Quantum chromodynamics: string theory meets collider physics

Report of Contributions

https://indico.desy.de/e/429

Contribution ID: **0** Type: **not specified**

Introduction to AdS/CFT

Tuesday 25 September 2007 09:00 (1h 45m)

Primary author: BARBÓN, Jose L.F. (Madrid)

Presenter: BARBÓN, Jose L.F. (Madrid)

Session Classification: Introductory lecture I

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

Introduction to Heavy Ion Physics

Tuesday 25 September 2007 11:15 (1h 45m)

Primary author: WIEDEMANN, Urs (CERN)

Presenter: WIEDEMANN, Urs (CERN)

Session Classification: Introductory lecture 2

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

Monte Carlo Physics for the LHC

Tuesday 25 September 2007 14:00 (1h 45m)

Primary author: GUSTAFSON, Gösta (Lund)

Presenter: GUSTAFSON, Gösta (Lund)

Session Classification: Introductory lecture 3

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

Integrability

Tuesday 25 September 2007 16:15 (1h 45m)

Primary author: ARUTYUNOV, Gleb (Utrecht)

Presenter: ARUTYUNOV, Gleb (Utrecht)

Session Classification: Introductory lecture 4

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

Large mass expansion in two-loop QCD corrections of para-charmonium decay

Thursday 27 September 2007 15:00 (30 minutes)

We calculate the light-by-light scattering type two-loop QCD corrections due to the light quark loops in the
para-charmonium decays $eta_c rightarrow gamma magamma$ and $eta_c rightarrow gg$. We replace the mass of the internal charm quarks by an artificial large mass and obtain the result as a series in the
large mass. The obtained series can be transformed into the good convergent ones by a change of the
expansion parameter. The results are supported by two other methods to improve the convergence. We also
observe that the color singlet state of eta_c eliminates the potential divergences in the two-loop QCD
corrections. The obtained corrections to the modes $eta_c rightarrow gamma magamma$ and $eta_c rightarrow gg$ account for -1.25% and -0.73% of the tree level values, respectively.

Based on preprint

hep-ph/0610415

Primary author: Dr HASEGAWA, Kouhei (Desy Zeuthen, Theory group)

Co-author: Mr ALEXEY, Pak (University of Alberta)

Presenter: Dr HASEGAWA, Kouhei (Desy Zeuthen, Theory group)

Session Classification: QCD Phenomenology

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

Diquark masses from AdS/QCD potential

Thursday 27 September 2007 17:30 (30 minutes)

AdS/QCD correspondence is able to predict quark-antiquark potential in the static limit [1]. We use this piece of information together with the Salpeter equation (Schroedinger equation with relativistic kinematics) and a short range hyperfine splitting potential to determine quark masses and quark potential parameters. Assuming a quark-diquark structure for the S-wave low-lying baryons allows to determine light diquark masses. A discussion of heavy diquark masses, based on the hypothesis of a diquark-antidiquark structure for the states X(3872) and X(3940) [2] is also presented.

[1] O. Andreev and V. Zakharov, Phys. Rev. D 74 (2006) 025023 [arXiv: hep-ph/0604204].
[2] L. Maiani, F. Piccinini, A.D. Polosa, V. Riquer, Phys. Rev. D 71 (2005) 014028 [arXiv: hep-ph/0412098].

Primary authors: Ms GIANNUZZI, Floriana (University of Bari and INFN sezione di Bari); Prof. NARDULLI, Giuseppe (University of Bari and INFN sezione di Bari); Ms CARLUCCI, Maria Valentina (University of Bari); Prof. PELLICORO, Mario (University of Bari and INFN sezione di Bari); Prof. STRAMAGLIA, Sebastiano (University of Bari and INFN sezione di Bari)

Presenter: Ms GIANNUZZI, Floriana (University of Bari and INFN sezione di Bari)

Session Classification: String theory (1) (continued)

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

Neutralino neutralino annihilation to gamma Z in MSSM

Thursday 27 September 2007 17:00 (30 minutes)

The 1-loop computation of the processes
$tchi_i$
$tchi_j \to \gamma Z$ has been
performed at an arbitrary c.m. energy for any pair of MSSM neutralinos. As an application suitable for Dark
Matter (DM) searches, the neutralino-neutralino annihilation is studied at the limiting case of vanishing relative velocity, describing the present DM distribution in the galactic
halo; and at a relative velocity of about 0.5, determining the neutralino relic density contributions. Our results are contained in the FORTRAN code PLATONdmgZ, applying to any set
of real MSSM parameters. Numerical results are also presented for a sample of 6 MSSM models,
describing the various possible neutralino properties. A comparison with other existing works is also made.

