QNP 2015

7th International Conference on Quarks and Nuclear Physics

BOOK OF ABSTRACTS

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1. Dr. ALICI, Andrea, Centro Studi e Ricerche Enrico Fermi, Rome, Italy.
2. Mr. ANDERSON, Mark, University of Glasgow, Scotland, UK.
3. Prof. BIJNENS, Johan, Lund University, Sweden.
4. Dr. BROOKS, William King, UTFSM, Valparaíso, Chile.
5. Mr. CASTAÑO-YEPES, Jorge David, Universidad Nacional Autónoma de México, Mexico.
6. Dr. CONTRERAS, Carlos Hidalgo, UTFSM, Valparaíso, Chile.
7. Mr. CZOPOWICZ, Tobiasz, Warsaw University of Technology, Poland.
8. Prof. DONG, Yubing, Chinese Academy of Sciences, Beijing, China.
9. Ms. HAGELSTEIN, Franziska, Institut für Kernphysik, Johannes Gutenberg-Universität, Mainz, Germany.
10. Mr. HATTAWY, Mohammad, IPN d'Orsay, Orsay, France.
11. Dr. JO, Hyon-Suk, IBS-CUP, Republic of Korea.
12. Dr. KASHEVAROV, Victor, Institut für Kernphysik, Johannes Gutenberg-Universität, Mainz, Germany.
13. Dr. KISTENEV, Edouard, Brookhaven National Laboratory, Upton, NY, USA.
14. Prof. KOPELIOVICH, Vladimir, Institute for Nuclear Research of RAS, Moscow, Russia.
15. Prof. KREIN, Gastao, IFT, Universidade Estadual Paulista, Sao Paulo, Brazil.
16. Dr. KUBAROVSKY, Valery, TJNAF, Newport News, VA, USA.
17. Prof. LOEWE, Marcelo, Pontificia Universidad Católica de Chile, Santiago, Chile.
18. Dr. MACK, David, TJNAF, Newport News, VA, USA.
19. Mr. MARTINEZ, Hector, Technische Universität München, Garching, Germany.
20. Prof. MENDES, Tereza, IFSC, University of Sao Paulo, Brazil.
21. Dr. MIZHER, Ana Julia, Universidad Nacional Autonoma de Mexico, Mexico.
22. Dr. NEMCHIK, Jan, Czech Technical University, Prague, Czech Republic.
23. Dr. PASCALUTSA, Vladimir, Institut für Kernphysik, Johannes Gutenberg-Universität, Mainz, Germany.
24. Dr. PASECHNIK, Roman, Lund University, Sweden.
25. Mr. RABEN, Timothy, Brown University, Providence, RI, USA.
26. Dr. ROJAS, Juan Cristóbal, Universidad Católica del Norte, Chile.
27. Dr. ROZPEDZIK, Dagmara, Jagiellonian University, Poland.
28. Dr. ROZYNEK, Jacek, NCBJ, Warsaw, Poland.
29. Dr. SHINTANI, Eigo, Institut für Kernphysik, Johannes Gutenberg-Universität, Mainz, Germany.

30. Mr. SON, Hyeon-Dong, Inha University, South Korea.
31. Prof. SPARVERIS, Nikolaos, Temple University, Philadelphia, PA, USA.
32. Mr. SZABELSKI, Adam, National Centre for Nuclear Research, Warsaw, Poland.
33. Dr. VEGA, Alfredo, Universidad de Valparaíso, Chile.
34. Dr. VILLAVICENCIO, Cristian, Universidad del Bio Bio, Chile.
35. Dr. WILLIAMS, Mark Richard James, CERN, Switzerland.
36. Mr. WOITEK, Marcio, IFT-UNESP, Brazil.
37. Prof. WOLF, György, Wigner Research Center for Physics, Budapest, Hungary.
38. Dr. ZABRODIN, Evgeny, University of Oslo, Norway.

Abstract ID: 1

Speaker: Prof. KOPELIOVICH, Vladimir
Affiliation: Institute for Nuclear Research of RAS, Moscow, Russia

Session: D
Chair: Tereza Mendes (IFSC/Sao Paulo)

Time/Location:

"Buddha's Light" of cumulative particles

Content:

We show analytically that in the cumulative particles production off nuclei multiple interactions lead to a glory-like backward focusing effect. Employing the small phase space method we arrived at a characteristic angular dependence of the production cross section near the strictly backward direction. This effect takes place for any number of interactions of rescattered particle, either elastic or inelastic (with resonance excitations in intermediate states), when the final particle is produced near corresponding kinematical boundary. In the final angles interval including the value the angular dependence of the cumulative production cross section can have the crater-like (or funnel-like) form. Such a behaviour of the cross section near the backward direction is in qualitative agreement with some of available data. Explanation of this effect and the angular dependence of the cross section near are presented for the first time.

Co-author(s):

- Galina Matushko
- Irina Potashnikova

Submitted on: 30 October 2014, 08:37

Abstract ID: 2

Speaker: Dr. KASHEVAROV, Victor
Affiliation: Institut für Kernphysik, Johannes Gutenberg-Universität, Mainz, Germany

Session: B
Chair:

Time/Location:

Baryon spectroscopy at MAMI

Content:

The most information on light-quark baryons have been obtained from N or KN scattering data. But after decades of research, the properties of the baryon resonances and the underlying mechanisms leading to the broad and overlapping excitation spectrum are still poorly understood. In recent years, meson photo- and electroproduction on nucleons with many final states has become some additional and probably main tool of the baryon spectroscopy.

The Mainz Microtron MAMI is an ideal facility for investigations in this field due to the presence of the high-intensity linearly and circularly polarized photon beams, longitudinal and transverse polarized targets, recoil polarimeters, 4 calorimeter for detection of the final particles, and the tagged photon system with high energy resolution.

High-precision total and differential cross sections, single and double polarization observables in the reactions of meson photoproduction on nucleons from the threshold up to a center-of-mass energy of W=1.9 GeV have been obtained last few years.

