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ABSTRACT BOOK

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SESSION B

B-1

Exclusive $c \to s, d$ semileptonic decays of ground-state spin-1/2 and spin-3/2 doubly heavy cb baryons

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We have evaluated semileptonic decays of ground-state spin-1/2 and spin-3/2 doubly heavy cb baryons driven by a $c \to s, d$ transition at the quark level. Due to the finite value of the quark masses, the hyperfine interaction between the light and any of the heavy quarks can admix both $S = 0$ and $S = 1$, with S the spin of the heavy quark subsystem, components into the wave function. This configuration mixing effect has a tremendous impacts on the decay widths, similar to what one obtains in corresponding $b \to c$ semileptonic [1, 2] and electromagnetic decays [3, 4].

We have derived for the first time heavy quark spin symmetry (HQSS) relations for the hadronic amplitudes valid in the limit of very large heavy quark masses and near zero recoil. HQSS imposes constraints on the form factors that are satisfied by our calculation. Deviations at the 10% level are observed due to the actual, finite, heavy quark masses.

With the use of HQSS relations we have made model independent, though approximate, predictions for ratios of decay widths. Our values for those ratios agree with the HQSS motivated predictions at the 10% level in most of the cases. We expect those predictions to hold to that level of accuracy in other approaches.

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Recent Results on Charmonium Transitions studied with BESIII

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Despite the successes of the Standard Model, the QCD-based nature of the strong interaction is insufficiently understood. Charmonium spectroscopy is an ideal tool to provide insight into the nonperturbative dynamics of the strong force. In particular, the precise determination of charmonium states and transitions provides strong guidelines to various theoretical approaches, such as effective field theories, thereby, gaining insight into the quark confinement and the generation of hadron masses.

The charmonium system has been systematically studied with the BESIII spectrometer operated at the BEPCII electron-positron collider at IHEP Beijing, China. Using the world's largest data set of charmonium states produced at the J/ψ, ψ' and ψ'' masses, the precision of various resonance parameters and decay properties of charmonium states was significantly improved by BESIII with respect to previously published data. Rare charmonium transitions have been successfully observed for the first time by the BESIII collaboration.

Here we will present recent BESIII results on radiative and hadronic transitions between charmonium states below the open-charm threshold. These transitions have been exploited to study charmonium resonances, such as the h_c and the $\eta_c(2S)$ resonances. In addition, we will report on improved measurements of branching fractions for isospin-violating decays, which will be essential to determine the light-quark mass ratio.

B-3

Polarization observables in the photoproduction of phi mesons with linearly polarized photons at threshold

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The CLAS collaboration has measured the photoproduction of phi mesons off protons using linearly-polarized photons from coherent bremsstrahlung. In particular, we have measured the angular distributions of the decay pseudoscalar mesons ($\phi \rightarrow K^+K^-$) in the rest frame of the photoproduced phi mesons. Polarization observables are extracted from the decay angular distribution and, in turn, these observables may be parameterized by the Spin Density Matrix Elements (SDMEs). These SDMEs, formed of bilinear combinations of helicity amplitudes, give straightforward relations for understanding the nature of the parity exchange at threshold energies, as well as for extracting signatures of the Okubo-Zweig-Iizuka violation. This paper will show our measurements of the SDMEs for reaction $\gamma p \rightarrow \phi p$ from the g8b experimental data set taken in Hall B of Jefferson Lab with the CLAS detector. In particular, we shall show the observables from two separate coherent peak settings covering the respective photon energy ranges: 1.7 to 1.9 GeV (four momentum transfer squared t range of -1.2 to -0.25 GeV^2) and 1.9 to 2.1 GeV (t range of -1.4 to -0.25 GeV^2).

Dalitz plot analysis of the $pp \to pK^+\Lambda$ reaction to extract N*-resonances, cusp and FSI contributions

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The $pp \to pK^+\Lambda$ reaction has been studied at different beam energies with the COSY-TOF detector. From these measurements various observables can be extracted to gain insight into the reaction mechanism. By comparing the measured data with model calculations it is possible to investigate the relative contributions of hyperon nucleon final state interaction (FSI), N* - resonances and the so called cusp effect. This is a coupled channel effect at the $\Sigma^0 p$ production threshold and it manifests itself as an enhancement of the yield in the $p\Lambda$ subsystem.

