Excited QCD 2017

Report of Contributions

https://indico.cern.ch/e/607808

Contribution ID: **115** Type: **not specified**

Off-shell fragmentation

According to recent measurements, the mass of jets created in LHC energy pp collisions has broad fluctuation. Typically, the mean mass of a jet with transverse momentum 200-600 GeV/c is around 40-100 GeV/cˆ2, so the ratio (jet mass)/(jet energy) is of order 0.2. As this value is not negligibly small, as required for factorisation to be applicable, the virtualitis of partons created in the hard process (most probably) should not be neglected. Besides, the fragmentation of these off-shell partons has to be handled.
Based on recent works [1-4], I present a simple statistical fragmentation model, which is suitable for the treatment of the hadronisation of virtual partons as well as the inclusion of jet mass fluctuations. I present fits to fragmentation functions measured in ep and pp collisions and give prediction for the jet mass dependence of hadron multiplicity distributions inside jets.

[1] arXiv:1606.03208
[2] PoS DIS2016 (2016) 054, arXiv:1605.06876
[3] Phys. Lett. B, 718 (2012) 125-129, arXiv:1204.1508
[4] Phys. Lett. B, 701 (2011) 111-116, arXiv:1101.3023

Primary author: UERMOESSY, Karoly (Hungarian Academy of Sciences (HU))

Presenter: UERMOESSY, Karoly (Hungarian Academy of Sciences (HU))

Session Classification: Friday Afternoon (20min talks + 10min discussions)

Contribution ID: **116** Type: **not specified**

The Topological Susceptibility via the Gribov horizon?

Monday 8 May 2017 17:00 (30 minutes)

The topological susceptibility χ^4 is famous in QCD. It explains the η' mass, solving the $U(1)_A$ problem. It is also known that χ^4 is related with Veneziano Ghost (VG), an unphysical mass pole in topological current K_μ correlator, that ensure $\chi^4 \neq 0$. Recently, Kharzeev and Levin (KL) attempted to connect the VG with confinement and so with Gribrov copies (GC) too. However, their result breaks the BRST symmetry. We analyze the topological susceptibility, in SU(3) and SU(2), using Pad{\' e} approximation and RGZ gluon propagator in MOM scheme.

Primary authors: FELIX, Caroline; Prof. DUDAL, David (KU Leuven); Prof. GUIMARÃES, Marcelo (UERJ); Prof. SORELLA, Silvio (UERJ)

Presenter: FELIX, Caroline

Session Classification: Monday Afternoon (20min talks + 10min discussions)

Contribution ID: **117** Type: **not specified**

ATLAS results on exotics searches

Thursday 11 May 2017 10:00 (30 minutes)

The significant increase of the centre-of-mass energy of the Large Hadron Collider (LHC) from 8 to 13 TeV has allowed the LHC experiments to explore previously inaccessible kinematic regimes in their search for phenomena beyond the Standard Model (BSM).
Many BSM theories predict new phenomena accessible by the LHC. Searches for new physics models are performed using the ATLAS experiment at the LHC. The results reported here use the pp collision data sample collected in 2015 and 2016 by the ATLAS detector at the LHC with a centre-of-mass energy of 13 TeV.

Primary author: BENEKOS, Nectarios (National Technical Univ. of Athens (GR))

Presenter: BENEKOS, Nectarios (National Technical Univ. of Athens (GR))

Session Classification: Thursday Morning (20min talks + 10min discussions)

Contribution ID: **118** Type: **not specified**

Azimuthal correlations and mixed higher order flow harmonics from CMS at the LHC

Thursday 11 May 2017 17:30 (30 minutes)

Two-particle correlations measurements of v_n (n=2-4) in 8.16 TeV pPb collisions, and event-by-event correlations of different v_n measured using symmetric cumulants in 13 TeV pp, 5.02 and 8.16TeV pPb and 5.02 TeV PbPb collisions at the LHC. These new results give important insights to the origin of collectivity observed in small collision systems. Additionally, using the scalar product method and the method of two-particle correlations, the mixed higher order flow harmonics and extracted nonlinear response coefficients of charged particles are measured for the first time as a function of p_T and centrality in 2.76 and 5.02 teV PbPb collisions. The obtained results are compared with different theoretical predictions.

Primary author: STOJANOVIC, Milan (University of Belgrade (RS))

Presenter: STOJANOVIC, Milan (University of Belgrade (RS))

Session Classification: Thursday Afternoon (20min talks + 10min discussions)

Contribution ID: **119** Type: **not specified**

Low Energy Antikaon-nucleon/nuclei interaction studies by AMADEUS

Thursday 11 May 2017 09:30 (30 minutes)

The AMADEUS experiment deals with the investigation of the low-energy kaon-nuclei hadronic interaction at the DAΦNE collider at LNF-INFN, which is fundamental to solve longstanding questions in the non-perturbative strangeness QCD sector. AMADEUS step 0 consisted in the reanalysis of 2004/2005 KLOE data, exploiting K^- absorptions in H, ^{4}He, ^{9}Be and ^{12}C, leading to the first invariant mass spectroscopy study with very low momentum (100MeV) in-flight K^- captures. With AMADEUS step 1 a dedicated pure Carbon target was implemented in the central region of the KLOE detector, providing a high statistic sample of pure at-rest K^- nuclear interaction.
The results obtained in the analyses of the hyperon-pion correlated events, searching for the resonant shapes of Y* states, and the analyses of hyperon-proton, deuteron, and triton correlations, searching for possible K^--multi nucleon bound states, will be presented.

Primary author: PISCICCHIA, Kristian

Presenter: PISCICCHIA, Kristian

Session Classification: Thursday Morning (20min talks + 10min discussions)

Contribution ID: **121** Type: **not specified**

Recent results from NA61/SHINE

Friday 12 May 2017 17:00 (30 minutes)

NA61/SHINE at the CERN SPS is a fixed-target experiment pursuing a rich physics program including measurements for heavy ion, neutrino and cosmic ray physics. The main goal of the ion program is to study the properties of the onset of deconfinement and to search for the signatures of the critical point.

In this contribution the latest NA61/SHINE results on particle spectra as well as on fluctuations and correlations from p+p, Be+Be, and Ar+Sc energy scans will be presented. The NA61 measurements will be compared with world data and with model predictions.

Primary author: MACKOWIAK-PAWLOWSKA, Maja Katarzyna (Warsaw University of Technology (PL))

Presenter: MACKOWIAK-PAWLOWSKA, Maja Katarzyna (Warsaw University of Technology (PL))

Session Classification: Friday Afternoon (20min talks + 10min discussions)

Contribution ID: **122** Type: **not specified**

Heavy glueballs

Tuesday 9 May 2017 17:30 (30 minutes)

Glueballs, i.e. bound state of gluons, were predicted to exist in the very early days of QCD. This expectation has been confirmed by numerous lattice calculations. However, glueballs could not yet be experimentally identified. While in the low-energy sector (below 2.6 GeV) some candidates exist, in the high-mass sector (between 2.6-5 GeV) the situation is not satisfactory. In this talk, after a brief review of the status of glueballs in general, we concentrate on novel aspects of glubeall's search. A general discussion of the width of an heavy glueball is presented . Then, predictions for the decays of the vector glueball (whose mass is about 3.6 GeV according to lattice calculations) and for the decays of a pseudotensor glueball (whose mass is about 3 GeV) are shown. In the end, an outlook concerning other heavy glueballs is presented.