In this contribution, an overview over selected recent experiments concerning the baryon spectroscopy is given. The results are compared to existing experimental data and different PWA predictions: MAID, SAID, BnGa, Giessen model. As rule, the existing predictions fail to reproduce the most of new data indicating a significant impact on our understanding of the underlying dynamics of meson photoproduction.

Co-author(s):

- A2 Collaboration at MAMI

Submitted on: 12 November 2014, 08:39

Abstract ID: 3

Speaker: Prof. DONG, Yubing
Affiliation: Chinese Academy of Sciences, Beijing, China

Session: B
Chair:

Time/Location:

A study of the new resonance in the annihilation reaction with a hadronic molecule scenario

Content:

The annihilation process is studied taking into account t-channel , meson exchange and the resonance contributions of and baryons. In the calculation, we assume that the baryon is a molecular state with spin-parity and . Our results show that near the threshold of the contribution from the intermediate state is also sizeable and can be observed at the PANDA experiment. Another conclusion is that the spin-parity assignment for gives enhancement for the cross section in comparison with a choice .

Co-author(s):

- Amand Faessler
- Thomas Gutsche
- Valery E. Lyubovitskij

Submitted on: 25 November 2014, 06:38

Abstract ID: 4

Speaker: Dr. KUBAROVSKY, Valery
Affiliation: TJNAF, Newport news, VA, USA

Session: A
Chair: Marat Siddikov (UTFSM)

Time/Location:

Deeply pseudoscalar meson production and Generalized Transversity Distributions

Content:

A longstanding goal in nuclear and particle physics has been to describe the three dimensional structure of the nucleon in terms of the quarks and gluon fields. Exclusive electron scattering at high momentum transfers directly related to the Generalized Parton Distributions (GPDs). Most reactions studied, such as DVCS or vector meson electroproduction, are primarily sensitive to the chiral-even GPDs. Very little is known about the chiral-odd GPDs, except that becomes the transversity function in the forward limit. It turns out that pseudoscalar meson electroproduction, and especially and production, were identified as especially sensitive to the parton helicity-flip subprocesses. Dedicated experiments to study Deeply Virtual Meson Production have been carried out in Hall B at Jefferson Lab. The cross sections and asymmetries of the exclusive pseudoscalar meson electroproduction processes in a very wide kinematic range of , and have been measured with CLAS. The Generalized form factors and were extracted directly form the experimental observables. These combined and data will provide the way for the flavor decomposition of the transversity GPDs.

Co-author(s):

Submitted on: 01 December 2014, 17:28

Abstract ID: 5

Speaker: Mr. MARTINEZ, Hector
Affiliation: Technische Universität München, Garching, Germany

Session: F
Chair:

Time/Location:

Phenomenology of the heavy quarkonium E1 transition

Content:

We use the complete expression for the corrections to the quark-antiquark potential derived from QCD in terms of Wilson loop expectation values, and a mapping, valid at large distances, between those Wilson loop expectation values and correlators evaluated in the effective string theory (EST), to compute all potentials at large distances. In particular, we present previously unknown results for the spin-independent part of the potential and confirm known results for the spin and momentum dependent parts. Using the EST long-distance contributions as the infrared completion of the potential we calculate the corrections induced by these to the heavy quarkonium wavefunction. Finally, considering these corrections, we evaluate the heavy quarkonium electric dipole (E1) transition rates at NLO in the relativistic expansion. We show that our results compare favorable with the experiment and provide predictions for the rates for which no experimental data is yet available.

Co-author(s):

- Nora Brambilla
- Antonio Vairo

Submitted on: 05 December 2014, 16:24

Abstract ID: 6

Speaker: Dr. WILLIAMS, Mark Richard James
Affiliation: CERN, Switzerland

Session: B
Chair:

Time/Location:

Heavy quark spectroscopy at LHCb

Content:

LHCb recently reported the observation of several new particles either produced promptly in the proton collision, like the $\Omega_c^{(*,')}$ -baryons, or in B decays as the spin-3 Ds3 meson. We also report about a new observation of excited B meson states.

Co-author(s):

- On behalf of the LHCb Collaboration

Submitted on: 05 January 2015, 11:00

Abstract ID: 7

Speaker: Dr. SHINTANI, Eigo
Affiliation: Institut für Kernphysik, Johannes Gutenberg-Universität, Mainz, Germany

Session: C
Chair: Georg von Hippel (Mainz University)

Time/Location:

High statistics analysis of nucleon form factor in lattice QCD

Content:

In this talk, I would like to present our recent analysis of nucleon form factor, including axial, scalar and tensor charge and isovector form factors with high statistics in lattice QCD. Using the algorithm of all-mode-averaging technique, we obtain lattice data having order of ten thousand measurements in various lattice spacings, lattice volumes in 3-4 fm and quark masses in 0.2-0.5 GeV. Numerical study of excited state contamination performed in two-flavor Wilson-clover fermion configurations suggests that there appears large effect in source-sink separation less than 1.3 fm, and in order to control it below a few percent error we need to separate more than 1.5 fm. I present several analysis including the first excited state contamination and show the consistency test in ground state dominant region. I also discuss the chiral behaviour and systematics uncertainties of finite size and lattice artifact effect.

Co-author(s):

Submitted on: 09 January 2015, 18:16

Abstract ID: 8

Speaker: Dr. PASECHNIK, Roman
Affiliation: Lund University, Sweden

Session: B
Chair:

Time/Location:

Inclusive charmonia production: color dipole approach vs perturbative QCD

Content:

In my talk I overview inclusive charmonia production in pp collisions in the light-cone color dipole framework. The results will be compared with the perturbative QCD ones. In addition, coherence phenomena in charmonia production off nuclei will be discussed.