To separate the different contributions, the Dalitz plot is fitted with a modified ISOBAR model which takes into account the N*-resonances, the $p\Lambda$-final-state interaction and the cusp effect on an amplitude level and which allows interferences between the different terms. In this poster the model parameters will be explained and the result of different fits of the model to data measured at 2.95 GeV/c beam momentum with the COSY-TOF detector will be presented.

Strong, electromagnetic and semileptonic decays of Ξ_c baryon in quark-diquark model

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Spectroscopy and decay properties of the heavy flavour baryons have become a subject of recent interest due to the experimental facilities at Belle, BABAR, DØ, CLEO, CDF, LHC etc. The spectroscopies as well as their decay properties are important from the point of view of understanding the heavy flavor dynamics. For the description of the Ξ_c baryon, we employ the quark-diquark model with two body color coulomb plus power potential CPPν [1, 2, 3]. The model parameters are fixed using the hyperfine mass splitting for each choice of the potential exponent ν, choice of running strong coupling constant α_s and with different quark mass parameters m_Q. These extracted spectroscopic parameters are used to compute decay width of the strong, electromagnetic and semileptonic decays of Ξ_c baryon. The results for the decay widths are listed in Table 1. Our results are in good agreement with the available experimental as well as other theoretical results.

Table 1: Electromagnetic, strong and semileptonic decay width of Ξ_c baryon

Decay width	Our	Others
$\Gamma_{\Xi_c^{*0}\to\Xi_c^0\pi}$	2.55 MeV	< 5.5 MeV [4]
$\Gamma_{\Xi_c^{*0}\to\Xi_c^0 l\nu_l}$	$2.43\times10^{10}S^{-1}$	$2.2\times10^{10}S^{-1}$ [5]
$\Gamma_{\Xi_c^{*0}\to\Xi_c^0\gamma}$	0.87 keV	0.90 keV [6]
$\Gamma_{\Xi_c^{*0}\to X l\nu_l}$	$1.11\times10^{10}S^{-1}$	$2.32\times10^{10}S^{-1}$ [7]

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Chiral Particle Decay of Heavy-Light Mesons in a Relativistic Potential Model

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We have been trying to explain the mass spectrum of the heavy-light mesons, including the famous $D_{s0}(2317)$ and $D_{s1}^*(2460)$, by a relativistic potential model with a linear potential and the Coulombic potential, and have successfully reproduced many of the experimental mass spectrum of D, D_s, B, and B_s with a fairy good accuracy including radially excited states.[1] To confirm the validity of our relativistic potential model, we have calculated the semileptonic weak form factors (Isgur-Wise functions) for the process $\bar{B} \to D^{(*)}\ell\bar{\nu}$ in Ref. [2] to obtain reasonable results compared with the experiments.

There are already papers [4, 5] which calculated the decay rates of the heavy-light mesons emitting one chiral particle. However, they have neglected the effects of relativistic wave functions, Lorentz covariance and the recoil effects of the heavy-light mesons, the last of which we claim is essential to calculate the relativistic transition amplitude because the plane wave function of the emitted particle is replaced by another phase factor, which involves the heavy quark mass and the velocity of the heavy-light meson. The plane wave, which, for instance, is used in a hydrogen atom, is inserted without any criticism, which may lead to the erroneous conclusion.

In this paper [3], partial decay widths of the heavy-light mesons, D, D_s, B, and B_s, emitting one chiral particle (π or K) are evaluated in the framework of a relativistic potential model. Decay amplitudes are calculated by keeping the Lorentz invariance as far as possible and use has been made of the Lorentz-boosted relativistic wave functions of the heavy-light mesons.

One of predictions of our calculation is very narrow widths of a few keV for yet undsicovered $B_s(0^+, 1^+)$ mesons corresponding to $^{2S+1}L_J = {}^3P_0$ and "$^3P_1$" assuming their masses to be 5617 and 5682 MeV, respectively, as calculated in our former paper. Here double quotation marks denote that they are mixed states between $^3P_1$ and $^1P_1$ and the dominant states are expressed by those without quotations.