Primary author: Prof. GIACOSA, Francesco (Kielce University)

Presenter: Prof. GIACOSA, Francesco (Kielce University)

Session Classification: Tuesday Afternoon (20min talks + 10min discussions)

Contribution ID: **123** Type: **not specified**

Predictions for $\eta_c \to \eta\pi^+\pi^-$ producing $f_0(500)$, $f_0(980)$ and $a_0(980)$

Wednesday 10 May 2017 10:00 (30 minutes)

We perform calculations for the $\eta_c \to \eta\pi^+\pi^-$ decay using elements of SU(3) symmetry to see the weight of different trios of pseudoscalars produced in this decay, prior to the final state interaction of the mesons. After that, the interaction of pairs of mesons, leading finally to $\eta\pi^+\pi^-$, is done using the chiral unitary approach. We evaluate the $\pi^+\pi^-$ and $\pi\eta$ mass distributions and find large and clear signals for $f_0(500)$, $f_0(980)$ and $a_0(980)$ excitation. The reaction is similar to the $\chi_{c1} \to \eta\pi^+\pi^-$, which has been recently measured at BESIII and its implementation and comparison with these predictions will be very valuable to shed light on the nature of the low mass scalar mesons.

Primary authors: Mr RODRIGUES DEBASTIANI, Vinicius (IFIC, University of Valencia); Prof. LIANG, Wei-Hong (Guangxi Normal University, Guilin, China); Dr XIE, Ju-Jun (Institute of Modern Physics, CAS, Lanzhou, China); Prof. OSET, Eulogio (University of Valencia)

Presenter: Mr RODRIGUES DEBASTIANI, Vinicius (IFIC, University of Valencia)

Session Classification: Wednesday Morning (20min talks + 10min discussions)

Contribution ID: **124** Type: **not specified**

The analytic properties of the Landau gauge quark propagator Dyson-Schwinger equation at rainbow level

Monday 8 May 2017 19:30 (30 minutes)

In this talk I review the status of an ongoing study that is aimed at solving the quark propagator Dyson-Schwinger equation (qDSE) in the complex domain. Knowledge of the propagator's analytic properties is required for bound state equations, but can also potentially provide insights into fundamental phenomena such as confinement through its spectral characteristics. Using only the infrared part of the so-called Maris-Tandy interaction model renders the integrand of the quark-self energy loop analytic, and it is then straightforward to solve the equation in the complex domain. This (over)simplified model serves as a starting point in this work. A Graphics Processing Unit (GPU) based code has been developed, that allows for fast, robust and reliable computation of the complex solution for a wide range of bare mass values. The resulting poles and residues are extracted automatically, and can be used to approximate and model the solution of the propagator. The next step in this project is to not only consider the infrared term of the interaction model, but also the (logarithmic) ultraviolet (UV) term, which induces non-analyticities in the self-energy integrand in form of branch cuts. These branch cuts must be taken into account when evaluating the self-energy integral. I will discuss the techniques I employ to address these complications.

Primary author: WINDISCH, Andreas (Washington University in St Louis)

Presenter: WINDISCH, Andreas (Washington University in St Louis)

Session Classification: Monday Afternoon (20min talks + 10min discussions)

Contribution ID: **125** Type: **not specified**

Interference effect in vacuum polarization from BABAR, KLOE,CMD2 and SND data.

Friday 12 May 2017 09:30 (30 minutes)

The cross section of the process $e^+e^- -> \mu^+\mu^-$ is calculated within hadronic polarization taken into account. The interference effects in vicinity of ϕ and ω mesons are calculated (not only) from $\sigma(e^+e^- -> hadrons)$ and compared with available experiments.

Primary author: SAULI, Vladimir (Nuclear Institute Rez near Prague)

Presenter: SAULI, Vladimir (Nuclear Institute Rez near Prague)

Session Classification: Friday Morning (20min talks + 10min discussions)

Contribution ID: **127** Type: **not specified**

Thermodynamically consistent formulation of quasiparticle viscous hydrodynamics

Wednesday 10 May 2017 11:30 (30 minutes)

We present the derivation of second-order relativistic viscous hydrodynamics from an effective Boltzmann equation for a system consisting of quasiparticles of a single species. We consider temperature-dependent masses of the quasiparticles and devise a thermodynamically-consistent framework to formulate second-order evolution equations for shear and bulk viscous pressure corrections. The main advantage of this formulation is that one can consistently implement realistic equation of state of the medium within the framework of kinetic theory. Specializing to the case of one-dimensional purely-longitudinal boost-invariant expansion, we study the effect of this new formulation on viscous hydrodynamic evolution of strongly-interacting matter formed in relativistic heavy-ion collisions.

Primary authors: TINTI, Leonardo (Jan Kochanowski University); Dr RYBLEWSKI, Radoslaw (Institute of Nuclear Physics PAN); Dr JAISWAL, Amaresh (GSI Helmholtzzentrum für Schwerionenforschung)

Presenter: Dr RYBLEWSKI, Radoslaw (Institute of Nuclear Physics PAN)

Session Classification: Wednesday Morning (20min talks + 10min discussions)

Contribution ID: **128** Type: **not specified**

Recent QCD-related results from Kaon physics at CERN (NA48 and NA62)

Friday 12 May 2017 09:00 (30 minutes)

The NA48/2 experiment presents a final result of the charged kaon semileptonic decays form factors measurement based on 4.28 million $K^{\pm}_{e3}$ and 2.91 million $K^{\pm}_{\mu 3}$ selected decays collected in 2004. The result is competetive with other measurements in $K^{\pm}_{\mu 3}$ mode and has a smallest uncertainty for $K^{\pm}_{e3}$, that leads to the most precise combined $K^{\pm}_{l3}$ result and allows to reduce the form factor uncertainty of $|V_{US}|$. The NA62 experiment at the CERN SPS collected a large sample of charged kaon decays with a highly efficient trigger for decays into electrons in 2007. The kaon beam represents a source of tagged neutral pion decays in vacuum. A preliminary result of a new measurement of the electromagnetic transition form factor slope of the neutral pion in the time-like momentum region from 1.05 million fully reconstructed π 0 Dalitz decays is presented in the second part of this report.

Primary author: Mr SHKAROVSKIY, Sergey (Joint Institute for Nuclear Research (RU))

Presenter: Mr SHKAROVSKIY, Sergey (Joint Institute for Nuclear Research (RU))

Session Classification: Friday Morning (20min talks + 10min discussions)

Contribution ID: **129** Type: **not specified**

Decays of excited vector mesons

Tuesday 9 May 2017 17:00 (30 minutes)

We study two types of excited vector mesons, radially excited vector mesons characterised by quantum numbers $n\ ^{2s+1}L_J = 2^3S_1$ and angular-momentum excited vector mesons with quantum numbers $n\ ^{2s+1}L_J = 1^3D_1$. We evaluate the decays of these mesons into pseudoscalar and ground-state vector mesons. By using an effective relativistic QFT model based on flavour symmetry, we calculate the decay widths and we compare the results with experimental data taken from PDG. We also make predictions for the $s\bar{s}$ state in the 1^3D_1 nonet which has not yet been experimentally seen. We calculate also the decay rates of excited vector mesons into a photon and a pseudoscalar meson by making use of „Vector Meson Dominance".