Co-author(s):

- Boris Kopeliovich
- Irina Potashnikova
- Jan Nemchik

Submitted on: 10 January 2015, 18:39

Abstract ID: 9

Speaker: Mr. HATTAWY, Mohammad
Affiliation: IPN d'Orsay, Orsay, France

Session: A
Chair: Marat Siddikov (UTFSM)

Time/Location:

Deeply Virtual Compton Scattering off ^{4}He

Content:

The Generalized Parton Distributions (GPDs) open a new avenue for studying the partonic structure of target hadrons in hard exclusive reactions. The GPDs contain information on quark/anti-quark correlations, and on correlation between longitudinal momentum and the transverse spatial position of partons. The Deeply Virtual Compton Scattering (DVCS), i.e. the leptoproduction of a real photon where the photon is emitted by the target hadron, has been a prime reaction for studying the nucleon GPDs. In particular, in the beam and target spin asymmetry measurements, the interference of the DVCS and Bethe-Heitler (BH) processes (where the photon is emitted from the incoming or outgoing electron) is used to access Compton form-factors that are combination of GPDs. In this talk, we present the first measurement of the DVCS process off ^{4}He with a longitudinally polarized electron beam of 6 GeV using the CLAS detector in the experimental Hall-B at Jefferson Lab. The ^{4}He is of particular interest since the number of Compton form-factors is reduced to one because of its spin zero. The aim of this study is to understand the nuclear medium modifications of parton distributions. In our experiment, the CLAS detector was upgraded with a Radial Time Projection Chamber (RTPC) to detect the low-energy recoil nuclei, and an Inner Calorimeter (IC) to detect the forward going photons. The details of the data analysis and the results of the beam spin asymmetry will be discussed.

Co-authors:

- Raphaël Dupré
- Michel Guidal
- On behalf of the CLAS Collaboration

Submitted on: 12 January 2015, 21:05

Abstract ID: 10

Speaker: Dr. JO, Hyon-Suk
Affiliation: IBS-CUP, Republic of Korea

Session: A
Chair: Marat Siddikov (UTFSM)

Time/Location:

Deeply virtual Compton scattering cross sections with CLAS and generalized parton distributions

Content:

Generalized parton distributions (GPDs) are the object of an intense research effort. Among other aspects, they allow us to unravel the correlation between the longitudinal momentum fraction and the transverse spatial distributions of quarks and gluons inside the nucleon. Of particular interest is that GPDs provide access to the orbital angular momentum of the partons in the nucleon. Deeply virtual Compton scattering (DVCS), the electroproduction of a real photon on a single parton of the nucleon , is the most straightforward deep exclusive process allowing access to GPDs. The CEBAF Large Acceptance Spectrometer (CLAS) at JLab plays a key role in the study of the DVCS process. Using CEBAF's 5.75 GeV polarized electron beam, an unpolarized hydrogen target, and the CLAS detector, we collected DVCS events in the widest kinematic range ever explored in the valence region: $1<Q^2<4.6$ GeV^2, $0.1<x_B<0.58$, $0.09<-t<2$ GeV^2. We will present preliminary results on the extraction of the DVCS unpolarized cross section and beam-polarized cross section difference. We will show the constraints on the GPDs which can be extracted from these results, in a nearly model-independent fitting procedure.

Co-author(s):

Submitted on: 13 January 2015, 09:32

Abstract ID: 11

Speaker: Prof. WOLF, György
Affiliation: Wigner Research Center for Physics, Budapest, Hungary

Session: F
Chair:

Time/Location:

Chiral phase transition in an extended linear sigma model

Content:

We investigate the chiral phase transition in the framework of an SU(3), (axial)vector meson extended linear sigma model with additional constituent quarks and Polyakov loops. We determine the parameters of the Lagrangian at zero temperature in a hybrid approach, where we treat the mesons at tree-level, while the constituent quarks at 1-loop level. We assume two nonzero scalar condensates and together with the Polyakov-loop variables we determine their temperature dependence according to the 1-loop level field equations. We calculate then the phase diagram. We study how the existence of the critical point depends on the scalar meson mass.

Co-author(s):

- Zsolt Szep
- Peter Kovacs

Submitted on: 13 January 2015, 11:35

Abstract ID: 12

Speaker: Dr. ZABRODIN, Evgeny
Affiliation: University of Oslo, Norway

Session: D
Chair: Gastao Krein (IFT/Sao Paolo)

Time/Location:

Ridge and higher order flow harmonics as interplay of elliptic and triangular flows

Content:

Dihadron angular correlations and higher-order harmonics of anisotropic flow in lead-lead collisions at LHC energies are studied within the parametrized hydrodynamics with jets. It is shown that ridge structure in dihadron angular correlations arises just as a result of interplay of elliptic v2 and triangular v3 flows. Contributions of v2 and v3 to higher-order flow harmonics up to hexagonal flow v6 are also investigated. Hard processes (jets) are found to be responsible for violation of the constituent-quark-scaling at LHC despite the scaling fulfillment in hydro-part of the model. Comparison of model results with the experimental data is presented for different centrality and transverse momentum intervals.

Co-author(s):

- Larisa Bravina
- Henrik Brusheim Johansson
- Jana Crkovska
- Gyulnara Eyyubova
- Vladimir Korotkikh
- Igor Lokhtin
- Ludmila Malinina
- Serguei Petrushanko
- Alexandre Snigirev

Submitted on: 14 January 2015, 11:27

Abstract ID: 13

Speaker: Prof. SPARVERIS, Nikolaos
Affiliation: Temple University, Philadelphia, PA, USA

Session: A
Chair: Marat Siddikov (UTFSM)

Time/Location:

Pion Electroproduction and VCS in the Δ Resonance Region

Content:

The study of the N to Δ transition has been a subject of intense scientific interest for more than two decades. The pion electroproduction and VCS channels of the transition allow, through the measurement of the transition quadrupole amplitudes, the exploration for non-spherical angular momentum amplitudes in hadrons while the VCS channel also provides access to the nucleon generalized polarizabilities. Results from the recent JLab/Hall-A and MAMI experiments will be presented and future prospects will be discussed.