Primary author: Dr DIAKONIDIS, theodoros (DESY, Zeuthen)

Presenter: Dr DIAKONIDIS, theodoros (DESY, Zeuthen)

Session Classification: QCD Phenomenology (continued)

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

Charged Current DIS at three loops

Thursday 27 September 2007 15:30 (30 minutes)

In this presentation I would like to discuss technical and computational problems on the derivation of the perturbative QCD corrections to three loops for the charged current structure functions F_2, F_L and F_3 for deep-inelastic neutrino-proton scattering in the combination “nu P - nubar P”. In leading twist approximation we calculate the first six odd-integer Mellin moments in the case of F_2 and F_L and the first five even-integer moments in the case of F_3 . As a new result we obtain the coefficient functions to O(alpha_s^3) while the corresponding anomalous dimensions agree with known results in the literature.

Based on preprint

arXiv:0704.1740 [hep-ph]

Primary authors: Dr ROGAL, Mikhail (DESY, Zeuthen); Dr MOCH, Sven (DESY, Zeuthen)

Presenter: Dr ROGAL, Mikhail (DESY, Zeuthen)

Session Classification: QCD Phenomenology

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

Heavy flavor production in DIS at O(a_s^2) and beyond

Thursday 27 September 2007 14:30 (30 minutes)

QCD precision tests based on deeply inelastic scattering data require the detailed knowledge of the heavy flavor contributions to the structure functions. We report on recent calculations of the heavy flavor Wilson coefficients to O(a_s^2), unpolarized and polarized, in the region Q^2/m^2 => 10 and on first results relevant at O(a_s^3).

Primary author: Mr KLEIN, Sebastian (DESY-Zeuthen)

Co-authors: Dr BIERENBAUM, Isabella (DESY-Zeuthen); Dr BLUEMLEIN, Johannes (DESY-Zeuthen)

Presenter: Mr KLEIN, Sebastian (DESY-Zeuthen)

Session Classification: QCD Phenomenology

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

The standard model on twistor space

Thursday 27 September 2007 16:30 (30 minutes)

Many recent advances in the calculation of scattering amplitudes are inspired by insights from twistor space as initiated by Witten. However, little direct use has been made untill recently of the extra structure available on the twistor space. Partly based on joint research with Lionel Mason and David Skinner, I will present a simple method of deriving actions on twistor space from any given four dimensional theory with matter with spin less than or equal to one. In particular, the method applies to the standard model. Extra gauge symmetry on the twistor space allows one to choose a gauge which reproduces MHV/CSW-style Feynman rules. On space-time, I will show that this corresponds to a non-local and non-linear field transformation.

Based on preprint

hep-th/0703080, hep-th/0702035 and some work in progress

Primary author: Dr BOELS, Rutger (Niels Bohr International Academy (from sept. 1))

Presenter: Dr BOELS, Rutger (Niels Bohr International Academy (from sept. 1))

Session Classification: String theory (2) (continued)

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

Welcome

Wednesday 26 September 2007 09:00 (10 minutes)

Primary author: WAGNER, Albrecht (DESY)

Presenter: WAGNER, Albrecht (DESY)

Session Classification: Plenary session I

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

HERA - Results and Perspectives for the LHC

Wednesday 26 September 2007 09:10 (45 minutes)

Primary author: KLEIN, Uta (Liverpool)

Presenter: KLEIN, Uta (Liverpool)

Session Classification: Plenary session I

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

Tevatron Results

Wednesday 26 September 2007 09:55 (30 minutes)

Primary author: LECOMPTE, Tom (Argonne)

Presenter: LECOMPTE, Tom (Argonne)

Session Classification: Plenary session I

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

Recent Monte Carlo Improvements

Wednesday 26 September 2007 10:25 (30 minutes)

