaw)

Session Classification: Session 5

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

Adaptation of the THERMINATOR model for BES program

Saturday 6 January 2018 12:30 (30 minutes)

THERMINATOR model is dedicated to heavy-ion collisions. Its current description allows one to work with data for the highest collision energies achieved by LHC and RHIC colliders. However it is possible to adapt THERMINATOR model to the lower energy spectrum as is used in Beam Energy Scan (BES) program at RHIC.
Femtoscopy of two particles investigates the properties of matter produced in heavy-ion collisions. It allows one to study the space-time characteristics of the medium. We present single- and two-particle momentum distributions of particles generated for the energy spectrum for BES program. To verify how model preditions agree with experimental results, we present the correlation functions obtained for identical pions in Au+Au collisions for BES program

Primary authors: ZBROSZCZYK, Hanna (Warsaw Univesroty Of Technology); SZYMAŃSKI, Paweł (Warsaw University of Technology)

Presenter: ZBROSZCZYK, Hanna (Warsaw Univesroty Of Technology)

Session Classification: Session 2

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

Beam Energy Scal program with EPOS model

Saturday 6 January 2018 11:30 (30 minutes)

Studies of collisions of highly accelerated ions are the key to understand the creation of quark matter. Experimental physicists put considerable effort in collecting information characterising the various processes occurring during such collisions. In order to describe such scenarios, complex models have been constructed, one of them being the EPOS approach. It applies Parton-based Gribov-Regge theory as an initial condition, introduces the core-corona approach, hydrodynamical evolution and hadronic cascades as well. The model is used by experimental physicist at the LHC or in cosmic ray physics.
At the Brookhaven National Laboratory, the STAR collaboration is currently investigating an interesting project called Beam Energy Scan. The QCD phase diagram is studied in order to understand the phase transitions close to the critical point, which should be in the energy domain studied in this program. Models have difficulties to describe this energy range properly. The aim of our investigation is to adapt the EPOS model to describe correctly collisions of ions with energies studied in the framework of the BES program.
The detailed description of the theory included in EPOS model will be presented. The energy dependence of the separation into the core and corona will be discussed, and the way it affects transverse momentum spectra of identified particles and the observables of the azimuthal anisotropy of expanding matter. The particles from the corona are strongly affected by the radial flow and the flow asymmetries. The results of different types of analysis of elliptic flow will be discussed. The simulation results for collisions of Au+Au at selected BES energies will be presented in comparison with the published STAR data.

Primary author: STEFANIAK, Maria (Warsaw University of Technology)

Presenter: STEFANIAK, Maria (Warsaw University of Technology)

Session Classification: Session 2

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

Net-baryon number fluctuations in the quark-meson-nucleon model at finite baryon density

Saturday 6 January 2018 17:30 (30 minutes)

One of the most significant aspects of QCD thermodynamics is understanding how the transition from hadrons to their constituents—quarks and gluons—relates to the underlying deconfinement and chiral dynamics. This is of major relevance for heavy-ion collisions, as well as in the study of cold and dense systems, such as compact stars. The latter, however, is often studied exclusively in models of either hadron or quark degrees of freedom. In this talk, we present the mean-field thermodynamics of an effective hybrid quark-meson-nucleon (QMN) model for QCD phase transitions at low temperatures and finite baryon densities. In this framework, the chiral dynamics is described within the linear sigma model, whereas the deconfinement transition is driven by a medium-dependent modification of the particle distribution functions, where an additional scalar field is introduced. The structure of the net-baryon number fluctuations along with its higher order cumulants is discussed as possible probes for the chiral and deconfinement phase transitions. A qualitative comparison of the results obtained in the nucleonic (parity doublet) and quark (NJL) models is also presented.