Co-author(s):

Submitted on: 14 January 2015, 15:34

Abstract ID: 14

Speaker: Mr. CASTAÑO-YEPES, Jorge David
Affiliation: Universidad Nacional Autónoma de México, Mexico

Session: D
Chair: Gastao Krein (IFT/Sao Paolo)

Time/Location:

Impact of the energy loss spatial profile and shear viscosity to entropy density ratio for the Mach cone vs. head shock signals produced by a fast moving parton in a quark-gluon plasma

Content:

We compute the energy and momentum deposited by a fast moving parton in a quark-gluon plasma using linear viscous hydrodynamics with an energy loss per unit length profile proportional to the path length and with different values of the shear viscosity to entropy density ratio. We show that when varying these parameters, the transverse modes still dominate over the longitudinal ones and thus energy and momentum is preferentially deposited along the head-shock, as in the case of a constant energy loss per unit length profile and the lowest value for the shear viscosity to entropy density ratio

Primary author(s):

- Alejandro Ayala

Submitted on: 16 January 2015, 08:04

Abstract ID: 15

Speaker: Dr. NEMCHIK, Jan
Affiliation: Czech Technical University, Prague, Czech Republic

Session: D
Chair: Gastao Krein (IFT/Sao Paolo)

Time/Location:

Heavy mesons in a hot medium: Manifestation of absorption

Content:

We investigate whether a different suppression of light and heavy mesons in a hot medium can be explained entirely by absorption, which represents a colour-exchange interaction of the dipole with the medium.

Co-author(s):

- Roman Pasechnik
- Irina Potashnikova

Submitted on: 19 January 2015, 16:55

Abstract ID: 16

Speaker: Mr. ANDERSON, Mark
Affiliation: University of Glasgow, Scotland, UK

Session: B
Chair:

Time/Location:

Measurements of Spin-Density Matrix Elements and the Spin Observable ∑ for the channel

Content:

Preliminary results from the analysis of the photoproduction of the ρ^0 meson in the energy region between 1.7 and 2.2 GeV center-of-mass energy will be presented. The data analysed were taken at the Thomas Jefferson Accelerator Facility using the CLAS detector in Hall B with a bremsstrahlung tagging facility allowing for photon beams with an average polarization of 75% at energies of 1.3-2.1 GeV. The spin density matrix elements of ρ^0 mesons and the spin observable ∑, the beam asymmetry, have been extracted as functions of and W. Different techniques are being investigated in order to separate the contributions from the ρ^0 and other processes which result in a final state. As it is postulated that missing resonances have remained undiscovered due to different coupling strengths for different reaction channels and the fact that the majority of our analysis so far has been focused on studies of single pion channels, the measurements from this vector meson analysis could provide valuable information in the search for missing baryon resonances.

Co-author(s):

- Ken Livingston
- David Ireland

Submitted on: 20 January 2015, 10:18

Abstract ID: 17

Speaker: Ms. HAGELSTEIN, Franziska
Affiliation: Institut für Kernphysik, Johannes Gutenberg-Universität, Mainz, Germany

Session: A
Chair: Marat Siddikov (UTFSM)

Time/Location:

Nucleon polarizabilties - present status and impact on precision physics

Content:

Observations of nucleon polarizabilities in a variety of real and virtual Compton scattering processes will be critically examined using model-independent approaches based on dispersive sum rules and chiral perturbation theory (ChPT). The so-called "deltaLT puzzle" will find a natural solution within baryon ChPT. Prediction of baryon ChPT for polarizability contribution to muonic hydrogen Lamb shift will be presented. New lepton-nucleon scattering sum rules unveil a previously-missed contribution of spin polarizabilities to hyperfine structure of hydrogen.

Primary author(s):

- Dr. PASCALUTSA, Vladimir

Submitted on: 24 January 2015, 16:08

Abstract ID: 18

Speaker: Ms. HAGELSTEIN, Franziska
Affiliation: Institut für Kernphysik, Johannes Gutenberg-Universität, Mainz, Germany

Session: A
Chair: Marat Siddikov (UTFSM)

Time/Location:

Subleading effects of nucleon structure in hydrogen spectra

Content:

Using the dispersive technique we derive the recoil and other subleading contributions of nucleon form factors into the spectrum of normal and muonic hydrogen. The numerical value of new contributions is presented and their relevance to the proton size puzzle discussed.

Co-author(s):

- Vladimir Pascalutsa

Submitted on: 24 January 2015, 16:19

Abstract ID: 19

Speaker: Dr. CONTRERAS, Carlos Hidalgo
Affiliation: UTFSM, Valparaíso, Chile

Session: C
Chair: Georg von Hippel (Mainz University)

Time/Location:

Reggeon Field Theory and Exact Renormalization Group

Content:

We study the Reggeon Field Theory RFT in the non-perturbative approach of the Exact Renormalization Group. The analysis of Flow Equation, fixed points and the running parameters are calculated and discussed.

Co-author(s):

- J. Bartels
- G.P. Vacca

Submitted on: 28 January 2015, 12:38

Abstract ID: 20

Speaker: Dr. MACK, David
Affiliation: TJNAF, Newport News, VA, USA

Session: B
Chair:

Time/Location:

The Early Physics Program with η Decays in JLab's Hall D

Content:

The η decay program in Hall D using the GlueX detector will begin with the copious branches to better determine the quark mass ratio. Improving on the state of the art requires statistical and systematic errors below 0.1% corresponding to several years of data-taking. A precise new Dalitz distribution for the charged branch will also improve direct constraints on C violating, P conserving interactions. Ultimately, our η working group intends to upgrade the forward calorimeter to improve the sensitivity for extremely challenging rare, neutral η decays by 2 orders of magnitude.

