Partial list of talk titles and abstracts

Carlos Nuñez

Aspects of Gauge Strings Duality

Abstract: I will describe recent developments in the duality between gauge fields and Strings. The presentation will be pedagogical, open to discussions and questions.

Roman Yaresko

Holographic Modelling of SU(N) Yang-Mills and QCD Equations of State and Bulk Viscosity

Abstract: In a 5D gravity-dilaton bottom-up holographic model the dilaton potential is adjusted to match recent lattice data for (i) the SU(3) Yang-Mills equation of state (ii) the QCD equation of state and the corresponding bulk viscosities are obtained and compared. A condition for enforcing (for (i)) or avoiding (for (ii)) a phase transition is discussed. For SU(3) Yang-Mills, a dilaton potential is presented, which reproduces both the confined (down to 0.7 T_c) and deconfined (up to 10 T_c) phases, separated by a thermodynamically consistent first-order phase transition at temperature T_c. This construction is compared with the model of Kiritsis et al., where the phase transition is like what one expects from large-N SU(N) Yang-Mills theory. Implications for N increasing from 3 to infinity are discussed.

Gerald Dunne

Resurgence, Trans-series and Non-perturbative Physics

Abstract: Resurgent trans-series provide a novel mathematical formalism to unify perturbative and non-perturbative physics, leading to new insights into the general structure of differential equations and path integrals. I will review the main ideas with some basic illustrative examples.

Aleksey Cherman

Resurgence in QFT and the role of large N

Abstract: I will briefly review what is believed and what is known about renormalon divergences in asymptotically-free QFTs. I will then explain the idea of adiabatic compactification as a controlled tool to see resurgence theory at work via the cancellation of renormalon ambiguities in a semi-classical domain in asymptotically-free theories.

Michal Spalinski

Hydrodynamics Beyond the Gradient Expansion: Resurgence and Resummation

Abstract: Computations in supersymmetric Yang-Mills theory at large N based on the AdS/CFT correspondence have lead to important advances in relativistic hydrodynamics. In particular, it was recently appreciated that consistent formulations of relativistic viscous hydrodynamics involve short lived modes which lead to asymptotic rather than convergent gradient expansions. Focusing on the case of longitudinally expanding quark-gluon plasma I will describe how hydrodynamics can be identified as a universal attractor without invoking the gradient expansion. I will then show that this attractor can be recovered from the divergent gradient expansion by Borel summation. This requires careful accounting for the short-lived modes which leads to an intricate mathematical structure known from the theory of resurgence.

Antonio González-Arroyo

Meson masses at large N from twisted reduction

Abstract: TBA

Pavel Buividovich

Diagrammatic Monte-Carlo algorithms for large-N quantum field theories from Schwinger-Dyson equations

Abstract: We present a general framework for constructing Diagrammatic Monte-Carlo algorithms for large-N quantum field theories, which is based on the stochastic solution of the full untruncated hierarchy of Schwinger-Dyson equations and is an extension of the approach presented in arXiv:1104.3459, arXiv:1009.4033. The algorithms are capable of constructing both weak- or strong-coupling expansions which are convergent at large N and asymptotic 1/N expansions. We illustrate the application of the algorithm on the examples of the planar phi^4 theory and U(N) principal chiral model (including the exactly solvable limiting case of the Gross-Witten matrix model), and discuss the extension of the method to lattice gauge theory. In the latter cases of lattice field theories with U(N) degrees of freedom, simulations in the weak-coupling regime are hindered by a sign problem. We discuss possible ways to overcome this problem, for example, by introducing non-perturbative condensates into the Schwinger-Dyson equations.

Liam Keegan & Alberto Ramos

Dimensional reduction in large N gauge theories

Abstract: We will use the ideas of reduction and volume independence to numerically investigate the large N limit of YM theories by reducing two of the directions to a single point. We will argue that this might be a convenient way to extract physical quantities from numerical simulations.

Matt Koren

x-scaling in 2+1 dimensional SU(N) gauge theories with twisted b.c.

Abstract: We analyze 2+1 dimensional Yang-Mills theory with twisted boundary conditions in the spatial directions. It is conjectured that the physical quantities in the theory obey the so-called x-scaling, i.e. depend only on the variable x~NL/b and the magnetic flux, given by the parameters of the twist (L being the length of the spatial torus and b the inverse 't Hooft coupling). Using lattice approach and a broad range of values of N, we show numerical evidence supporting the x-scaling conjecture both in the non-zero electric flux sector and in the zero-flux (glueball) sector.

Herbert Neuberger

Lattice Methods for Euclidean Conformal Field Theory

Abstract: A Conformal Euclidean Quantum Field Theory (CEuQFT) is a EuQFT which is scale invariant and also carries a representation of the Conformal Group of E^n, Euclidean n-dimensional space. My objective is to set up a lattice construction of a CEuQFT. I restrict my attention to globally defined conformal transformations and use radial quantization.

Adam Schwimmer

Review of Constraints on Renormalization Group Flows

Abstract: TBA