In the course of our calculation, new sum rules are discovered on the decay widths in the limit of $m_Q \to \infty$. Among these rules, $\Gamma\left(D_{s0}^*(2317) \to D_s + \pi\right) = \Gamma\left(D_{s1}(2460) \to D_s^* + \pi\right)$ and $\Gamma\left(B_{s0}^*(5615) \to B_s + \pi\right) = \Gamma\left(B_{s1}(5679) \to B_s^* + \pi\right)$ are predicted to hold with a good accuracy.

The axial-vector coupling constant $\hat{g} = 0.577$ used in our paper, which is derived by fitting our decay widths with experiments, is in a good agreement with other calculations, *e.g.*, those derived by the leptonic decay width using the Schwinger-Dyson equation and the lattice QCD.[6] This coupling may be used for the study of dissociation processes $\pi + J/\psi \to D + \bar{D}$ or $\pi + \Upsilon \to B + \bar{B}$ by exchanging D^* or B^*.

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$B_d - \bar{B}_d$ mixing parameter using CPP_ν model

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The strength of $B_d - \bar{B}_d$ can be described by the mass difference Δm_B. Because of the large mass difference $m_{u,c}m_t$ only top quark contribution becomes dominant in this type of mixing operators. To find the parameters like mass of B mesons and decay constant we adopt coulomb plus power type of potential of the form $V(r) = -\frac{\alpha_c}{r} + Ar^\nu$ with ν varying from 0.1 to 1.5 defining different confining strength of potential. Other input parameters are taken as experimental input from PDG 2010. The computed values of mass spectra, decay constant and mixing parameters are shown in the Table 1 below. It is clear from the Table 1 that our results agree with experimental data for choices of ν as $\nu \sim 0.5$ for both spectroscopy and mixing.

Table 1: Mass, Decay constants and mixing parameters for B_d system

ν	M_B (in GeV)	f_B (in GeV)	$x_d = \frac{\Delta m_B}{\Gamma_B}$
0.1	5.294	0.122	0.321
0.3	5.279	0.165	0.585
0.5	5.266	0.194	0.806
0.7	5.255	0.215	0.988
0.8	5.250	0.224	1.072
0.9	5.246	0.232	1.149
1.0	5.241	0.239	1.218
1.1	5.238	0.245	1.279
1.3	5.231	0.255	1.384
1.5	5.225	0.264	1.481
Expt.	5.279		0.774

Measurement of the neutron electric form factor $G_{\mathrm{E}}^{\mathrm{n}}$ in the reaction $^3\vec{\mathrm{H}}\mathrm{e}(\vec{\mathrm{e}},\mathrm{e}'\mathrm{n})$

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Electromagnetic nucleon form factors play an important role in our understanding of the nucleon structure as they are directly related to the charge and current distributions of the proton and the neutron.

The ratio $G_{\mathrm{E}}^{\mathrm{n}}/G_{\mathrm{M}}^{\mathrm{n}}$ of the electric and magnetic neutron form factors was measured at $Q^2 = 1.58\,(\mathrm{GeV}/c)^2$ in a double polarization experiment within the A1 collaboration at the electron accelerator site MAMI [1]. This was accomplished by the study of beam helicity asymmetries in the reaction $^3\vec{\mathrm{H}}\mathrm{e}(\vec{\mathrm{e}},\mathrm{e}'\mathrm{n})$ in quasielastic kinematics which are particularly sensitive to $G_{\mathrm{E}}^{\mathrm{n}}/G_{\mathrm{M}}^{\mathrm{n}}$, e.g. Refs. [2, 3]. With the magnetic form factor being well known, the electric form factor can be determined.

MAMI-C [4] provided a 1.5 GeV polarized electron beam, a polarized ^{3}He gas target [5] served as an effective polarized neutron target. The scattered electrons were detected with a magnetic spectrometer. To detect the recoil neutrons in coincidence with the electrons, a nucleon detector was installed. It consisted of a plastic scintillator array inside a heavy lead shield.

The measurement method will be illustrated and our experimental setup and our result will be presented.