Co-author(s):

Submitted on: 28 January 2015, 17:00

Abstract ID: 21

Speaker: Mr. SZABELSKI, Adam
Affiliation: National Centre for Nuclear Research, Warsaw, Poland

Session: A
Chair: Marat Siddikov (UTFSM)

Time/Location:

Gluon contribution to the Sivers effect. COMPASS results

Content:

The Sivers effect for gluons is connected to the gluon orbital angular momentum which may be the missing part in the nucleon spin. We present a method of extraction of the Sivers effect for gluons from COMPASS SIDIS data on a transversely polarised target. It is based on the assumption that there are 3 processes contributing to muon-nucleon scattering: leading process (the absorption of an intermediate photon by a quark), QCD Compton process (the absorption of an intermediate photon by a quark with gluon emission) and photon-gluon-fusion (PGF - the process through which one wants to access the Sivers effect for gluons). To enhance the fraction of PGF in the sample, one selects high-pT hadron pair events. Then one performs a weighting procedure which allows for the simultaneous extraction of the asymmetries of the 3 contributing processes. In order to do that one needs a neural network trained by a Monte Carlo to assign to each event 3 probabilities corresponding to the 3 processes. Finally we show results of the Sivers effect for gluons from COMPASS data.

Co-author(s):

- On behalf of COMPASS collaboration

Submitted on: 30 January 2015, 11:49

Abstract ID: 22

Speaker: Prof. LOEWE, Marcelo
Affiliation: Pontificia Universidad Católica de Chile, Santiago, Chile

Session: D
Chair: Gastao Krein (IFT/Sao Paolo)

Time/Location:

Finite temperature quark-gluon vertex with a magnetic field in the hard thermal loop approximation

Content:

We compute the thermomagnetic correction to the quark-gluon vertex in the presence of a weak magnetic field within the hard thermal loop approximation. The vertex satisfies a QED-like Ward identity with the quark self-energy. The only vertex component that ger modified are the longitudinal ones. The calculation provides a first principles result for the quark anomalous magnetic moment at high temperature in a weak magnetic field. We extract the effective thermomagnetic quark-gluon coupling and show that this decreases as function of the field strength. The results support the idea that the properties of the effective quark-gluon coupling in the presence of a magnetic field are important ingredients for understanding the inverse magnetic catalysis phenomenon.

Co-author(s):

- Alejandro Ayala

Submitted on: 30 January 2015, 19:26

Abstract ID: 23

Speaker: Dr. VEGA, Alfredo
Affiliation: Universidad de Valparaíso, Chile

Session: C
Chair: Georg von Hippel (Mainz University)

Time/Location:

About the inclusion of Fock States in AdS/QCD models

Content:

We present an analysis of some nucleon properties in a holographic soft-wall model. We describe the nucleon structure as a superposition of several Fock states by studying the dynamics of 5D fermion fields of different scaling dimension in anti-de Sitter space. In applications that we discuss along the talk, we restrict to the contribution of 3, 4 and 5 parton components in the nucleon Fock states.

Co-author(s):

- Thomas Gutsche
- Velery Lyubovitskij
- Iván Schmidt

Submitted on: 01 February 2015, 01:20

Abstract ID: 24

Speaker: Dr. KISTENEV, Edouard
Affiliation: Brookhaven National Laboratory, Upton, NY, USA

Session: D
Chair: Gastao Krein (IFT/Sao Paolo)

Time/Location:

RHIC Physics with sPHENIX

Content:

In a few years the completed stochastic cooling upgrade to the RHIC accelerator will bring new opportunities to RHIC experiments. With new beam projections the full acceptance upgraded PHENIX detector will record 100 billion Au+Au minimum bias collisions in a typical one-year run. With modest trigger requirements, one can sample 0.6 trillion Au+Au minimum bias collisions to allow detailed extraction of the information about the quark-gluon plasma properties, dynamics, time evolution, and structure at 1-2 Tc. Billions of recorded events will provide RHIC and a new sPHENIX detector the outreach into currently unexplored territory of fully reconstructed jet measurements.

The theoretical bridgework needed to connect these measurements to the interesting and unknown medium characteristics of deconfined color charges is under active construction by many theorists. Combining this work with the flexible and high luminosity RHIC accelerator facility can produce new discoveries in heavy ion collisions.

sPHENIX is a new jet detector at RHIC optimized to make best use of these opportunities via comprehensive program of jet probes, direct photon tagged jets, Upsilons and more. Both new physics at RHIC and how it reflects on the sPHENIX design will be reviewed in this talk.

Co-author(s):

Submitted on: 02 February 2015, 18:13

Abstract ID: 25

Speaker: Mr. RABEN, Timothy
Affiliation: Brown University, Providence, RI, USA

Session: C
Chair: Georg von Hippel (Mainz University)

Time/Location:

AdS/CFT, Confinement Deformation, and DIS at small-x

Content:

We apply AdS/CFT to Deep Inelastic Scattering (DIS) at small-x, and search for the onset of confinement effects as a function of Q^2. The AdS-Pomeron has provided a very good fit to the combined HERA DIS data at small x, lending new confidence to the AdS dual approach to high energy diffractive scattering. Traditionally, DIS at small x, at least for Q^2 large, has been analyzed using perturbative QCD. In a holographic approach, at small to moderate Q^2, confinement must be taken into account. Confinement effects have also been seen at the onset of saturation, where the HERA data also exhibit approximate geometrical scaling. For Q^2 fixed and x-sufficiently small, the data should eventually show behavior, as advocated by Berger, Block and Tan. These features have been confirmed previously by using a hard-wall cutoff. In this talk, we provide evidence that these are generic confinement effects by adopting a soft-wall deformation. We will also discuss generalities of the soft wall models and comment on the relation of our approach to that of S. Brodsky, G. de Téramond and H. H. Dosch, who have also adopted a soft-wall deformation, due to its hidden conformal invariance, for their "Light-Front QCD".