Primary authors: MARCZENKO, Michał (University of Wrocław); SASAKI, Chihiro

Presenter: MARCZENKO, Michał (University of Wrocław)

Session Classification: Session 4

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

Heavy Quarks in Turbulent QCD Plasmas

Saturday 6 January 2018 14:00 (30 minutes)

The quark-gluon plasma, which is produced at an early stage of ultrarelativistic heavy-ion collisions, is expected to be initially strongly populated with chromodynamic fields. We address the question how heavy quarks interact with such a turbulent plasma in comparison with an equilibrated one of the same energy density. For this purpose we derive a Fokker-Planck transport equation of heavy quarks embedded in a plasma of light quarks and gluons. We first discuss the equilibrium plasma and then the turbulent one applying the same approach, where the heavy quarks interact not with the plasma constituents but rather with the long wavelength classical fields. We first consider the three schematic models of isotropic trubulent plasma and then the simplified model of glasma with the chromodynamic fields only along the beam direction. The momentum broadening and collisional energy loss of a test heavy quark are computed and compared to those of equilibrium plasma of the same energy density.

Primary author: MROWCZYNSKI, Stanislaw (Jan Kochanowski University)

Presenter: MROWCZYNSKI, Stanislaw (Jan Kochanowski University)

Session Classification: Session 3

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

Upgrade of the NA61/SHINE facility beyond 2020 for an expanded physics programme

Saturday 6 January 2018 10:00 (30 minutes)

The NA61/SHINE experiment studies hadron production in hadron-hadron, hadron-nucleus and nucleus-nucleus collisions. The physics programme includes the study of the onset of deconfinement and search for the critical point as well as reference measurements for neutrino and cosmic ray experiments. For strong interactions, future plans are to extend the programme of study of the onset of deconfinement by measurements of open-charm and possibly other short-lived, exotic particle production in nucleus-nucleus collisions. This new programme is planned to start after 2020 and requires upgrades to the present NA61/SHINE detector setup. Besides the construction of a large acceptance silicon detector, a 10-fold increase of the event recording rate is foreseen, which will necessitate a general upgrade of most detectors.

Primary author: LARSEN, Dag (Jagiellonian University (PL))

Presenter: LARSEN, Dag (Jagiellonian University (PL))

Session Classification: Session 1

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

The next round of RHI collision discoveries awaits you

Saturday 6 January 2018 09:15 (45 minutes)

The forthcoming AA collisions at the LHC promise to advance our understanding of Flavor, Strong Fields, Confinement, and Hadron Mass. For flavor we recognize QGP at LHC as the only physics system that has in one space-time spot all quark types present. I will look at observables suitable to explore dynamical differences among the heavy c, b, t quarks in the deconfined domain filled with u, d, s thermal plasma. I will explain how a near-missed peripheral collision creates EM fields that rip the vacuum and offer a path to seek the origin of vacuum meta stability that the SM parameters predict. In the already explored Confinement and Hadron mass domains we will seek quantitative understanding of vacuum condensates, and the mass spectrum, learning how to adapt the lattice results to the highly dynamical AA collision environment.

Primary author: RAFELSKI, Johann (University of Arizona (US))

Presenter: RAFELSKI, Johann (University of Arizona (US))

Session Classification: Session 1

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

Charm physics in NA61/SHINE

Saturday 6 January 2018 10:30 (30 minutes)

NA61/SHINE (SPS Heavy Ion and Neutrino Experiment) is a fixed-target experiment operating at the CERN SPS accelerator. The main goal of the Collaboration is to study the properties of the phase transition between confined matter and quark-gluon plasma by performing a two-dimensional scan of the phase diagram of strongly interacting matter. Within this program, collisions of different systems (p+p, Be+Be, Ar+Sc, Xe+La, Pb+Pb) over a wide range of beam momenta (13A-158A GeV/c) have been recorded.