Primary author: GIESEKE, Stefan (Karlsruhe)

Presenter: GIESEKE, Stefan (Karlsruhe)

Session Classification: Plenary session I

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

Gluon Scattering Amplitudes at Strong Coupling

Wednesday 26 September 2007 11:30 (45 minutes)

Primary author: MALDACENA, Juan M. (IAS Princeton)

Presenter: MALDACENA, Juan M. (IAS Princeton)

Session Classification: Plenary session II

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

Higher Loop Amplitudes in N=4 SYM

Wednesday 26 September 2007 12:15 (45 minutes)

Primary author: DUNBAR, David C. (Swansea)

Presenter: DUNBAR, David C. (Swansea)

Session Classification: Plenary session II

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

QGP from AdS/CFT

Wednesday 26 September 2007 14:00 (45 minutes)

Primary author: PEETERS, Kasper (Utrecht)

Presenter: PEETERS, Kasper (Utrecht)

Session Classification: Plenary session III

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

QCD - Phases and T_c

Wednesday 26 September 2007 14:45 (30 minutes)

Primary author: UKAWA, Akira (Tsukuba)

Presenter: UKAWA, Akira (Tsukuba)

Session Classification: Plenary session III

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

Lattice QCD at Small Quark Masses and Overlap Fermions

Wednesday 26 September 2007 15:15 (45 minutes)

Primary author: FARCHIONI, Federico (Münster)

Presenter: FARCHIONI, Federico (Münster)

Session Classification: Plenary session III

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

Holographic Mesons

Wednesday 26 September 2007 16:00 (30 minutes)

Primary author: EVANS, Nick (Southampton)

Presenter: EVANS, Nick (Southampton)

Session Classification: Plenary session III

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

QCD, Strings and Black Holes: A connection between Gauge Theories and Gravity

Wednesday 26 September 2007 17:30 (1h 30m)

Primary author: MALDACENA, Juan M. (IAS Princeton)

Presenter: MALDACENA, Juan M. (IAS Princeton)

Session Classification: Heinrich Hertz Lecture

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

Recent Developments in Small-x Physics

Thursday 27 September 2007 09:00 (45 minutes)

Primary author: KOVCHEGOV, Yuri (Ohio)

Presenter: KOVCHEGOV, Yuri (Ohio)

Session Classification: Plenary session IV

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

High Energy Behavior in N=4 SYM

Thursday 27 September 2007 09:45 (30 minutes)

Primary author: LIPATOV, Lev (Hamburg/St.Petersburg)

Presenter: LIPATOV, Lev (Hamburg/St.Petersburg)

Session Classification: Plenary session IV

Contribution ID: **25** Type: **not specified**

Differential Cross Sections at NNLO

Thursday 27 September 2007 10:15 (30 minutes)

Primary author: MITOV, Alexander (DESY)

Presenter: MITOV, Alexander (DESY)

Session Classification: Plenary session IV

Contribution ID: **26** Type: **not specified**

Spin Physics at RHIC

Friday 28 September 2007 11:30 (45 minutes)

Primary author: VOGELSANG, Werner (BNL)

Presenter: VOGELSANG, Werner (BNL)

Session Classification: Plenary session VII

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

QCD calculations in Heavy Flavor Physics and SCET

Thursday 27 September 2007 12:00 (30 minutes)

Primary author: FELDMANN, Thorsten (Siegen)

Presenter: FELDMANN, Thorsten (Siegen)

Session Classification: Plenary session V

Contribution ID: **28** Type: **not specified**

Structure of Hadrons from Lattice Calculations

Thursday 27 September 2007 12:30 (30 minutes)

Primary author: HÄGLER, Philipp (TU München)

Presenter: HÄGLER, Philipp (TU München)

Session Classification: Plenary session V

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

String Theory and RHIC Physics: The Fundamental Story

Friday 28 September 2007 09:45 (45 minutes)

Primary author: MATEOS, David (Santa Barbara)

Presenter: MATEOS, David (Santa Barbara)

Session Classification: Plenary session VI

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

Drag Force and Jet Quenching from AdS/CFT

Friday 28 September 2007 10:30 (30 minutes)