Co-author(s):

- Richard Brower
- Marko Djuric
- Chung-I Tan

Submitted on: 02 February 2015, 19:17

Abstract ID: 26

Speaker: Dr. BROOKS, William King
Affiliation: UTFSM, Valparaíso, Chile

Session: D
Chair: Gastao Krein (IFT/Sao Paolo)

Time/Location:

Recent results on electroweak probes in lead-lead and proton-lead collisions from the ATLAS Detector at the LHC

Content:

Photons and weak bosons do not interact strongly with the dense and hot medium formed in the nuclei collisions, thus should be sensitive to the nuclear modification of parton distribution functions (nPDFs). In particular, proton-lead collisions provide an excellent opportunity to test nPDFs in a less dense environment than lead-lead. The ATLAS detector, optimized for searching new physics in proton-proton collisions, is especially well equipped to measure photons, Z and W bosons in the high occupancy environment produced in heavy ion collisions. Using the full data samples of 2.76 TeV lead-lead and 5.02 TeV proton-lead collisions we will present recent results on the prompt photon, Z and W boson yields as a function of centrality, transverse momentum and rapidity, from the ATLAS experiment. The binary collision scaling of the yields will be discussed in detail.

Co-author(s):

- On behalf of COMPASS collaboration

Submitted on: 04 February 2015, 14:47

Abstract ID: 27

Speaker: Dr. ALICI, Andrea
Affiliation: Centro Studi e Ricerche Enrico Fermi, Rome, Italy

Session: D
Chair: Gastao Krein (IFT/Sao Paolo)

Time/Location:

ALICE results on open heavy-flavour production in pp, p-Pb and Pb-Pb collisions at the LHC

Content:

ALICE (A Large Ion Collider Experiment) is the dedicated heavy-ion experiment at the CERN LHC focusing on the study of the physics of strongly-interacting matter at extreme energy densities, where the formation of a deconfined phase of matter, the quark-gluon plasma (QGP), is expected. Hadrons containing heavy-quarks are powerful probes to investigate the properties of the QGP. Because of their large masses, charm and beauty quarks are produced in the early stages of the collisions and propagate through the high-density medium interacting with its constituents, thus probing the medium properties over the whole evolution of the system. The measurement of heavy-flavour hadron production cross sections in pp collisions at LHC energies provides a way to test perturbative QCD predictions at the high-energy frontier. Furthermore, such measurements are a reference for heavy-flavour studies in p-Pb and Pb-Pb collisions where, for instance, particle spectra are affected by partonic energy loss through radiative and collisional processes. Particle production in p-Pb collisions is expected to be sensitive to nuclear effects in the initial state. Therefore, measurements in p-Pb collisions can discriminate between initial and final state effects, and allow one to attribute the latter to the formation of hot QCD matter in heavy-ion collisions. In ALICE, open heavy-flavour hadrons are studied through the reconstruction of D-meson hadronic decays at mid-rapidity and via semi-leptonic decays (with heavy-flavour decay electrons at mid-rapidity and heavy-flavour decay muons at forward rapidity) of charm and beauty hadrons. These measurements are possible over a wide transverse-momentum range thanks to the high precision tracking, good vertexing capabilities and excellent particle identification offered by the ALICE detectors. In this talk, a review of the main ALICE results on heavy-flavour hadron production in pp collisions at , p-Pb collisions at and Pb-Pb collisions at will be presented.

Co-author(s):

Submitted on: 05 February 2015, 11:07

Abstract ID: 28

Speaker: Mr. CZOPOWICZ, Tobiasz
Affiliation: Warsaw University of Technology, Poland

Session: D
Chair: Gastao Krein (IFT/Sao Paolo)

Time/Location:

News from NA61/SHINE

Content:

NA61/SHINE is a fixed-target experiment aiming to discover the critical point of strongly interacting matter and study the properties of the onset of deconfinement. These goal is to be reached by preforming precise measurements on hadron production properties in proton-proton, proton-nucleus and nucleus-nucleus interactions in a wide range of system size and collision energy.

In this contribution recent inclusive spectra and new results on fluctuations in p+p and Be +Be interactions at the SPS energies will be shown. The results will be compared with the world data, in particular with the corresponding results of NA49 for central Pb+Pb collisions as well as with model predictions.

Co-author(s):

Submitted on: 05 February 2015, 17:12

Abstract ID: 29

Speaker: Prof. BIJNENS, Johan
Affiliation: Lund University, Sweden

Session: F
Chair:

Time/Location:

Leading logarithms for the nucleon mass

Content:

I will present the results for the leading logarithms for the nucleon mass for up to seven loops. This is a generalization of the earlier work of Bijnens et al. to the nucleon sector. I will describe in some detail the extra parts needed for dealing with nucleons.

References:

Johan Bijnens, Alexey A. Vladimirov, Nucl. Phys. B891 (2015) 700-719

Co-author(s):

- Alexey Vladimirov

Submitted on: 06 February 2015, 04:56

Abstract ID: 30

Speaker: Mr. SON, Hyeon-Dong
Affiliation: Inha University, South Korea

Session: A
Chair: Marat Siddikov (UTFSM)

Time/Location:

Stability of the pion in the chiral quark model

Content:

We investigate the energy-momentum tensor matrix elements of the pion within the frame work of the chiral quark model beyond the chiral limit. The pressure of the pion, which should vanish to secure the stability of the pion, vanishes nontrivially by the Gell-Mann - Oakes - Renner relation. The corresponding generalized form factors, the low-energy constants and the second-order transverse charge density are presented and discussed.

