Invited speakers / lecturers

Stanley Brodsky

"Light-Front Quantum Chromodynamics"

Relevant references:

"Light cone representation of the spin and orbital angular momentum of relativistic composite systems", S. J. Brodsky, D. S. Hwang, B. Ma, I. Schmidt, Nucl.Phys. B593 (2001) 311-335; e-Print: hep-th/0003082

"Exclusive Processes in Quantum Chromodynamics ", S. J. Brodsky, G. P. Lepage, Adv.Ser.Direct.High Energy Phys. 5 (1989) 93-240
http://inspirehep.net/record/278919/files/slac-pub-4947.pdf

"The Light-Front Schr\"odinger Equation and Determination of the Perturbative QCD Scale from Color Confinement ", S. J. Brodsky, G. F. de Téramond, A. Deur, H. G. Dosch; e-Print: arXiv:1410.0425 [hep-ph]

"Light-Front Holographic Quantum Chromodynamics", S. J. Brodsky, G. F. de Téramond, H. G. Dosch. e-Print: arXiv:1309.4856 [hep-th]

"The Renormalization Scale-Setting Problem in QCD", X. Wu, S. J. Brodsky, M. Mojaza, Prog.Part.Nucl.Phys. 72 (2013) 44-98, e-Print: arXiv:1302.0599 [hep-ph]

These slides might also be useful

Zoltan Bajnok

"Aspects of Integrability"

I will not explain everything, but will partly cover section 22-25 of our review (there is also a related book). The review is available on the net:

http://www.physics.sk/aps/pub.php?y=2011&pub=aps-11-02

Shiraz Minwalla

"Vector models and AdS/CFT"

Per Sundell

“Higher Spin Gravity: Vasiliev theory from Frobenius-Chern-Simons theory”

Abstract: ``We first review the classical formulation of higher spin gravity based on Vasiliev's equations. We then present an off shell formulation of four dimensional higher spin gravity based on a natural generalization Chern-Simons theory to higher dimensions based on Frobenius algebras. Finally, we comment on consequences for the quantum theory and connections to topological open strings, ordinary strings and ordinary quantum field theory.''

As for literature, I recommend the recent review by Didenko and Skvortsov
http://arxiv.org/abs/1401.2975

João Penedones

“Mellin amplitudes and their uses for Regge theory and the flat space limit of AdS”

Useful background: familiarity with concepts for CFT in general dimension: conformal transformations, conformal algebra, primary and descendant operators, correlation functions of primary operators (two, three and four), operator product expansion and conformal block.

Hugo Reinhardt

“Hamiltonian approach to QCD in Coulomb gauge“.

Unfortunately there is no review on this subject available. If the students are willing to read original papers I can recommend as an introduction into the subject:

C. Feuchter and H. Reinhardt, Phys. Rev D70(2004)105021.

Parts of the subject of my talk are covered in:

H. Reinhardt and H. Heffner, Phys. Rev. D88(2013)045024.

Both papers are written in some detail and should be accessible to PhD students.

Technical Talks

Tan, Chung-I: “High Energy Scattering from AdS/CFT and Conformal Bootstrap”.

From the perspective of AdS/CFT the Pomeron trajectory can be identified with a Reggeized Graviton. We focus on the strong coupling expansion for the dimension of the leading twist operators in N=4 SYM dual to those Regge trajectories relevant for high energy scattering. In particular, we discuss constraints due to conformal invariance as well as consequences of confinement deformations in the IR.

Jevicki, Antal: "Reconstructing Higher Spin Holography"

The collective picture of O(N) vector CFT is used for construction of Higher Spin Theory in AdS. The 'gauge' origin of holography in HS theories will be outlined. Recent one-loop calculations will be summarized.

De Mello Koch, Robert: TBA

Goldstein, Kevin: TBA

Hirano, Shinji: "Two Tales of ABJ(M) Theory: Higher Spin Limit and Background Independent Reformulation"

Fried, Herb: "An Exact, Finite, Gauge-Invariant, Non-Perturbative Model of QCD Renormalization"

A previous formulation of non-perturbative, gauge-invariant, realistic QCD was able to sum over all gluons exchanged between any two quark lines, including cubic and quartic gluon interactions. Such an infinite number of exchanged gluons takes the form of one Gluon Bundle exchanged between those quark lines; Feynman graphs of individual gluon exchange are then replaced by Bundle Graphs, linking quarks and large numbers of closed quark loops, conveniently defined by a functional cluster expansion. Such combinations now form the essential set of "radiative corrections" of this non-perturbative formulation of QCD.