Primary author: LIU, Hong (Boston)

Presenter: LIU, Hong (Boston)

Session Classification: Plenary session VI

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

Heavy Ions - Results and Interpretation

Friday 28 September 2007 09:00 (45 minutes)

Primary author: HARRIS, John W. (Yale)

Presenter: HARRIS, John W. (Yale)

Session Classification: Plenary session VI

Contribution ID: **32** Type: **not specified**

Large N - the View from the Lattice

Friday 28 September 2007 14:45 (30 minutes)

Primary author: TEPER, Michael (Oxford)

Presenter: TEPER, Michael (Oxford)

Session Classification: Plenary Session VIII

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

Anomalous Dimensions and Integrability in AdS/CFT

Friday 28 September 2007 14:00 (45 minutes)

Primary author: BEISERT, Niklas (AEI Golm)

Presenter: BEISERT, Niklas (AEI Golm)

Session Classification: Plenary Session VIII

Contribution ID: **34** Type: **not specified**

Integrability in High Energy QCD

Thursday 27 September 2007 11:15 (45 minutes)

Primary author: BRAUN, Vladimir (Regensburg)

Presenter: BRAUN, Vladimir (Regensburg)

Session Classification: Plenary session V

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

Diffractive Physics at the LHC

Friday 28 September 2007 12:15 (30 minutes)

Primary author: COX, Brian (Manchester)

Presenter: COX, Brian (Manchester)

Session Classification: Plenary session VII

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

Loop Calculations of Amplitudes with Many Legs

Friday 28 September 2007 15:15 (45 minutes)

Primary author: DIXON, Lance (Stanford)

Presenter: DIXON, Lance (Stanford)

Session Classification: Plenary Session VIII

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

Two loop virtual QCD corrections to W pair production at the LHC

Thursday 27 September 2007 17:30 (30 minutes)

Gauge boson production at the LHC

Primary author: Dr CHACHAMIS, Grigorios (University of Wuerzburg)

Presenter: Dr CHACHAMIS, Grigorios (University of Wuerzburg)

Session Classification: High Energy QCD (continued)

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

AdS/CFT with Flavour and constant Kalb-Ramond field

Thursday 27 September 2007 16:30 (30 minutes)

We investigate the effect of a pure electric or magnetic Kalb-Ramond B-field on the physics of a D7 brane probe in the context of the AdS/CFT correspondence, both at finite and zero temperature. We find a confinement/deconfinement phase transition in both cases, and chiral symmetry breaking for the magnetic field. The general behaviour is that the magnetic field acts confining, while the electric field acts deconfining by ionizing the mesons. We also investigate the s-state meson spectra and find a shift for the zero temperature electric case similar to the second-order Stark effect.

Based on preprint

unpublished results

Primary author: Mr MEYER, René (Max-Planck-Instute for Physics, Munich, Germany)

Co-authors: Dr ERDMENGER, Johanna (Max-Planck-Instute for Physics, Munich, Germany); Dr SHOCK, Jonathan P. (Institut for Theoretical Physics, Chinese Academy of Sciences, Beijing, People's Republic of China)

Presenter: Mr MEYER, René (Max-Planck-Instute for Physics, Munich, Germany)

Session Classification: String theory (1) (continued)

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

Wilson loops in 4d SYM and in 2d YM

Thursday 27 September 2007 17:00 (30 minutes)

I will present some new results about supersymmetric Wilson loops in four dimensional YM. First I will present a large class of operators preserving 1/2, 1/4, 1/8 and 1/16 of the supersymmetries of the vacuum. Then I will show a possible realtion between some of those loops, following an arbitrary curve on an S^2 subspace of R^4 to Wilson loops in two dimensional YM. To the extent that we've been able to calculate, there is a precise agreement, suggesting another connection between certain operators in N=4 SYM and low dimensional soluable models.