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A Preliminary Partial-Wave Analysis of the Centrally Produced $\pi^+\pi^-$ System in pp Reactions at COMPASS

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COMPASS is a fixed-target experiment at CERN SPS which investigates the structure and spectroscopy of hadrons. During nine weeks in 2008 and 2009, a 190 GeV/c proton beam impinging on a liquid hydrogen target was used in order to study the production of exotic mesons and glueball candidates at central rapidities. As no bias on the production mechanism was introduced by the trigger system, the contribution from diffractive dissociation of the beam proton poses a challenge. We select a centrally produced sample by kinematic cuts and introduce a model to describe the data in terms of partial waves. Furthermore, preliminary fits are presented and compared to results from previous experiments. Particular attention is paid to the ambiguities in the amplitude analysis of the two-pseudoscalar final state.

The role of pion-exchange tensor forces in nuclear excitations and binding energies

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Pion play an important role in recent theoretical models including the Effective Field Theory and the Constituent Quark Model with Goldstoune Exchange Interaction. Nucleon interactions within nuclei are considered as a result of one- and many-pion exchange. The role of tensor forces connected with the pion exchange in the description of nuclear binding energies and nuclear excitations was discussed recently by T.Otsuka, I.Tanihata, A.Arima and others.
We performed the analysis of values of excitation in many nuclei which are situated at different parts of nuclear shells where tensor forces are important. We find out a systematic character of excitations and spacing in such nuclei by using recent compilation of nuclear excitations from the volume I/25 of Landoldt Boernstein Library (Springer, 2012). Two the most frequently appearing stable energy excitation and intervals are found to be rationally connected with the pion and nucleon mass differences. This conclusion will be considered together with several the strongest correlations in the near-magic nuclei and in nuclei with the collective motions of nucleons [1, 2].

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Λ photoproduction studied with an electromagnetic calorimeter FOREST

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Baryon resonances have been experimentally studied by means of meson photoproduction experiments at ELPH. Photons from neutral meson decays such as $\pi^0 \to \gamma\gamma$ and $\eta \to \gamma\gamma$ are detected with an electromagnetic calorimeter complex FOREST covering a solid angle of 90% in total. It consists of three calorimeters: 192 pure CsI crystals, 252 lead scintillating fiber modules, and 62 lead glass Čerenkov counters. The energy resolutions of the calorimeters are 3%, 7%, and 5% for 1 GeV positrons. Plastic scintillator hodoscopes are placed in front of each calorimeter to identify the charge of the incident particle. Since the forward hodoscopes are comprised of left and right handed plastic scintillators, they can determine the incident position of the detected particle. And also the forward calorimeter has good energy resolution. The charged particle detected with the forward detector gives much information on the reaction.

The analysis of the events proceeds for photoproduction of single neutral mesons which decay into several photons. These data will be finalized in the near future. To extend the analysis to the events having several charged particles, the $\gamma p \to K^+\Lambda$ reaction is investigated at the beginning. Here, we focus on the events that π^- and p are detected with the forward detector and the other K^+ is detected with the central detector. The Λ peak is clearly observed in the $\pi^- p$ invariant mass distribution. We will present the current status of the analysis.

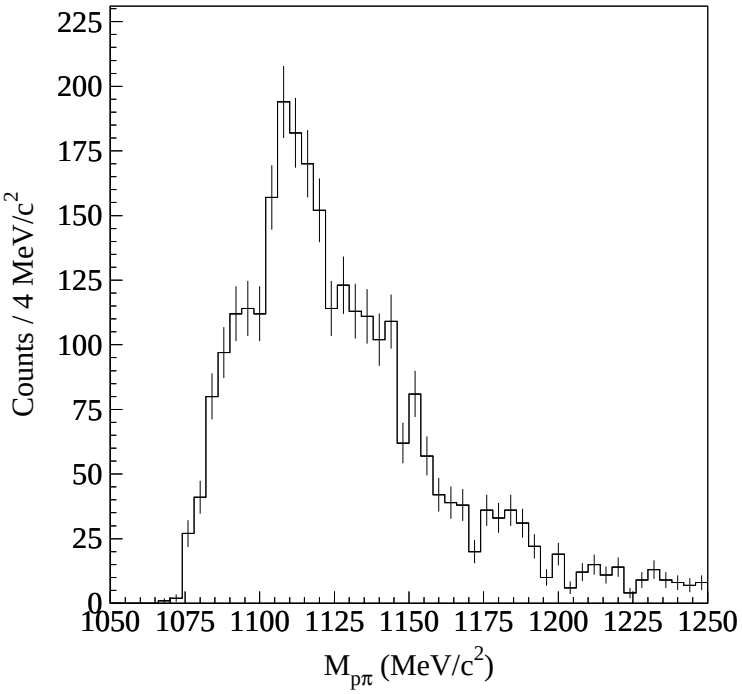

Figure 1:$\pi^- p$ invariant mass distribution.