Primary author: PIOTROWSKA, Milena (Jan Kochanowski University)

Co-author: Prof. GIACOSA, Francesco (Kielce University)

Presenter: PIOTROWSKA, Milena (Jan Kochanowski University)

Session Classification: Tuesday Afternoon (20min talks + 10min discussions)

Contribution ID: **130** Type: **not specified**

Quark, gluon and meson correlators of unquenched QCD

Monday 8 May 2017 09:30 (30 minutes)

We present first-principle results for the 1PI correlation functions of two-flavour Landau-gauge QCD in the vacuum. These correlation functions carry the full information about the theory. They are obtained by solving their Functional Renormalisation Group equations in a systematic vertex expansion, aiming at apparent convergence. This work represents an indispensable and pivotal prerequisite for quantitative first-principle studies of the QCD phase diagram and the hadron spectrum within this framework.

In particular, we have computed the gluon, ghost, quark and scalar-pseudoscalar meson propagators, as well as gluon, ghost-gluon, quark-gluon, quark, quark-meson, and meson interactions. Our results stress the crucial importance of the correct semi-perturbative running of the different vertices in order to quantitatively describe the phenomena and scales of confinement and spontaneous chiral symmetry breaking without further phenomenological input. Furthermore, preliminary results for the correlation functions of pure Yang-Mills at finite temperature are presented.

Primary authors: CYROL, Anton; MITTER, Mario; PAWLOWSKI, Jan M. (University of Heidelberg); Dr STRODTHOFF, Nils (LBNL)

Presenter: MITTER, Mario

Session Classification: Monday Morning (20min talks + 10min discussions)

Contribution ID: **131** Type: **not specified**

Decays of light mesons triggered by chiral chemical potential

Monday 8 May 2017 17:30 (30 minutes)

Light meson (π, σ, a_0) properties in the environment with chiral imbalance will be analyzed with the help of meson effective lagrangian associated with QCD. New spatial parity violating decays of scalar meson arise as a result of mixing of π and a_0 mesons. The pion electromagnetic formfactor obtains an unusual parity-odd contribution. Pion effective masses vanish in flight. The possible determination of chiral chemical potential in heavy ion collisions based on above mentioned phenomena will be outlined.

Primary author: Prof. ANDRIANOV, Aleksandr (Saint-Petersburg State University)

Co-authors: ESPRIU CLIMENT, Domenec (University of Barcelona (ES)); Prof. ANDRIANOV, Vladimir (Saint-Petersburg State University)

Presenter: Prof. ANDRIANOV, Aleksandr (Saint-Petersburg State University)

Session Classification: Monday Afternoon (20min talks + 10min discussions)

Contribution ID: **132** Type: **not specified**

Photoproduction of Light Exotic and Strange Mesons

Thursday 11 May 2017 11:00 (30 minutes)

Studies of meson spectra via strong decays provide insight regarding QCD at the confinement scale. These studies have led to phenomenological models for QCD such as the constituent quark model. However, QCD allows for a much richer spectrum of meson states which include extra states such as hybrids, exotics, multi-quarks, and glueballs. Within the past two decades a number of experiments have put forth tantalizing evidence for the existence of light quark exotic hybrid mesons in the mass range below 2 GeV. Recent Lattice QCD calculations of the light-quark meson spectrum indicate a constituent gluon-like excitation contributing an additional $J^{PC} = 1^{+-}$ and mass $1 - 1.5$ GeV resulting in the lightest hybrid nonets with masses near 2.0 GeV. High statistical yields from recent experiments along with new advances in analysis techniques have shed a new light towards the understanding the latest experimental exotic candidates. Recent results from photo-production will be presented.

Primary author: Prof. EUGENIO, Paul (Florida State University)

Presenter: Prof. EUGENIO, Paul (Florida State University)

Session Classification: Thursday Morning (20min talks + 10min discussions)

Contribution ID: **133** Type: **not specified**

QCD phase diagram and magnetic fields

Friday 12 May 2017 18:30 (30 minutes)

We examine possible effects of an external magnetic field on the phase diagram structure of QCD. The study is performed using NJL-type models. We focus on the influence of a magnetic field on the chiral and deconfinement phase transitions. Possible consequences of the Inverse Magnetic Catalysis effect on the QCD phase diagram at both finite chemical potential and temperature is analyzed. We devote special emphasis on how the location of the Critical-End-Point (CEP) changes in a magnetized medium.

Primary authors: FERREIRA, Márcio (CFisUC); COSTA, Pedro (CFisUC); PROVIDÊNCIA, Constança (CFisUC)

Presenter: FERREIRA, Márcio (CFisUC)

Session Classification: Friday Afternoon (20min talks + 10min discussions)

Contribution ID: **134** Type: **not specified**

Spin 1 low lying meson spectra and the subtle link to the spin 0 mesons.

Monday 8 May 2017 10:00 (30 minutes)

An NJL-type three-flavor quark model with a complete set of explicit chiral symmetry breaking terms is extended to include vector and axial vector effective interaction terms. A suitable bosonization procedure is implemented and discussed. The bosonized Lagrangian is written up to quadratic order in the bosonic fields and the role of the new interactions is analysed in detail. The model's parameters are fitted to yield reasonable values to the four low-lying spin 0 and spin 1 meson nonets' masses.

Primary authors: MORAIS, Jorge (FCTUC / CFisUC); HILLER, Brigitte (Coimbra U.); OSIPOV, A. A. (Coimbra U.)

Presenter: MORAIS, Jorge (FCTUC / CFisUC)

Session Classification: Monday Morning (20min talks + 10min discussions)

Contribution ID: **135** Type: **not specified**

Thermal entropic destruction and entanglement entropy of the quark-antiquark pair from dynmical holographic QCD

Thursday 11 May 2017 19:30 (30 minutes)

To be announced.

Primary authors: Prof. DUDAL, David (KU Leuven); Dr MAHAPATRA, Subhash (KU Leuven)

Presenter: Dr MAHAPATRA, Subhash (KU Leuven)

Session Classification: Thursday Afternoon (20min talks + 10min discussions)

Contribution ID: **136** Type: **not specified**

Transverse momentum fluctuations and correlations

Wednesday 10 May 2017 18:30 (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.