Based on preprint

arXiv:0707.2699, arXiv:0704.2237

Primary author: Dr DRUKKER, Nadav (Humboldt University)

Co-authors: Dr TRANCANELLI, Diego (UC Santa Barbara); Dr RICCI, Riccardo (Imperial College, London); Dr GIOMBI, Simone (Harvard University)

Presenter: Dr DRUKKER, Nadav (Humboldt University)

Session Classification: String theory (2) (continued)

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

Yang-Mills and Gravity Scattering Amplitudes from Twistor Strings

Thursday 27 September 2007 17:30 (30 minutes)

I review the recent construction of a family of new twistor string theories which are free from world-sheet anomalies and give the space-time spectra of Einstein supergravities, with second order field equations, instead of the higher derivative conformal supergravities that arose from earlier twistor strings. I then discuss the calculation of gauge theory and gravity amplitudes in the new theories.

Based on preprint

arXiv:hep-th/0606272

Primary author: Dr ABOU ZEID, Mohab (Institut des Hautes Etudes Scientifiques, Bures-sur-Yvette)

Presenter: Dr ABOU ZEID, Mohab (Institut des Hautes Etudes Scientifiques, Bures-sur-Yvette)

Session Classification: String theory (2) (continued)

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

Flavors from time-dependent D7 embeddings

Thursday 27 September 2007 15:30 (30 minutes)

We consider flavors in a holographic description of a boost-invariant viscous plasma by embedding D7 branes into the dual geometry. We obtain the (time-dependent) chiral quark condensate and meson spectra. To first order both agree with the adiabatic approximation, i.e. the prediction from the static AdS black hole. For very late times the supersymmetric configurations are approached.

Primary author: Dr GROSSE, Johannes (Institute of Physics, Jagiellonian University)

Presenter: Dr GROSSE, Johannes (Institute of Physics, Jagiellonian University)

Session Classification: String theory (1)

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

Hadronic B Decays in the MSSM with Large $\tan\beta$

Thursday 27 September 2007 17:30 (30 minutes)

I present an analysis of Hadronic B decays in the MSSM with large $\tan\beta$. I consider all new four-quark operators arising in the MSSM and I
give estimates for the corresponding Wilson coefficients. I select the most relevant new four-quark operators and I calculate their contribution to non leptonic B decays. Significant differences with the SM are found in penguin dominated B decays, for $\tan\beta \geq 40$. Various estimates for relevant branching ratios, CP asymmetries and others B physics observables are given.

Primary author: Mr VERNAZZA, Leonardo (Institute für Theoretische Physik E, RWTH Aachen)

Presenter: Mr VERNAZZA, Leonardo (Institute für Theoretische Physik E, RWTH Aachen)

Session Classification: QCD Phenomenology (continued)

Contribution ID: **43** Type: **not specified**

Meson and baryon excitations in AdS/QCD

Thursday 27 September 2007 18:00 (30 minutes)

We construct an approximate holographic dual of QCD from experimental hadron properties. Conformal symmetry breaking and other IR effects are described exclusively by deformations of the anti-de Sitter background metric. This framework allows us to reproduce the empirically found linear square-mass trajectories of universal slope for radially and orbitally excited hadrons. The predictions for the light hadron spectrum include new relations between ground state masses and trajectory slopes and are in good overall agreement with experimental data.

Based on preprint

http://www.slac.stanford.edu/spires/find/hep/www?eprint=arXiv:0705.1857

Primary author: Dr BEYER, Michael (Institut für Physik, Univ. Rostock)

Co-authors: Dr FORKEL, Hilmar (CTA ITA Sao Jose dos Campos, BR); Prof. FREDERICO, Tobias (CTA ITA Sao Jose dos Campos, BR)

Presenter: Dr BEYER, Michael (Institut für Physik, Univ. Rostock)

Session Classification: String theory (1) (continued)

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

Conformal spins at colliders and BFKL versus gravitational collapse.

Thursday 27 September 2007 14:30 (30 minutes)

Firstly, we review the Moebius invariance present in the Regge limit of perturbative QCD, and argue that the associated conformal spins are related to azimuthal angle correlations in the hadro-production of dijets.
Secondly, we report on progress in the study of the connection between unitarity corrections at small x and critical behaviour of gravitational collapse in five dimensions.