Co-author(s):

- Hyun-Chul Kim

Submitted on: 06 February 2015, 10:55

Abstract ID: 31

Speaker: Dr. ROJAS, Juan Cristóbal
Affiliation: Universidad Católica del Norte, Chile

Session: B
Chair:

Time/Location:

Chiral transitions with magnetic fields of low magnitude

Content:
We study the effect of a constant magnetic field on the nature of phase transition for a system composed of bosons and fermions. The problem is studied in terms of the relative intensity of the magnetic field with respect to the mass and the temperature. When the magnetic field is the lowest of the scales, we present a method to obtain magnetic and thermal corrections up to ring order at high temperature. By these means, we solve the problem of the instability in the boson sector for these theories, where the squared masses, taken as functions of the order parameter, can vanish and even become negative. The solution is found by considering the screening properties of the plasma, expressed in the resummation of the ring diagrams at high temperature. We also consider values of the magnetic field between the values of other two parameters. We show that the critical temperature for the restoration of chiral symmetry monotonically increases from small to intermediate values of the magnetic field and that this temperature is always above the critical temperature for the case when the magnetic field is absent.

Co-author(s):
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- Ana Júlia Mizher
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Submitted on: 06 February 2015, 14:26

Abstract ID: 32

Speaker: Dr. MIZHER, Ana Julia
Affiliation: Universidad Nacional Autonoma de Mexico, Mexico

Session: D
Chair: Tereza Mendes (IFSC/Sao Paulo)

Time/Location:

Thermal photon production in relativistic heavy ion collisions with a magnetic background

Content:

Direct photons are produced during the early stages in a relativistic heavy ion collision. Measurements at RHIC and at the LHC show both an excess of low pt photons as well as a high azimuthal flow with respect to models that otherwise do a good job describing data within this environment. Both observables have a non-trivial centrality dependence. In this talk I argue that both features may be understood if account is taken for the magnetic field produced in non-central collisions. We show that in the presence of such field, the lowest order thermal rate for photon production from gluon fusion in perturbation theory (which otherwise vanishes in the absence of the magnetic field) becomes non-zero and provides a significant contribution for the photon production rate at high temperature.

Co-author(s):

- Alejandro Ayala
- Angel Sanchez
- Maria Elena Tejeda

Submitted on: 06 February 2015, 15:34

Abstract ID: 33

Speaker: Mr. WOITEK, Marcio
Affiliation: IFT-UNESP, Brazil

Session: C
Chair: Georg von Hippel (Mainz University)

Time/Location:

Flux representation for effective Z(N) theories for the Polyakov loop

Content:

Currently there are not many analytical techniques allowing us to study QCD in its non-perturbative regime. Hence much of the present understanding about this theory is based on results of numerical simulations that employ Monte Carlo (MC) methods. One of the difficulties with this approach to QCD is due to the fact that describing important phenomena in a realistic way requires that we consider *finite-density effects*. But studying QCD with the help of MC methods when the baryon chemical potential is non-zero represents a challenge due to the infamous *complex phase problem* (CPP) [1]. Whenever this problem arises, the theory cannot be analyzed by using conventional MC methods. This happens because *it is not possible to assign a real and non-negative weight to all the system's configurations* in order to calculate the corresponding partition function and observables. Thus there is a need for considering new computational methods for investigating QCD at finite baryon density. Interesting possibilities have been offered by the so-called *worm algorithms* [2]. These algorithms are obtained by means of a suitable reformulation of the theory along with the enlargement of the associated configuration space. However, before analyzing the case of QCD, it is important to consider a simpler theory that suffers from the CPP for gaining insight on how the corresponding problem in QCD could be overcome. Then we discuss the solution to the CPP for the Z(N) theory with external field terms and non-vanishing chemical potential, generalizing the results of Ref. [3]. This theory furnishes an effective description for the *Polyakov loop* (PL) related to a SU(N) theory with static quarks, and is relevant for the study of deconfinement phase transitions in gauge theories. We show that the CPP can be solved in this case by changing to the model's *flux representation*, i.e., by reformulating the theory in terms of new *dimer* and *monomer* variables. Expressions in terms of these new variables for the estimators of the internal energy, expectation value of the PL, heat capacity and PL susceptibility are derived. Moreover, we consider an application of this flux representation to the analysis of the Z(N) theory in the so-called *mean field approximation*. Preliminary results for the observables within this approximation are also presented.

References:

[1] M. Alford, S. Chandrasekharan, J. Cox, U.-J. Wiese, Nucl. Phys. B 602 (2001); [2] N. Prokof'ev and B. Svistunov, Phys. Rev. Lett. 87 (2001); [3] Y. D. Mercado, H. G. Evertz and C. Gattringer, Phys. Rev. Lett.106, 222001 (2011).

Co-author(s):

- Gastao Krein

Submitted on: 06 February 2015, 20:32

Abstract ID: 34

Speaker: Prof. MENDES, Tereza
Affiliation: IFSC, University of Sao Paulo, Brazil

Session: C
Chair: Georg von Hippel (Mainz University)

Time/Location:

Lattice Gluon Propagator as Input for a Potential Model

Content:

We compute the spectra of heavy quarkonia in a potential model that incorporates a nonperturbative gluon propagator, obtained from lattice simulations of pure SU(2) theory on large lattices. We compare our results to the Cornell-potential case.

Co-author(s):

- Willian Serenone
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Submitted on: 06 February 2015, 20:55

Abstract ID: 35

Speaker: Dr. ROZYNEK, Jacek
Affiliation: NCBJ, Warsaw, Poland

Session: D
Chair: Tereza Mendes (IFSC/Sao Paulo)

Time/Location:

The nucleon PDF inside dense nuclear medium

Content:

In the Relativistic Mean Field (RMF) the nucleons are approximated by point like objects, which interact exchanging mesons. But in fact nucleons have a finite volume therefore a positive pressure should influence internal parton distributions. This process cannot be described clearly by a perturbative QCD and we present a simple estimate of Parton Distribution Function inside dense nuclear medium. Partons-gluons and quarks inside compressed nucleon will start to adjust their momenta to nucleon properties like a volume and a mass. We propose to benefit from the concept of enthalpy in order to include volume corrections to the nucleon rest energy which are proportional to pressure and absent in a standard RMF with point-like nucleons. According to our predictions the future deep inelastic experiments in dense nuclear medium will answer how the nucleon mass and volume will change with nuclear density. It is shown also how the Equation of State (EoS) depends on nucleon properties inside Nuclear Matter (NM). As a result, the nucleon mass can decrease inside NM, making the model nonlinear and the EoS softer. The course of the EoS in our RMF model agrees with a semi-empirical estimate and is close to the results obtained from extensive DBHF calculations with a Bonn A potential, which produce an EoS stiff enough to describe neutron star properties (mass-radius constraint), especially the masses of ¨PSR J1614–2230¨ and ¨PSR J0348+0432¨, known as the most massive neutron stars. The presented model has proper saturation properties, including a good value of compressibility.