Recently, the physics program of NA61/SHINE was extended by measurements of open charm production in A+A collisions which is the main goal of NA61/SHINE beyond 2020. In order to meet the challenges of the required spatial resolution of primary and secondary vertex reconstruction, the detector was upgraded by a micro vertex detector. A Small-Acceptance version of the Vertex Detector (SAVD) was successfully commissioned in December 2016 and first pilot data were collected for Pb+Pb collisions at a beam momentum of 150A GeV/c. During Long Shutdown 2 the detector will be upgraded to a Large Acceptance Vertex Detector (LAVD) the layout of which is still under discussion. This contribution will present the motivation of open charm studies as well as the current status and details of the analysis of the collected Pb+Pb data. The future project of the LAVD will be also discussed.

Primary author: BRYLINSKI, Wojciech (Warsaw University of Technology (PL))

Presenter: BRYLINSKI, Wojciech (Warsaw University of Technology (PL))

Session Classification: Session 1

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

Polyakov loop fluctuations in the presence of external fields

Sunday 7 January 2018 13:30 (30 minutes)

We study susceptibilities of real and imaginary parts as well as modulus of the Polyakov loop in an effective model of gluons and quarks. In pure SU(3) gauge theory, the ratios of these susceptibilities exhibit a clear discontinuity at the deconfinement temperature while ratios calculated in 2+1 QCD become smoothened and vary between corresponding pure gauge asymptotic values. This suggests these quantities as an excellent probe of deconfinement.
We propose a schematic model of the Polyakov loop and the quark, and show that the model captures these trends in lattice QCD data. We also discuss scaling properties of the susceptibilities.

Primary authors: Dr LO, Pok Man (University of Wroclaw); REDLICH, Krzysztof (University of Wroclaw); SASAKI, Chihiro; SZYMANSKI, Michal (University of Wroclaw)

Presenter: SZYMANSKI, Michal (University of Wroclaw)

Session Classification: Session 7

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

Measurements of Upsilon production in p+p collisions at sqrt(s)=500 GeV with the STAR experiment

Sunday 7 January 2018 09:00 (30 minutes)

Studies of the production cross-sections for various Υ states have provided valuable constraints on the bottomonium production models. Recently, a more differential measurement, namely the relative production yields as a function of event multiplicity, has been presented for the Υ mesons in p+p collisions at the LHC. A stronger-than-linear rise is observed, indicating an interplay between hard and soft processes. Possible explanations for such a rise include a possible collective behavior due to interactions between color field strings in high-multiplicity collisions or creation of Υ mesons in multiple parton interactions. Similar measurements at the RHIC energy can further shed light onto the Υ production mechanism. In addition, possible effects of interactions between loosely-bound excited Υ states and the co-moving hadrons can be accessed by studying the relative yields between the ground and excited Υ states as a function of event multiplicity.

In this talk, the first measurement of the Υ invariant cross section in p+p collisions at $\sqrt{s} = 500$ GeV at RHIC will be presented as a function of transverse momentum and rapidity. The data sample collected in year 2011 allows a separation of $\Upsilon(1S)$ and $\Upsilon(2S + 3S)$ states. The obtained cross sections are compared to the Color Evaporation Model as well as to the Non-relativistic Quantum Chromodynamics calculation coupled with the Color Glass Condensate formalism. The relative production yields for the ground and excited Υ states separately, as well as the yield ratios between the ground and excited Υ states, will be presented as a function of event multiplicity, and compared to model calculations and existing data.

Primary author: Mr KOSARZEWSKI, Leszek (Warsaw University of Technology)

Presenter: Mr KOSARZEWSKI, Leszek (Warsaw University of Technology)

Session Classification: Session 5

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

Femtoscopy at MPD

Sunday 7 January 2018 11:50 (25 minutes)

MPD (Multi Purpose Detector) will be future experiment at NICA facility. NICA complex is dedicated to study phase diagram of QCD matter at high baryonic densities.
We present current status of preparation for femtoscopic measurements in MPD. We present femtoscopic observables for AuAu collisions at Beam Energy Scan energies (\sqrt{s_{NN}} 7.7-62.4 GeV) calculated with viscous hydro + cascade model vHLLE+UrQMD with two Equations of State - one that correspond to 1st order phase transition and the second one with crossover transition. We also discuss perspectives of femtoscopic measurements with MPD detector based on recent MC simulations.