Based on preprint

hep-ph/0602250, hep-ph/0702158, hep-th/0611312

Primary author: Dr SABIO VERA, Agustin (CERN)

Presenter: Dr SABIO VERA, Agustin (CERN)

Session Classification: String theory (2)

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

High energy limit of R-current scattering in N=4 SYM

Thursday 27 September 2007 15:00 (30 minutes)

We address the computation of the four-point function of R-currents in N=4 SYM in the Regge limit as a tool to study such regime in a gauge invariant framework. The R-current is a close analog of the EM current in QED and SQED, which couple a gauge invariant state ('photon') to a YM system. Gauge invariance guarantee that the amplitude is free from infrared divergences. We discuss some subtlelties associated with the fact the R-current are not associated with a gauge symmetry.

Based on preprint

to be published

Primary authors: Ms MISCHLER, Anna-Maria (II. Institut fuer Theoretische Physik, Universitaet Hamburg); Prof. BARTELS, Jochen (II. Institut fuer Theoretische Physik, Universitaet Hamburg); Dr SALVADORE, Michele (II. Institut fuer Theoretische Physik, Universitaet Hamburg)

Presenter: Dr SALVADORE, Michele (II. Institut fuer Theoretische Physik, Universitaet Hamburg)

Session Classification: String theory (2)

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

Kaluza-Klein gluon in the Bulk Randall-Sundrum model

The Bulk Randall-Sundrum model, where all Standard Model particles except the Higgs are free to propagate in the bulk, predicts the existence of Kaluza-Klein (KK) modes of the gluon with a large branching into top-antitop pairs. We study the production of the lowest KK gluon mode at the Tevatron energy and use the data on the top cross-section from the Run II of Tevatron to put a bound on the mass of the KK gluon.

Based on preprint

hep-ph/0703060

Primary author: Dr MAHMOUDI, Farvah Nazila (Uppsala University)

Presenter: Dr MAHMOUDI, Farvah Nazila (Uppsala University)

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

On baryon scattering in QCD

Thursday 27 September 2007 17:00 (30 minutes)

Impact-factors are presented corresponding to a baryon scattering at large energies by 2,3 and 4 gluon coupling. The small-x evolution of the impact factors is studied for various numbers of Reggeons in the t-channel. We find a new C-even BKP state that couples to baryons and a new 3->4 Reggeon transition vertex.

Primary author: Dr MOTYKA, Leszek (Hamburg University and Jagellonian University)

Presenter: Dr MOTYKA, Leszek (Hamburg University and Jagellonian University)

Session Classification: High Energy QCD (continued)

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

Central jet production vertex in NLO kt-factorization

Thursday 27 September 2007 16:30 (30 minutes)

We discuss the inclusive production of jets in central regions of rapidity in the context of k_T-factorization at next-to-leading order (NLO). Calculations are performed in the Regge limit making use of the NLO BFKL results. We introduce a jet cone definition and carry out a proper phase-space separation into multi-Regge and quasi-multi-Regge kinematic regions. We discuss two situations: scattering of highly virtual photons, which requires a symmetric energy scale to separate impact factors from the gluon Green's function, and hadron-hadron collisions, where a non-symmetric scale choice is needed.

Primary author: Dr FLORIAN, Schwennsen (Universitaet Hamburg)

Presenter: Dr FLORIAN, Schwennsen (Universitaet Hamburg)

Session Classification: High Energy QCD (continued)

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

Reggeon transition vertices from the gauge invariant effective action

Thursday 27 September 2007 15:30 (30 minutes)

We investigate the derivation of reggeon transition vertices from Lipatov's gauge invariant effective action for high energy processes in QCD. In particular we address the question of longitudinal integrations in order to reduce the vertices into the required purely transverse form. We present a momentum space derivation of the BFKL-kernel and verify the vanishing of the 2 to 3 reggeon transition vertex. In addition we show first results on the derivation of the 2 to 4 reggeon transition vertex.

Primary author: Mr HENTSCHINSKI, Martin (University of Hamburg)

Co-authors: Prof. BARTELS, Jochen (University of Hamburg); Prof. LIPATOV, Lev (University of Hamburg)

Presenter: Mr HENTSCHINSKI, Martin (University of Hamburg)

Session Classification: String theory (2)

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

Two loop O(G_F^2 m_t^4) correction to the Higgs decay into bottom quarks

Thursday 27 September 2007 16:30 (30 minutes)

In most of the mass range encompassed by the limits from the direct search and the electroweak precision test, the Higgs boson of the standard model preferably decays to bottom quarks. We calculated, in analytic form, the dominant two-loop electroweak correction, of O(G_F^2 m_t^4), to the partial width of this decay. It amplifies the familiar enhancement due to the O(G_F m_t^2) one-loop correction by about +16% and thus more than compensates the screening by about -8% through strong-interaction effects of O(alpha_s G_F m_t^2). In this talk I will present the results and describe the most important conceptual and technical details.