A particular choice of renormalization, within the simplifications provided by the non-perturbative property of Effective Locality, leads to a completely finite, renormalized theory of QCD, in which all correlation functions can, in principle, be defined and calculated. In this Model of renormalization, only the Bundle chain-Graphs of the cluster expansion are non-zero. All Bundle graphs connecting to closed quark loops of whatever complexity, and attached to a single quark line, provide no 'self-energy' to that quark line, and hence no effective renormalization. However, the exchange of momentum between one quark line and another, involves only the cluster-expansion's chain graphs, and yields a set of contributions which can be summed and provide a finite color-charge renormalization that can be incorporated into all other QCD processes. An application to HE elastic pp scattering is now underway.

Dudal, David: "Charmonia melting in a magnetic field: a preliminary view from a phenomenological soft wall model"

We consider a slight modification of the original soft wall model of Karch et al to include a magnetic field coupling to the charm constituents of the "J/Psi meson". The goal is to study the deconfinement transition in terms of the melting of the meson, this in order to get a potential view on how a magnetic field can influence the transition The latter is not yet well understood from general principles. (this is based on work in progress of D. Dudal & T. Mertens).

Mertens, Thomas: "The Thermal Scalar and Random Walks in Curved Spacetime"

I will discuss the generalization of the random walk picture of the near-Hagedorn string gas for curved spacetimes. After introducing our approach based on a combination of the worldsheet path integral and the thermal scalar field theory, we consider the specific case of the AdS_3 (and BTZ) WZW model. After that, we apply our method to Rindler space, the results of which we interpret as providing a realization of Susskind's picture of the long string surrounding the black hole event horizon. (based on JHEP 1402 (2014) 127, JHEP 1403 (2014) 086 and JHEP 1406 (2014) 156, in collaboration with H. Verschelde and V. I. Zakharov).

Hofmann, Ralf: "Yang-Mills Thermodynamics and Radiation in our Universe"

We first review a number of results on nonperturbative thermodynamics of an SU(2) Yang-Mills theory including: (anti)calorons, inert adjoint Higgs field, Higgs mechanism, thermodynamical selfconsistency, action of a caloron, free thermal quasiparticles, kinematic constraints, radiative corrections (polarisation tensor of massless mode, loop expansion of pressure), deconfining-preconfining phase transition, ground-state tunneling, single and selfintersecting center-vortex loops and their multiplicities, curve shrinking and vacuum energy. In the second part of the lecture we postulate an SU(2) Yang-Mills theory of scale ~10^-4 eV to fundamentally describe photon propagation. Consequences of this postulate are explored and include: an approach to the so-called cosmic radio background invoking the onset of a cosmic (albeit incomplete) Meissner effect, a low-frequency spectral anomaly in the CMB at redshift ~1, CMB large angle anomalies, early reionisation, CMB decoupling, and the cosmic neutrino background.

Djuric, Marko: "Strong Coupling Expansion for the Conformal Pomeron/Odderon Trajectories"

Abstract: From the perspective of AdS/CFT the Pomeron is identified with a Reggeized Graviton, while the Odderons correspond to Reggeized anti-symmetric AdS5 Kalb-Ramond tensor-fields. In this paper, we consider the strong coupling expansion of the dimension of the leading twist operators dual to these Regge trajectories, Δ(j), to determine its analytic continuation in j beyond the diffusion limit. In particular, we compute the strong coupling expansion of the intercept to order λ^(-3), where λ is the t'Hooft coupling, for both the Pomeron, which is C=+1 crossing-even, and the "Odderons", which are the leading C=−1 crossing-odd Regge singularities. We discuss the spectral curves of the class of single-trace operators to which these string modes couple.

Yoon, Jung-Gi: "Canonical Formulation of O(N) Vector/Higher Spin Correspondence"

We discuss the canonical structure of the collective formulation of Vector Model/Higher Spin Duality in AdS4. This involves a construction of bulk AdS Higher Spin fields through a time-likebi-local Map, with a Hamiltonian and canonical structure which are established to all orders in 1/N.

Tsang, Peter: TBA