Primary authors: WIELANEK, Daniel (Warsaw University of Technology); LEDNICKY, Richard (Joint Institute for Nuclear Research, Dubna, Russia); BATYUK, Pavel (Joint Institute for Nuclear Research (RU)); KARPENKO, Iurii (Frankfurt Institute for Advanced Studies); MIKHAYLOV, Konstantin (Institute for Theoretical and Experimental Physics (RU)); MALININA, Ludmila (Joint Institute for Nuclear Research (RU)); Dr ROGACHEVSKY, Oleg (Veksler and Baldin Laboratory of High Energy Physics)

Presenter: WIELANEK, Daniel (Warsaw University of Technology)

Session Classification: Session 6

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

Partial correlation analysis in ultra-relativistic nuclear collisions

Saturday 6 January 2018 16:00 (30 minutes)

We argue that statistical data analysis of two-particle correlations in ultra-relativistic heavy-ion collisions may be efficiently carried out with the technique of partial covariance. We show that in the superposition approach the presented framework allows onę to impose constraints on the number of sources rather than hadrons, which leads to better understanding of the initial-state physics. We demonstrate the method on simulated data for the cases where centrality is determined with a single central control bin, or with two peripheral control bins.

Primary author: OLSZEWSKI, Adam (UJK Kielce)

Presenter: OLSZEWSKI, Adam (UJK Kielce)

Session Classification: Session 4

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

On strangeness from NA61/SHINE

Sunday 7 January 2018 09:30 (30 minutes)

NA61/SHINE is a fixed target experiment at the CERN Super-Proton-Synchrotron. The main goals of the experiment are to discover the critical point of strongly interacting matter and to study the properties of the onset of deconfinement. In order to reach these goals, a study of hadron production properties is performed in nucleus-nucleus, proton-proton and proton-nucleus interactions as a function of collision energy and size of the colliding nuclei.
In this talk, recent results on strangeness production in p+p, Be+Be and Ar+Sc collisions in the SPS energy range are reviewed. Transverse mass spectra, rapidity spectra and mean multiplicities of kaons obtained with various analysis methods are presented.
An overview of statistical and dynamical models of strangeness production in the vicinity of phase transition will be presented as well. Predictions of the models will be compared with available results on heavy-ions collisions and, most importantly, with new results on intermediate mass systems.

Primary author: Mr LEWICKI, Maciej Piotr (University of Wroclaw (PL))

Presenter: Mr LEWICKI, Maciej Piotr (University of Wroclaw (PL))

Session Classification: Session 5

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

Dissociation of hadrons in hot dense matter

Sunday 7 January 2018 14:00 (30 minutes)

A unified equation of state for quark-hadron matter is presented in the generalized Beth-Uhlenbeck form. It follows from a Φ–derivable approach to the thermodynamic potential where the ansatz for the Φ functional contains all 2PI diagrams at two-loop order formed with quark cluster Green's functions for quark, diquark, meson and baryon propagators. We present numerical results using an effective model for the generic behaviour of hadron masses and phase shifts at finite temperature which shares basic features with recent developments within the PNJL model for correlations in quark matter. We obtain the transition between a hadron resonance gas phase and the quark gluon plasma where the Mott dissociation of hadrons is encoded in the hadronic phase shifts. The resulting thermodynamics is in very good agreement with recent lattice QCD simulations.

Primary author: BLASCHKE, David (University of Wroclaw)

Co-authors: TURKO, Ludwik (University Wroclaw); Dr DUBININ, Aleksandr (Jagellonian University Cracow)

Presenter: BLASCHKE, David (University of Wroclaw)

Session Classification: Session 7

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

Some personal impressions

Sunday 7 January 2018 12:40 (20 minutes)

Presenter: Prof. RAFELSKI, Johann (University of Arizona (US))

Session Classification: Session 6