Primary authors: BOZEK, Piotr (AGH University of Science and Technology); BRONIOWSKI, Wojciech (IFJ PAN); CHATTERJEE, Sandeep (AGH University of Science and Technology)

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

Session Classification: Wednesday Afternoon (20min talks + 10min discussions)

Contribution ID: **137** Type: **not specified**

Chern-Simons 5-form and Holographic Baryons

Tuesday 9 May 2017 11:00 (30 minutes)

In the top-down holographic model of QCD based on D4/D8-branes in type IIA string theory and some of the bottom up models, the low energy effective theory of mesons is described by a 5 dimensional Yang-Mills-Chern-Simons theory in a certain curved background with two boundaries. The 5 dimensional Chern-Simons term plays a crucial role to reproduce the correct chiral anomaly in 4 dimensional massless QCD. However, there are some subtle ambiguities in the definition of the Chern-Simons term for the cases with topologically non-trivial gauge bundles, which include the configurations with baryons. In particular, for the cases with three flavors, it was pointed out by Hata and Murata that the naive Chern-Simons term does not lead to an important constraint on the baryon spectrum, which is needed to pick out the correct baryon spectrum observed in nature. In this talk, we propose a formulation of well-defined Chern-Simons term which can be used for the cases with baryons, and show that it recovers the correct baryon constraint as well as the chiral anomaly in QCD.
This talk is based on our recent paper arXiv:1612.09503 written with P.H.C. Lau.

Primary author: SUGIMOTO, Shigeki (Kyoto University)

Presenter: SUGIMOTO, Shigeki (Kyoto University)

Session Classification: Tuesday Morning (20min talks + 10min discussions)

Contribution ID: **138** Type: **not specified**

Excited Baryons and Quark-Hadron Duality

Wednesday 10 May 2017 17:00 (30 minutes)

We analyse the role of the excited Baryonic spectrum in Quark Hadron Duality.

Primary authors: Prof. RUIZ ARRIOLA, Enrique (Universidad de Granada); MASJUAN QUERALT, Pere (u)

Presenter: Prof. RUIZ ARRIOLA, Enrique (Universidad de Granada)

Session Classification: Wednesday Afternoon (20min talks + 10min discussions)

Contribution ID: **139** Type: **not specified**

Polarized Drell-Yan measurements at COMPASS

Thursday 11 May 2017 09:00 (30 minutes)

COMPASS is a fixed-target experiment that was put in operation in 2002 at CERN (SPS, M2 beamline). An important part of its physics programme is the exploration of the transverse spin structure of the nucleon via measurements of spin (in)dependent azimuthal asymmetries in semi-inclusive DIS and, recently, also in Drell-Yan processes. Drell-Yan measurements with a π^- beam interacting with a transversely polarized NH_3 target started with the 2015 run and will be continued in 2018. The measurement of the Sivers and other azimuthal asymmetries in polarized SIDIS and Drell-Yan performed by COMPASS provides a unique possibility to test (pseudo-)universal features of transverse momentum dependent parton distribution functions, predicted in QCD. Results of the first ever measurements of the polarised Drell-Yan reaction
performed by COMPASS will be presented.

Primary author: LONGO, Riccardo (Universita e INFN Torino (IT))

Presenter: LONGO, Riccardo (Universita e INFN Torino (IT))

Session Classification: Thursday Morning (20min talks + 10min discussions)

Contribution ID: **140** Type: **not specified**

Hadron properties from nPI: towards first principles results

Monday 8 May 2017 18:30 (30 minutes)

The Green's functions of QCD encode the properties of hadrons, with the appearance of (colour singlet) poles in n-point functions corresponding to bound-states and resonances. There are several techniques by which such information may be extracted, including lattice QCD and functional methods. We discuss recent progress in applying nPI effective action techniques to the systematic truncation of Dyson-Schwinger and Bethe-Salpeter equations, with particular emphasis on the spectrum of mesons and baryons.

Primary author: Dr WILLIAMS, Richard (University of Giessen)

Presenter: Dr WILLIAMS, Richard (University of Giessen)

Session Classification: Monday Afternoon (20min talks + 10min discussions)

Contribution ID: **141** Type: **not specified**

Unquenching and unitarising mesons in quark models and on the lattice

Wednesday 10 May 2017 09:30 (30 minutes)

Modern approaches to mesons and baryons go beyond the traditional description in terms of pure valence quark-antiquark or three-quark systems confined by some infinitely rising interquark potential inspired by QCD. As most hadrons are broad to very broad resonances, with decay widths often of the same order of magnitude as the average level splittings, pretending that they are stable systems is a gross approximation. This was recognised and dealt with long ago in a couple of unitarised quark models, and more recently also in lattice calculations.

In this context, I shall discuss the concepts of unquenching and unitarisation for mesons in quark models and on the lattice in a historical perspective, presenting old and recent results that appear to converge towards a better common understanding of the meson spectrum.

Primary authors: Dr RUPP, George (CeFEMA, IST, Lisbon); Prof. VAN BEVEREN, Eef (Physics Department, University of Coimbra)

Presenter: Dr RUPP, George (CeFEMA, IST, Lisbon)

Session Classification: Wednesday Morning (20min talks + 10min discussions)

Contribution ID: **142** Type: **not specified**

Rho meson form factors in the point form

Monday 8 May 2017 09:00 (30 minutes)

We present results for the electromagnetic form factors of the ρ meson obtained within point-form relativistic quantum mechanics. In our formalism for the calculation of the meson current we treat elastic electron-meson scattering as a Poincaré-invariant coupled-channel problem for a Bakamjian-Thomas mass operator. From the resulting invariant one-photon-exchange amplitude we extract the meson current. The well-known violation of cluster separability in the Bakamjian-Thomas framework causes the appearance of unphysical contributions in the current, which, however, can be separated unambiguously from the physical ones such that we obtain a current with all required properties.

Primary author: Dr BIERNAT, Elmar P. (Centro de Física Teórica de Partículas (CFTP), Instituto Superior Técnico (IST), Universidade de Lisboa, Av. Rovisco Pais, 1049-001 Lisboa, Portugal)

Co-author: Prof. SCHWEIGER, Wolfgang (Inst. fuer Physik, Karl-Franzens-Universitaet Graz)

Presenter: Dr BIERNAT, Elmar P. (Centro de Física Teórica de Partículas (CFTP), Instituto Superior Técnico (IST), Universidade de Lisboa, Av. Rovisco Pais, 1049-001 Lisboa, Portugal)

Session Classification: Monday Morning (20min talks + 10min discussions)

Contribution ID: **143** Type: **not specified**

Scale invariant resummed perturbation at finite temperature

Wednesday 10 May 2017 19:00 (30 minutes)

We will illustrate how our recently developed
nonperturbative variational technique combined with renormalization group (RG) properties efficiently resums perturbative expansions in thermal field theories. The resulting convergence and scale dependence of optimized thermodynamical quantities are drastically improved as compared to standard perturbative expansions, as well as to other related methods such as the screened perturbation or (resummed) hard-thermal-loop perturbation. Our general method will be illustrated for the nonlinear sigma model, as a toy model for thermal QCD, and we will also discuss some preliminary results in the framework of hard thermal loop resummation for QCD thermodynamical quantities.