SESSION C

Improving the phenomenology of the K_{l3} Form Factors using analyticity and unitarity

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The shape of the vector and scalar Kl3 form factors is investigated by exploiting analyticity and unitarity in a model-independent formalism. The method uses as input dispersion relations for certain correlators computed in perturbative QCD in the deep Euclidean region, soft-meson theorems, and experimental information on the phase and modulus of the form factors along the elastic part of the unitarity cut. We derive constraints on the coefficients of the parameterizations valid in the semileptonic range and on the truncation error. The method also predicts low-energy domains in the complex t-plane where zeros of the form factors are excluded. The results are useful for Kl3 data analyses and provide theoretical underpinning for recent phenomenological dispersive representations for the form factors.

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A non-homogeneous vacuum in a holographic model for large-N QCD

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We investigate the instability of the homogeneous vacuum of low-temperature QCD at large-N due to a chiral chemical potential. We use the holographic Sakai-Sugimoto model [1] to map large-N QCD, in the non-perturbative regime, to a five dimensional theory. We find at some critical chiral density a new vacuum that breaks translational invariance. This vacuum arises as a consequence of the Chern-Simons coupling present in the five dimensional theory. A similar transition has been previously obtained in [2] for the quark-gluon plasma phase, following the construction of [3, 4]. This presentation is based on our recent publication [5].

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Application of a light-front coupled-cluster method to quantum electrodynamics

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A field-theoretic formulation [1] of the exponential-operator technique [2, 3] is applied to a Hamiltonian eigenvalue problem in electrodynamics, quantized in light-front coordinates [4, 5]. Specifically, we consider the dressed-electron state, without positron contributions but with an unlimited number of photons, and compute its anomalous magnetic moment. A simple perturbative solution immediately yields the Schwinger result of $\alpha/2\pi$. The nonperturbative solution, which requires numerical techniques, sums a subset of corrections to all orders in α and incorporates additional physics.

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C-8

Integrating topological degrees of freedom with perturbation theory: YM_3

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Polyakov has demonstrated that a monopole plasma gives confinement in Georgi Glashow model in three Euclidean dimension. However his semiclassical techniques are not applicable for pure YM_3. Even though the gauge potential ansatz of 't Hooft Polyakov monopole has a finite action in YM_3, it is not a stable classical solution, indeed, larger the 'size' smaller the action.

We develop techniques for summing over such large overlapping monopole configurations. This is based on i) characterizing the configurations using eigenfunctions of $B_i(x) \cdot B_j(x)$ ii) obtaining a two potential formalism for Yang Mills theory. These techniques provide a way for combining renormalized perturbation theory and asymptotic freedom with confining effects of fluctuations of topological significance.

C-4

$2D$ Gauge Field Theory

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On a basis of the $4D \to 2D$ compactification realized in terms of the action principle the $2D$ $SU(N)$ gauge field theory is developed. The exact gauge invariant $2D$-Lagrangian is derived. On a basis of the obtained Lagrangian, the $2D$ Dirac equation, equations for the massive Yang-Mills as well as the for the transverse motion of a fermion in the $4D$ tube are derived. The mass of the arose $2D$-Dirac field is calculated. It is found to depend strongly on the transverse motion of a fermion in a $4D$ tube. On a basis of the $2D$-Dirac equation the gauge invariant fermion current is obtained. The derived current is found to be proportional to the amplitude of the gauge field, similar to the case of $2D$ QED Ref.[1] where such a proportionality leads to the appearance of a mass for the gauge field. The obtained mass for SU(N) field theory depends strongly on the $2D$ coupling constant, number of flavors, as well as on the transverse mass of the fermion. The transverse motion of a fermion in the $4D$ tube is studied.

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Hadronization in SU(N) Gauge Field Theory

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Bosonization of the strong interacting matter as a process of arising observable hadrons is studied in terms of the phase transition of the second kind. The spectrum of bosons which is free from the zero point energy is derived . The calculated boson mass is found to depend self-consistently on both the amplitude of a gauge field and quark mass. In the framework of the quasi-classical model Refs.[1, 2] the boson mass is calculated in the case of the bosonization into pions.