Based on preprint

Phys. Rev. Lett. 98 (2007) 071602 [hep-ph/0612184]; Nucl. Phys. B 772 (2007) 25 [hep-ph/0702215]

Primary authors: Prof. KNIEHL, Bernd A. (Universität Hamburg); Mr FUGEL, Frank (Universität Hamburg); Mr BUTENSCHÖN, Mathias (Universität Hamburg)

Presenter: Mr BUTENSCHÖN, Mathias (Universität Hamburg)

Session Classification: QCD Phenomenology (continued)

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

Isospin diffusion in thermal AdS/CFT with flavor

Thursday 27 September 2007 15:00 (30 minutes)

Using a generalization of the AdS/CFT correspondence, it is possible to determine thermodynamic properties of strongly coupled field theories. Aiming for a description of the characteristics of systems such as the quark gluon plasma, we study the gauge/gravity dual of a finite
temperature field theory at finite isospin chemical potential. Therefore we introduce a probe of two coincident D7-branes in the AdS-Schwarzschild black hole background. The isospin chemical
potential is obtained by giving a vev to the time component of the non-Abelian gauge field on the brane. The gauge/gravity duality allows to obtain SU(2) flavor current correlators by examining gauge field fluctuations. We discuss the properties of these correlators which go beyond linear response theory. In particular, we show that the isospin chemical potential leads to a frequency-dependent isospin diffusion coefficient.

Primary author: RUST, Felix (Max-Planck-Institut für Physik, München)

Presenter: RUST, Felix (Max-Planck-Institut für Physik, München)

Session Classification: String theory (1)

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

Early Time Dynamics in Heavy Ion Collisions from AdS/CFT Correspondence

Thursday 27 September 2007 14:30 (30 minutes)

We study the matter produced in heavy ion collisions assuming that this matter is strongly interacting and employing AdS/CFT correspondence to investigate its dynamics. At late proper times τ we show that Bjorken hydrodynamics solution, obtained recently by Janik and Peschanski using gauge-gravity duality, can be singled out by simply requiring that the metric tensor is a real and single-valued function of the coordinates everywhere in the bulk, without imposing any constraints on the curvature invariant. At early proper times we use similar strategy to show that the energy density ϵ approaches a constant as $\tau \to 0$. We therefore demonstrate that the strong coupling dynamics incorporates the isotropization transition in heavy ion collisions. By matching our early-time regime with the
late-time one of Janik and Peschanski we estimate the isotropization time at RHIC to be approximately $\tau_{\rm iso} \approx 0.3$~fm/c, in good agreement with results of hydrodynamic simulations.

Based on preprint

arXiv:0705.1234[hep-ph]

Primary author: Prof. KOVCHEGOV, Yuri (Ohio State University)

Presenter: Prof. KOVCHEGOV, Yuri (Ohio State University)

Session Classification: String theory (1)

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

Heavy-light mesons from AdS/CFT

Thursday 27 September 2007 17:00 (30 minutes)

In this talk I show how heavy-light mesons can be studied using the AdS/CFT correspondence. For this I embed two D7 brane probes at different positions into the dual supergravity background. I establish the non-Abelian Dirac-Born-Infeld (DBI) action for these probes which involves a 2x2 matrix. The off-diagonal elements of this U(2) fluctuation matrix correspond to the heavy-light mesons, while the diagonal elements correspond to the light-light and heavy-heavy mesons, respectively. Among other results, I find that heavy-light mesons scale differently with the ‘t Hooft coupling than the mesons involving quarks of equal mass.

Primary author: Dr KIRSCH, Ingo (ETH Zuerich)

Presenter: Dr KIRSCH, Ingo (ETH Zuerich)

Session Classification: String theory (1) (continued)