Primary author: KNEUR, Jean-Loic (Univ Montpellier)

Presenter: KNEUR, Jean-Loic (Univ Montpellier)

Session Classification: Wednesday Afternoon (20min talks + 10min discussions)

Contribution ID: **144** Type: **not specified**

A new theoretical method for lattice QCD calculations at finite density beyond the sign problem

Tuesday 9 May 2017 09:00 (30 minutes)

We propose a new theoretical method for the practical lattice QCD calculation at finite density as a possible solution of the sign problem in finite-density QCD. In this method, the fermionic determinant becomes real and non-negative, and therefore no sign problem appears and the practical numerical calculation can be performed in lattice QCD.

Primary author: SUGANUMA, Hideo (Kyoto University)

Presenter: SUGANUMA, Hideo (Kyoto University)

Session Classification: Tuesday Morning (20min talks + 10min discussions)

Contribution ID: **145** Type: **not specified**

Lattice Landau gauge gluon propagator at finite temperature: non-zero Matsubara frequencies and spectral densities

Tuesday 9 May 2017 09:30 (30 minutes)

The lattice Landau gauge gluon propagator at finite temperature is computed including the non-zero Matsubara frequencies. Furthermore, the Källén-Lehmann representation is inverted and the corresponding spectral density evaluated using a Tikhonov regularisation together with Morozov discrepancy principle. Implications for gluon confinement are also discussed.

Primary authors: Prof. DUDAL, David (KU Leuven); Dr OLIVEIRA, Orlando (Center for Physics, University of Coimbra); Mr ROELFS, Martin (KU Leuven-Kulak); SILVA, Paulo (Center for Physics, University of Coimbra)

Presenter: SILVA, Paulo (Center for Physics, University of Coimbra)

Session Classification: Tuesday Morning (20min talks + 10min discussions)

Contribution ID: **146** Type: **not specified**

Heavy and heavy-light mesons and the Lorentz structure of the quark-antiquark kernel

Monday 8 May 2017 08:30 (30 minutes)

We use the Covariant Spectator Theory (CST) to calculate the mass spectrum and relativistic vertex functions of mesons as quark-antiquark bound states in which at least one of the quarks is either a charm or bottom quark. The quark-antiquark bound-state equation in CST is, similar to the Bethe-Salpeter equation, an integral equation in which the kernel consists of two-particle irreducible Feynman diagrams. However, in the loop integration over intermediate four-momenta, only pole terms originated by the quark propagators are kept, which represent the leading contributions. This procedure leads to equations that possess the correct one-body limit, which is necessary for a realistic description of heavy-light systems. Our interaction kernel consists of a relativistic generalization of a linear confining potential, whose Lorentz structure is taken as an adjustable mixture of scalar, pseudoscalar, and vector form, and a one-gluon exchange interaction. I will present our recent results for fits to the observed meson spectrum and discuss the conclusions we can draw about the Lorentz structure of the quark-antiquark interaction.

Primary authors: Prof. STADLER, Alfred (University of Évora, and CFTP, University of Lisbon); LEITÃO, Sofia (CFTP, IST Lisbon); Prof. PEÑA, M. T. (CFTP, IST Lisbon); Dr BIERNAT, Elmar P. (Centro de Física Teórica de Partículas (CFTP), Instituto Superior Técnico (IST), Universidade de Lisboa, Av. Rovisco Pais, 1049-001 Lisboa, Portugal)

Presenter: Prof. STADLER, Alfred (University of Évora, and CFTP, University of Lisbon)

Session Classification: Monday Morning (20min talks + 10min discussions)

Contribution ID: **147** Type: **not specified**

Mixture of quark and gluon fluids described in terms of anisotropic hydrodynamics

Friday 12 May 2017 11:00 (30 minutes)

Relativistic hydrodynamics has been a fundamental tool to understand the evolution of matter in heavy-ion experiments at RICH and LHC. Despite the success of second order viscous hydrodynamics in reproducing collective behavior and particle spectra, there are still theoretical shortcomings that may question the validity of the approach in heavy-ion experiments conditions. Large gradients and fast longitudinal expansion produce very large pressure corrections, in contrast to the founding hypothesis of small deviation from local equilibrium and the perturbative treatment viscous corrections. One way to address this problem is anisotropic hydrodynamics. Most of the theoretical investigations about hydrodynamics started from a kinetic underlying substrate of a single species of particles. Unfortunately the striking agreement of anisotropic hydrodynamics with the exact solution of the Boltzmann equation was not preserved in the case of a mixtures of quarks and gluons.

We recently extended the anisotropic hydrodynamics prescription for massless particles in 1+1-dimensions to the case of mixtures of fluids, largely improving the agreement with the exact solutions compared to previous works [1-3]. We allow quarks and gluons to have different momentum scales during the evolution and a non vanishing baryon chemical potential. We take the dynamical equations from the zeroth, the first and the second moment of the Boltzmann equation [4]. We performed a test of the new formulation, comparing the results of anisotropic hydorodynamics with the exact solution of the Boltzmann equation for a mixture of fluid in the Bjorken flow limit, finding a very good agreement [5].

[1] W.Florkowski, R.Maj, R.Ryblewski, M.Strickland, Phys.Rev.C87 (2013) 3, 034914.

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[5] W.Florkowski, E.Maksymiuk, R.Ryblewski, L.Tinti, Phys.Rev. C92 (2015) no.5, 054912

Primary author: MAKSYMIUK, Ewa (Jan Kochanowski University)

Presenter: MAKSYMIUK, Ewa (Jan Kochanowski University)

Session Classification: Friday Morning (20min talks + 10min discussions)

Contribution ID: **148** Type: **not specified**

General unquenching properties of two-meson scattering and production amplitudes

Wednesday 10 May 2017 09:00 (30 minutes)

Besides the unitarity and symmetry requirements for a multi-resonance scattering amplitude, several other natural conditions can easily exclude unrealistic proposals. In particular, the behaviour of singularities under the variation of model parameters yield important information. We discuss how resonance poles should move in the complex-energy plane when coupling constants and masses are varied, how resonances above threshold can turn into bound states below threshold and how the light-quark spectrum can be turned into the spectrum of heavy quarks, with one and the same analytic expression for the scattering amplitude. Moreover, it is shown that perturbative approximations usually do not satisfy the natural conditions.

Primary author: Dr VAN BEVEREN, Eef (Coimbra University)

Co-author: Dr RUPP, George (Instituto Superior Técnico)

Presenter: Dr VAN BEVEREN, Eef (Coimbra University)

Session Classification: Wednesday Morning (20min talks + 10min discussions)

Contribution ID: **149** Type: **not specified**

Experimental evidence for the existence of 38 MeV and 57.5 GeV bosons

Rather convincing evidence is discussed for the possible existence of a boson with a mass of about 38 MeV. Furthermore, it is shown that a boson with mass of 57.5 GeV might exist.

Primary author: Prof. VAN BEVEREN, Eef (University of Coimbra, Portugal)

Co-author: Dr RUPP, George (Instituto Superior Técnico)

Presenter: Prof. VAN BEVEREN, Eef (University of Coimbra, Portugal)

Contribution ID: **150** Type: **not specified**

Features of the QCD phase diagram from small, noisy, fluctuating systems

Wednesday 10 May 2017 17:30 (30 minutes)

Statistical moments of particle multiplicities in heavy-ion collision experiments are an important probe in the exploration of the phase diagram of strongly-interacting matter and, particularly, in the search for the QCD critical endpoint. In order to appropriately interpret experimental measures of these moments, however, it is necessary to understand the role of experimental limitations, as well as background contributions, providing expectations on how critical behavior should be affected by them. We present a framework for calculating moments of particle multiplicities in the presence of correlations of both critical and spurious origins. We also include effects from resonance decay and a limited acceptance window, as well as detector efficiency. Although we focus on second-order moments, for simplicity, an extension to higher-order moments is straightforward.