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Production of $c\bar{c}$ pairs at LHC

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We discuss charm production at LHC. The production of single $c\bar{c}$ pairs is calculated in the k_t-factorization approach. We use several unintegrated gluon distributions from the literature. Some of them include effect of small-x staturation and fullfil Balitsky-Kovchegov evolution equation. The hadronization is included with the help of fragmentation functions found for the production of c ($\bar{c}$) in e^+e^- collisions. Differential distributions for several charmed mesons will be presented and compared to recent results of the ALICE and LHCb collaborations. Some missing strength is identified. Different schemes of fragmentation are discussed.

Furthermore we discuss production of two pairs of $c\bar{c}$ within a simple formalism of double-parton scattering (DPS). Surprisingly large cross sections, comparable to single-parton scattering (SPS) contribution, are predicted for LHC energies. Both total inclusive cross section as a function of energy and differential distributions are shown. We include recently discussed evolution of double partons in the case of two scales. We discuss perspectives how to identify the double scattering contribution. We find much larger cross section for large rapidity distance between charm quarks from different hard parton scatterings compared to single scattering. First predictions for two $c\bar{c}$ pair production in single-parton scattering will be presented.

Predictions for the production of different pairs of charm mesons (D^0D^0, $D^0\bar{D}^0$, etc.) are presented for the kinematics of LHCb experiment. I will show also predictions for so-called nonphotonic electrons and muons comming from the semileptonic decays of charmed mesons. The double-parton scattering gives large contribution with large (pseudo)rapidity gap between electrons (e^+e^+, e^-e^-, e^+e^-) or muons. This can be measured experimentally.

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C - 7

The ρ meson mass spectrum using soft-wall QCD

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Meson spectroscopy became one of the most interesting topics of particle physics in the last ten years [1-5]. In this poster analyzed the mass spectrum of the ρ vector meson using a modified background dilaton gauge field, in the soft-wall QCD model [6-9]. Aim is, that using positive z-depended dilaton gauge field the reproduction of the correct Regge trajectories without problems with massless modes in the vector sector. To do the results more strong, compare the proposed model with the experimental data. This comparison returns an error less than 1% for the high ρ masses.

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SESSION D

Diffractive pQCD mechanism of exclusive production of W^+W^- pairs in proton-proton collisions

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We discuss central exclusive production of W^+W^- pairs in proton-proton collisions at LHC. Several observables related to this process are calculated. Predictions for the total cross section and differential distributions in rapidity and transverse momentum of $W^\pm$ and WW invariant mass are presented. We show results for different polarization states of the final $W^\pm$ bosons. We discuss both $\gamma\gamma \to W^+W^-$ mechanism as well as a new mechanism of exclusive diffractive production. The amplitude for the latter process is calculated in the Durham model used recently to estimate cross section for exclusive production of Higgs boson, gluon-gluon, $b\bar{b}$ dijets as well as for pairs of photons. The amplitude for the $pp \to ppW^+W^-$ process is expressed in terms of off-diagonal unintegrated gluon distribution functions.

We compare the two (QED and QCD) types of contributions. The phase space integrated diffractive contribution when separated is only a small fraction of fb compared to 115.4 fb of the $\gamma\gamma$ contribution. The $\gamma\gamma$ contribution dominates at small four-momentum transfers squared in the proton lines as well as in a broad range of W^+W^- invariant masses. This opens a possibility of searches for anomalous four-boson $\gamma\gamma W^+W^-$ coupling due to new physics beyond Standard Model. The example are Higgsless models.

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A model for final state interactions in $D^+ \to K^-\pi^+\pi^+$

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In a recent publication Magalhaes et al. [1] assess the importance of final-state interactions in $D^+ \to K^-\pi^+\pi^+$, stressing the consistency between two- and three-body channels. The calculation was based on a isospin-1/2 s-wave $K\pi$ amplitude developed on unitarized chiral perturbation theory and with parameters determined by a fit to LASS data [3]. The resulting amplitude for s-wave $K^-\pi^-$ production was compared with the one determined by the FOCUS collaboration [2].