Co-author(s):

Submitted on: 06 February 2015, 23:20

Abstract ID: 36

Speaker: Prof. KREIN, Gastao
Affiliation: IFT, Universidade Estadual Paulista, Sao Paulo, Brazil

Session: C
Chair: Georg von Hippel (Mainz University)

Time/Location:

Decay constants of the pion and its excitations in holographic QCD

Content:

There is a remarkable prediction of QCD that the leptonic decay constants of the excited states of the pion are dramatically suppressed relative that of the ground-state pion - in the chiral limit, the decay constants of the excited pions are exactly zero [1]. Although within a quark model perspective a suppression of a leptonic decay constant for excited states is expected, as it is proportional to the wave-function at the origin, there is, however, no a priori reason, within such a perspective, for the dramatic suppression predicted by QCD. Two lattice computations [2,3] give conflicting results. In the present talk we present results of a recent study [4] of the structure of excited pions within a chiral holographic QCD model [5]. We report results on the leptonic decay constants of pion's excited states and present new predictions concerning on their quark mass dependence. Comparisons are made with corresponding results obtained in light-front holography [6].

References:

[1] A. Holl, A. Krassnigg, and C. Roberts, Phys. Rev. C 70, 042203 (2004); [2] C. McNeile and C. Michael (UKQCD Collaboration), Phys. Lett. B 642, 244 (2006); [3] E.V. Mastropas and D.G. Richards (Hadron Spectrum Collaboration), Phys. Rev. D 90, 014511 (2014); [4] A. Ballon-Bayona, G. Krein, and C. Miller, arXiv:1412.7505 [hep-ph]; [5] J. Erlich, E. Katz, D. T. Son and M. A. Stephanov, Phys. Rev. Lett. 95, 261602; [6] T. Branz, T. Gutsche, V. E. Lyubovitskij, I. Schmidt, and A. Vega, Phys.Rev. D 82, 074022 (2010).

Co-author(s):

- Alfonso Ballon-Bayona
- Carlisson Miller

Submitted on: 08 February 2015, 11:30

Abstract ID: 37

Speaker: Dr. ROZPEDZIK, Dagmara
Affiliation: Jagiellonian University, Poland

Session: F
Chair:

Time/Location:

Deuteron photodisintegration and n-p capture within the Chiral Effective Field Theory

Content:

Chiral Effective Field Theory (ChEFT) provides a systematic and model-independent framework to analyze hadron structure and dynamics in harmony with the spontaneously broken approximate chiral symmetry of QCD. Chiral power counting suggests that nuclear forces are dominated by pairwise interactions between the nucleons, a feature that was known for a long but could only be explained based on the ChEFT [1]. Chiral nucleon-nucleon potentials are known for a long time up to fourth order [2,3]. The potential regularization used within this approach includes a five pairs of cutoffs which produce the prediction bands for the observables - in some cases a very large [4,5]. A new approach to the regularization of the chiral nucleon-nucleon potentials derived in the ChEFT up to fifth-order [6,7] appeared recently. The new potentials do not require the additional spectral function regularization employed in [3] to cut off the short-range components of the two-pion exchange. A new procedure for estimating the theoretical uncertainty from the truncation of the chiral expansion, that replaces previous reliance on cutoff variation, gives a better theoretical estimation for the description of the experimental data. We present the preliminary results for the photodisintegration of the deuteron and its inverse process, radiative n-p capture reaction using the single nucleon current and one-pion exchange two-nucleon current with the improved chiral nucleon-nucleon potentials. The differential cross sections and many polarization observables are presented. The calculations were performed for the selected chiral orders (up to fifth) and for all observables a new procedure for estimating the theoretical uncertainties was applied. We also compare these results with the predictions obtained using the previous regularization of the nucleon-nucleon potentials and the AV18 potential with the corresponding currents.

References:

[1] C. Ordonez, L. Ray and U. van Kolck, Phys. Rev. C53 (1996) 2086; [2] D. R. Entem, R. Machleidt, Phys. Rev. C68 (2003) 041001; [3] E. Epelbaum, W. Gloeckle, U. Meissner, Nucl. Phys. A747 (2005) 362; [4] D. Rozpedzik, et al., AIP Conf. Proc. 1374 (2011) 329-332; [5] D. Rozpedzik, et al., Phys. Rev. C83 (2011) 064004; [6] E. Epelbaum, H. Krebs, U.-G. Meissner, nucl-th/1412.4623 (2014); [7] E. Epelbaum, H. Krebs, U.-G. Meissner, nucl-th/1412.0142 (2014).

Co-author(s):

Submitted on: 09 February 2015, 20:42

Abstract ID: 38

Speaker: Dr. VILLAVICENCIO, Cristian
Affiliation: Universidad del Bio Bio, Chile

Session: C
Chair: Georg von Hippel (Mainz University)

Time/Location:

QCD sum rules in a magnetic background

Content:

The Finite energy sum rules (FESER) are developed for the axial-axial channel in the presence of an external uniform magnetic field in the chiral limit. This work proposes a systematic treatment for the determination of nonperturbative terms evolving with the magnetic field. Using resent lattice results for the chiral condensate in the presence of an external magnetic field, we are able to predict the magnetic evolution of the gluon condensate.

Co-author(s):

- Alejandro Ayala
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Submitted on: 11 February 2015, 17:30