Primary author: FRAGA, Eduardo (Universidade Federal do Rio de Janeiro)

Presenter: FRAGA, Eduardo (Universidade Federal do Rio de Janeiro)

Session Classification: Wednesday Afternoon (20min talks + 10min discussions)

Contribution ID: **151** Type: **not specified**

Holographic models for heavy vector mesons

Monday 8 May 2017 11:30 (30 minutes)

Holographic AdS/QCD models provide a tool for calculating the spectra of glueballs and light mesons and baryons. In this talk we discuss some recent AdS/QCD models that extend the hadronic description to the case of heavy vector mesons.
Then we consider the finite temperature version of such a model in order to represent the thermal effects of a medium like the plasma in the states of heavy mesons. We show that it is possible to describe of the thermal behavior of the states 1S, 2S and 3S of bottomonium and charmonium.
The corresponding spectral function exhibits a consistent picture for the melting of the states where, for each flavor, the higher excitations dissociate at lower temperatures. A very clear distinction between the heavy flavors emerges, with bottomonium state $\Upsilon(1S)$ surviving deconfinemet transition at temperatures much larger than the critical deconfinement temperature of the medium.

Primary author: BRAGA, Nelson (Universidade Federal do Rio de Janeiro)

Presenter: BRAGA, Nelson (Universidade Federal do Rio de Janeiro)

Session Classification: Monday Morning (20min talks + 10min discussions)

Contribution ID: **152** Type: **not specified**

Excited Scalar and Pseudoscalar Mesons in the Extended Linear Sigma Model

Tuesday 9 May 2017 18:30 (30 minutes)

Masses and decays of excited scalar and pseudoscalar $\bar{q}q$ states are studied in depth within the Extended Linear Sigma Model (eLSM). The model also contains ground-state scalar, pseudoscalar, vector and axial-vector mesons. The main objective is to investigate the hypothesis that the $f_0(1790)$ resonance, observed a decade ago by the BES Collaboration and recently by LHCb, represents an excited scalar quarkonium. In addition the possibility is analysed that the new $a_0(1950)$ resonance, observed recently by BABAR, may also be an excited scalar state. Both hypotheses receive justification in this approach although there appears to be some tension between the simultaneous interpretation of $f_0(1790)/a_0(1950)$ and pseudoscalar mesons $\eta(1295)$, $\eta(1300)$, $\eta(1440)$ and $K(1460)$ as excited $\bar{q}q$ states.
Work presented in arXiv:1612.09218.

Primary authors: PARGANLIJA, Denis (TU Wien); Prof. GIACOSA, Francesco (Kielce University)

Presenter: PARGANLIJA, Denis (TU Wien)

Session Classification: Tuesday Afternoon (20min talks + 10min discussions)

Contribution ID: **154** Type: **not specified**

Photoproduction of exotic states

Tuesday 9 May 2017 19:30 (30 minutes)

The experimental investigation of hadrons is an unique way to understand how QCD behaves at the low-energy non-perturbative scale, where the bulk of the Universe visible mass exists. The search for "exotic" states, in particular, could permit to access further degrees of freedom of the theory that are characteristics of these particles, behind those of the Constituent Quark Model that well describes "conventional" hadrons.

In the past, these studies have been performed with different experimental techniques, such as peripheral production with high-energy pion or kaon beams. Today, the availability of high-energy, high-intensity photon beams permitted to start a new experimental program based on this probe, made of different efforts.

In the talk, after briefly presenting the physical motivations of hadron spectroscopy and discussing the main properties of photo-production, I'll first present few results from past experiments, such as LEPS and CLAS. Then, I'll discuss plans for exotic hadron searches in two "modern" photoproduction experiments at Jefferson Lab: "Meson-Ex"in Hall B and "GlueX"in Hall D.

Primary author: CELENTANO, Andrea (INFN - National Institute for Nuclear Physics)

Presenter: CELENTANO, Andrea (INFN - National Institute for Nuclear Physics)

Session Classification: Tuesday Afternoon (20min talks + 10min discussions)

Contribution ID: **155** Type: **not specified**

From the Gribov ambiguity to confining effective models

Monday 8 May 2017 11:00 (30 minutes)

In this talk we discuss recent developments in the quantization of Yang-Mills theories in the non-perturbative regime and possible phenomenological applications. In particular, we discuss how the procedure that takes into account the presence of Gribov copies in the gauge path integral has led to the construction of a scenario of gluon confinement via an infrared effective action, the (refined) Gribov-Zwanziger theory. Motivated by the importance of implementing con□finement in low-energy QCD eff□ective models in a dynamical way, we shall present a confining quark model that aims at the extension of this picture to the matter sector. In this model, interactions are encoded in a nonlocal quark propagator that displays dynamical chiral symmetry breaking in the infrared, while reproducing the perturbative expectations in the deep ultraviolet limit.

Primary author: PALHARES, Leticia (UERJ)

Presenter: PALHARES, Leticia (UERJ)

Session Classification: Monday Morning (20min talks + 10min discussions)

Contribution ID: **156** Type: **not specified**

Dilepton production in Relativistic heavy ion collisions

Friday 12 May 2017 11:30 (30 minutes)

Dilepton production plays a very important role to study hot and dense matter in relativistic heavy ion production.
At HADES or JPARC energies in pion induced dilepton production the interference between the dileptons stemming from intermediate rho and omega helps to study the propagation of the omega meson in dense matter, furthermore, we can study how the coherence is lost in strongly interacting enviroment.
In heavy ion collisions the low mass dileptons provide us information about the in-medium properties of vector mesons.

Primary authors: WOLF, Gyorgy (Wigner FK); ZETENYI, Miklos (RMKI)

Presenter: WOLF, Gyorgy (Wigner FK)

Session Classification: Friday Morning (20min talks + 10min discussions)

Contribution ID: **157** Type: **not specified**

Resent results from the KLOE-2 experiment

Wednesday 10 May 2017 11:00 (30 minutes)

We will report on recent results of the KLOE-2 experiment on
the measurement of the running of the fine structure constant below 1 GeV, and the search for the light gauge boson in the mass range below 1 GeV.

Primary author: Prof. MOSKAL, Pawel (Jagiellonian University)

Presenter: Prof. MOSKAL, Pawel (Jagiellonian University)

Session Classification: Wednesday Morning (20min talks + 10min discussions)

Contribution ID: **158** Type: **not specified**

Monte Carlo calculations using the holomorphic gradient flow

Tuesday 9 May 2017 08:30 (30 minutes)

Questions about quantum field theories at non-zero chemical potential and/or real-time correlators are often impossible to investigate numerically due to the notorious sign problem. A possible solution to this problem is to deform the integration domain for the path integral in the complex plane. We describe a family of such deformations, built using the holomorphic gradient flow, that interpolate between the original integration domain (where the sign problem is severe) and the union of relevant thimbles (where the sign problem is mild but a multimodal probability distribution complicates the Monte Carlo sampling). We show how this works in a fermionic model and for computing real time correlators for a simple thermal quantum field theory.