This work aims to investigate futher aspects of this decay in the context of the model proposed in [1]. In particular we consider the contribution of the isospin-3/2 s-wave Kpi channel to the three-body rescattering. In this channel we choose a parametrization proposed by Pennington [5] of the phase shift determined from early LASS data [4]. Projecting our final state onto the $K^-\pi^+\pi^+$ channel we are able to compare our results with the s-wave amplitude from FOCUS [2].

The three-body system is treated using an integral equation, inspired in the Faddeev formalism, which implements a convolution between the weak vertex and the final-state hadronic scattering. In the current work we truncate the rescattering series at second order in the two-body amplitudes. The single rescattering amplitudes satisfy Watson's theorem in the individual isospin channels. However, we find that the interference between the $I = 1/2$ and $I = 3/2$ channels is important for the $K^-\pi^+$ production amplitude, and can explain some of the features found in [1]. The double-rescattering contributions mean that Watson's theorem no longer holds. At this level, the $I = 1/2$ channel provides the most important correction, although the mixed rescattering terms are also significant.

Within this improved framework, we can understand some of the results obtained using the model in [1]. In particular, the good agreement with the FOCUS phase shift is found to arise largely from the interference between the two isospin channels. We also find that double-rescattering effects in the three-body system are significant. However, we are not able to describe simultaneously both the phase and the modulus of the FOCUS data [2]. This is an indication that we are still missing important physics. Two possible sources of this need to be investigated. One is the weak-vertex, where a better model including possible energy dependence is needed. The other is a more complete treatment of the three-body final state, such as a full solution of the Faddeev equation.

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D-3

Error estimates on Nuclear Binding Energies from NN uncertainties

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Despite great theoretical efforts the NN interaction can only be determined with a finite accuracy [1, 2, 3, 4, 5]. We address the problem on estimating the systematic errors related to the form of the potential and their impact on nuclear binding energies. To this end we exploit the concept of coarse grained interactions to typical nuclear wavelengths [6, 7]. Our estimate based just on two body interactions gives an error of 0.4(2)MeV binding energy per particle, suggesting that ab initio calculations might be tailored to such an accuracy eventually allowing calculations beyond mass number $A = 12$.

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SESSION E

E-1

On the radial expansion of tubular structures in a quark gluon plasma

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We study the radial expansion of cylindrical tubes in a hot QGP. These tubes are treated as perturbations in the energy density of the system which is formed in heavy ion collisions at RHIC and LHC. We start from the equations of relativistic hydrodynamics in two spatial dimensions and cylindrical symmetry and perform an expansion of these equations in a small parameter, conserving the non-linearity of the hydrodynamical formalism. We use the equation of state of the MIT bag model. We obtain a breaking wave equation for the energy density fluctuation, which is then solved numerically. We estimate the typical expansion time of the tubes. For details we refer the reader to Refs. [1, 2].

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Investigation of In-Medium Hadron Properties by Azimuthal Emission Patterns of K^+ and K^-

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Modification of hadron properties in hot and dense nuclear matter is a topic of great interest. Kaons, which are produced in nucleus-nucleus collisions at sub-threshold energies at SIS in GSI, are very promising particles to investigate in-medium effects on hadrons. Mean field and coupled channel model calculations predict that the effective mass of K^+ mesons increases moderately with increasing baryon density, while the effective mass of K^- mesons decreases significantly due to the density dependence of KN potential. By measuring the charged kaon azimuthal emission patterns and comparing it to model calculations we can obtain valuable information on the in-medium potential.

In this presentation we discuss new results on kaon and antikaon flow measured in Ni+Ni collisions at 1.91A GeV that allow to test the predictions of transport models differentially as function of centrality in different regions of phase space.

E-3

Initial state anisotropies and their uncertainties in ultrarelativistic heavy-ion collisions from the Monte Carlo Glauber model.
Massimiliano Alvioli

E-4

Role of Hyperons in the Equation of State of Dense Matter
Jonathan Carroll

E-5

Excitation of physical vacuum through antiproton-proton annihilation in selected channels
Eduard Kuraev

E-6

Hadron-quark burning velocities in dense stars and the equation of state in nuclear matter
M. A. Perez-Garcia

E-7

Hadron nuclear attenuation in p-A collisions from parton energy loss
Maryam Rustamova