Primary author: ALEXANDRU, Andrei (The George Washington University)

Presenter: ALEXANDRU, Andrei (The George Washington University)

Session Classification: Tuesday Morning (20min talks + 10min discussions)

Contribution ID: **159** Type: **not specified**

A novel multiquark approach to hadron resonances

Friday 12 May 2017 10:00 (30 minutes)

A new scheme for the hadron spectroscopy is put forward. By assumption, the form of spectrum is dictated by the trace of energy momentum tensor in QCD. This provides the relativistic and renormalization invariance of hadron masses. The schema is applied to the light mesons. Two complementary interpretations of hadron states emerge. The first one represents an "atomic" structure of resonances, in which the quanta of non-perturbative gluon contributions are quantified via an effective formation of quasiparticles representing gluon analogues of positronium. This picture allows to build a "periodic table of hadronic elements", i.e. to classify the hadron states, in some sense, in analogy with Mendeleev table in Chemistry. The Regge spin and radial trajectories appear in a natural way and without use of non-relativistic notion of orbital momentum or any semiclassical quantization conditions. The second interpretation is based on a "collisional" nature of some (or many) hadrons. This picture suits better for explaining the decay modes and isospin. In particular, it leads to a simple explanation of the scalar sector below 1˜GeV with correct masses and decay modes.

Primary author: Prof. AFONIN, Sergey

Presenter: Prof. AFONIN, Sergey

Session Classification: Friday Morning (20min talks + 10min discussions)

Contribution ID: **160** Type: **not specified**

Hollowness in pp at the LHC

Friday 12 May 2017 19:00 (30 minutes)

Parameterizations of the pp scattering data at the LHC collision energies indicate a hollow in the inelasticity profile of the pp interaction, with, curiously, less absorption for the head-on collisions than for collisions at a non-zero impact parameter. We argue that the hollowness in the impact parameter is a quantum effect; it precludes models of inelastic collisions where inelasticity is obtained by naive folding of partonic densities.

Primary authors: BRONIOWSKI, Wojciech (IFJ PAN); Prof. RUIZ ARRIOLA, Enrique (Universidad de Granada)

Presenter: BRONIOWSKI, Wojciech (IFJ PAN)

Session Classification: Friday Afternoon (20min talks + 10min discussions)

Contribution ID: **161** Type: **not specified**

Overview on QCD studies at BESIII

Friday 12 May 2017 08:30 (30 minutes)

The BESIII detector has been taking data for QCD study in the energy region of 2.0-4.6 GeV at the Beijing Electron and Positron Collider (BEPCII). There are totally 130 scan energy points with an integrated luminosity of 1.4 pb-1. Various QCD-related topics are performed, such as measurements of baryon form factors, hadron spectroscopy, precision tests of the standard model and Jpsi lineshape scan. In this report, the experimental situation for the QCD study at BESIII is reviewed together with a prospect at BESIII.

Primary author: ZHOU, Xiaorong (USTC)

Presenter: ZHOU, Xiaorong (USTC)

Session Classification: Friday Morning (20min talks + 10min discussions)

Contribution ID: **162** Type: **not specified**

Jets and charged hadrons in heavy ion collisions with the ATLAS detector

Friday 12 May 2017 17:30 (30 minutes)

Ultrarelativistic heavy ion collisions at the LHC produce the Quark Gluon Plasma. Jets are a useful probe to study this state of matter as they are produced at the early stages of the collisions and are expected to be modified as propagating through the medium. One observable is the energy loss lowering the jet yields at a given transverse momentum. Other observables are the modification of the dijet momentum balance and the modification of fragmentation functions. A phenomenon strictly correlated to the jet energy loss is the modification of the charged-hadron momentum spectrum. The large new Pb+Pb data sample collected by ATLAS in Run 2 allows precision measurements of these observables in a wide transverse momentum range and in different centrality and rapidity intervals.

Primary author: SANTOS, Helena (LIP - Lisbon)

Presenter: SANTOS, Helena (LIP - Lisbon)

Session Classification: Friday Afternoon (20min talks + 10min discussions)

Contribution ID: **163** Type: **not specified**

Fragmentation and Monte Carloe generators at Belle II

Thursday 11 May 2017 17:00 (30 minutes)

The Belle II experiment at the SuperKEKB collider is a major upgrade of the KEK "B factory"facility in Tsukuba, Japan aiming at an increase of the peak luminosity by a factor of 40. Commissioning of the SuperKEKB main ring took place in the first half of 2016. Phase 2 of the commissioning will start beginning of 2018 after the installation of the final focus system in the IR but still without the vertex detector system. Once machine operation in the nano-beam scheme is established, the goal is to accumulate data for early physics analyses at different center-of-mass energies. In this talk we describe the Belle II physics program in the QCD sector focusing on the tuning of the fragmentation process of quarks in PYTHIA8 Monte Carlo generator.

Primary author: ROSTOMYAN, Ami (DESY)

Presenter: ROSTOMYAN, Ami (DESY)

Session Classification: Thursday Afternoon (20min talks + 10min discussions)

Contribution ID: **164** Type: **not specified**

One-loop exclusive diffractive impact factors in the CGC framework

Thursday 11 May 2017 19:00 (30 minutes)

The Color Glass Condensate picture, or shockwave formalism, provides the non-planar extensions of the non-linear extension of the BFKL formalism for low-x physics. In such a framework, we will detail how to obtain IR- and UV-finite impact factors for two exclusive diffractive processes at one-loop accuracy.

Primary authors: BOUSSARIE, Renaud (IFJ Krakow); Dr WALLON, Samuel; SZYMANOWSKI, Lech (National Centre for Nuclear Research, Warsaw, Poland); GRABOVSKIY, Andrey (Budker Institute of Nuclear Physics (RU)); IVANOV, Dmitry (Sobolev Institute of Mathematics)

Presenter: BOUSSARIE, Renaud (IFJ Krakow)

Session Classification: Thursday Afternoon (20min talks + 10min discussions)

Contribution ID: **165** Type: **not specified**

Analytic approach to pion-kaon scattering and strange resonances

Tuesday 9 May 2017 19:00 (30 minutes)

Here we will discuss a recent dispersive determination of pion-kaon scattering and the use of analytic methods to extract the parameters of the poles associated to light strange resonances, without assuming a specific model.

Primary authors: RODAS BILBAO, Arkaitz (Universidad Complutense de Madrid); PELAEZ, Jose R.

Presenter: RODAS BILBAO, Arkaitz (Universidad Complutense de Madrid)

Session Classification: Tuesday Afternoon (20min talks + 10min discussions)

Contribution ID: **166** Type: **not specified**

Center Vortices and Topological Charge

Tuesday 9 May 2017 10:00 (30 minutes)

I review important aspects of the interplay between center vortices and topological charge.

Primary author: HÖLLWIESER, Roman

Presenter: HÖLLWIESER, Roman

Session Classification: Tuesday Morning (20min talks + 10min discussions)

Contribution ID: **167** Type: **not specified**

Relativistic perfect fluid hydrodynamics of particles with spin 1/2

Thursday 11 May 2017 18:30 (30 minutes)

Starting from local equilibrium distribution functions for particles and antiparticles with spin 1/2, which are generalised to two by two hermitian matrices to include spin degrees of freedom, and using the conservation laws for energy, momentum and angular momentum, we derive hydrodynamic equations for the local temperature, chemical potential and hydrodynamic flow, as well as for the spin tensor. The resulting framework results in a set of differential equations which, in the minimal way, extend the standard picture of perfect-fluid hydrodynamics with the entropy current conserved. They can be used in space-time analyses of spin and polarisation evolution for various physical systems including high-energy nuclear collisions. As a special solution of the obtained approach, we find a stationary vortex-like solution which exhibits the vorticity-spin alignment and has been found in earlier studies of fluids at global equilibrium.

Primary authors: FLORKOWSKI, Wojciech (Institute of nuclear Physics, Krakow); FRIMAN, Bengt (GSI); JAISWAL, Amaresh (GSI Helmholtzzentrum für Schwerionenforschung); SPERANZA, Enrico (GSI and TU Darmstadt)

Presenter: FLORKOWSKI, Wojciech (Institute of nuclear Physics, Krakow)

Session Classification: Thursday Afternoon (20min talks + 10min discussions)

Contribution ID: **168** Type: **not specified**

Phase diagram and isentropic curves from the vector meson extended Polyakov quark meson model

Wednesday 10 May 2017 19:30 (30 minutes)

In the framework of the $N_f = 2 + 1$ flavor (axial)vector meson extended Polyakov quark meson model we investigate the QCD phase diagram at finite temperature and density. We use a χ^2 minimization procedure to parametrize the model based on tree-level decay widths and vacuum scalar and pseudoscalar curvature masses which incorporate also the contribution of the constituent quarks. Using a hybrid approximation (mesons at tree level, fermions at one-loop level) for the grand potential we determine the pressure and other thermodynamical observables derived from it together with the phase boundary. We also determine the location of the critical end point of the phase diagram on the $\mu_B - T$ and $\rho - T$ planes. Moreover we determine a set of isentropic curves in the crossover and in the first order region. We show that the curves behave very similarly as their counterparts obtained from the lattice in the crossover regime.

Primary author: KOVACS, Peter (Wigner RCP)

Co-authors: SZÉP, Zsolt (MTA-ELTE Statistical and Biological Physics Research Group); WOLF, Gyorgy (Wigner FK)

Presenter: KOVACS, Peter (Wigner RCP)

Session Classification: Wednesday Afternoon (20min talks + 10min discussions)

Contribution ID: **169** Type: **not specified**

Combined Gravitational and Electromagnetic observations of Gamma-ray Bursts

Thursday 11 May 2017 11:30 (30 minutes)

Gamma-Ray Bursts (GRBs) are the brightest events in the universe since the big bang. Detailed studies of the electromagnetic emission from these transient events have show that the short GBRs are likely associated with the merger of two compact objects such as neutron stars. With the start of gravitational wave detection a new window is opened to study these events and their progenitors. The gravitational counter part of a neutron star merger event is expected to be observable by LIGO in the coming years. Furthermore the combined electromagnetic and gravitational detection potential of GRBs allows for a search for more exotic astrophysical objects such as boson and quark stars.

Primary author: KOLE, Merlin Reynaard (Universite de Geneve (CH))

Presenter: KOLE, Merlin Reynaard (Universite de Geneve (CH))

Session Classification: Thursday Morning (20min talks + 10min discussions)

Contribution ID: **170** Type: **not specified**

The Quark propagator in QCD and QCD-like theories

Tuesday 9 May 2017 11:30 (30 minutes)

QCD-like theories provide testing grounds for truncations of functional equations at non-zero density, since comparisons with lattice results are possible due to the absence of the sign problem. As a first step towards such a comparison, we determine for various theories the chiral and confinement/deconfinement transitions from the quark propagator Dyson-Schwinger equation by calculating the chiral and dual chiral condensates, respectively.

Primary author: CONTANT, Romain (University of Graz)

Co-author: HUBER, Markus (University of Graz)

Presenter: CONTANT, Romain (University of Graz)

Session Classification: Tuesday Morning (20min talks + 10min discussions)

Contribution ID: **171** Type: **not specified**

The structure of light baryons and tetraquarks

Monday 8 May 2017 19:00 (30 minutes)

I will review results for the light baryon spectrum, obtained from solving the genuine three-body equation as well as its quark-diquark simplification. The basic ingredients are QCD's n-point functions which are solved self-consistently. This allows for a combined description of baryons, light and heavy mesons, tetraquarks and other observables from the same underlying building blocks. The three-body and quark-diquark calculations yield similar results, which underlines the role of diquark correlations within baryons. The resulting baryons carry a rich structure with relativistically induced orbital angular momentum that would be forbidden in the non-relativistic quark model. In the second part I will give a status report on the light scalar mesons as tetraquarks. We have solved the four-body equation as well as its two-body (meson-meson / diquark-antidiquark) simplification. Also in this case we obtain similar results in both approaches, which suggest a meson-molecule nature of the light scalar mesons. I will conclude with a survey of current efforts towards treating tetraquarks as genuine resonances.

Primary author: Dr EICHMANN, Gernot (IST Lisboa)

Presenter: Dr EICHMANN, Gernot (IST Lisboa)

Session Classification: Monday Afternoon (20min talks + 10min discussions)

Contribution ID: **172** Type: **not specified**

Formation and deformation of the $\psi(3770)$

Wednesday 10 May 2017 08:30 (30 minutes)

Unexpected line-shapes disclose information about the non-perturbative mechanisms involved in the formation of a mesonic resonance. We study the non-Breit-Wigner amplitude of the $\psi(3770)$ using an unitarized effective Lagrangian approach, including the effect of the nearby threshold $D\bar{D}$. Possible contributions are analyzed and discussed.

Primary author: COITO, Susana

Presenter: COITO, Susana

Session Classification: Wednesday Morning (20min talks + 10min discussions)

Contribution ID: **173** Type: **not specified**

Lambda_b and Xi_b decays into Lambda_c* and Xi_c* states and dynamics of Lambda_c* and Xi_c*

Thursday 11 May 2017 08:30 (30 minutes)

I shall report on two unitary coupled channels works where the Λc(2595) (1/2-) and Λc(2625) (3/2-) states are generated on one side and the Xi_cˆ0 (2790), Xi_cˆ0 (2815) are generated in another case. After that I shall show the formalism by means of which these resonances are produced in the decays of Lambda_b and Xi_b, with results and comparison with experiment.

Primary author: Prof. OSET, Eulogio (University of Valencia)

Presenter: Prof. OSET, Eulogio (University of Valencia)

Session Classification: Thursday Morning (20min talks + 10min discussions)