Towards realistic physics at large quantum number

Monday 13 May 2024 - Friday 17 May 2024

Book of Abstracts

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6D N=(2,0) SCFTs at large-R-charge and the 2D conformal block

I will compute the OPE data of large-R-charge operators in 6D N=(2,0) SCFTs using the moduli effective action. Using the work of Beem, Rastelli, and Rees, this is related to the large-order behaviour of the 2D (Virasoro) conformal block. I will compute the 2D data numerically to show consistency with the result from 6D effective action. Based on these, a general conjecture about the large-order behaviour of the Virasoro block will also be presented.

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Dimensionally Reducing Generalized Symmetries

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(Large) charge covexity and hairy black holes in AdS

4

Conformal ladder graphs as thermal partition functions

I describe a recently discovered correspondence between L-loop conformal ladder graphs in D=2 and D=4 fishnet CFTs, and thermal partition functions of massive free scalars in d=2L+1 dimensions. The correspondence reveals some previously unobserved algebraic and differential relations among the conformal graphs. It also provides a statistical field theory interpretation for the all-loop resummation of the ladder graphs. Other possible implications of the correspondence are also discussed.

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New perspective in fermionic CFTs at large charge

I will present some results concerning large-charge sectors of 3d CFTs with fermionic degrees of freedom. I will focus on theories that are weakly coupled at large-N, allowing for analytic determination of finite-density ground states. Other than superfluid ground states, certain large-charge

sectors are described by filled Fermi Sphere ground states, whose stability beyond the large-N expansion is still an open problem. If time allows it, I will present a few recent ideas on matrix-model effective theories for monopole operators in fermionic (gauge) theories.

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Monodromy defects and holography

With an aim to further quantify non-pertubative defects in quantum field theory, we study two-dimensional magnetic defects in four dimensional SUSY quantum field theories which preserve a two-dimensional superconformal symmetry along the defect. These can be thought of as an infrared limit of a magnetic solenoid. On general grounds such magnetic defects support localized chiral edge states, and in our system we generically preserve a (0,2) supersymmetry. We compute various physical observables such induced currents rotating around the solenoid, as well as central charges of the defect, as a function of the monodromies. Time permitting, we also comment on the analagous case of one dimensional defects in three dimensional QFTs.

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Towards Standard Model at large charge

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Squeezing information out of QCD

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String Interactions in Yang Mills Theory

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The EFT of Large Spin Mesons

As well known, mesons with large spin J in large Nc QCD can be described as rotating open strings using effective field theory (EFT). However, some subtleties arise for light quarks, due to the breakdown of the derivative expansion near the endpoints. Building on previous works on the subject, I

will describe a consistent treatment of such endpoints' singularities and obtain results, in a systematic 1/J expansion, for the spectrum of the leading and daughter Regge trajectories. Interestingly, the redshift factor associated with the quarks' acceleration implies that the applicability regime of the EFT is smaller than for static fluxtubes. Depending on time, I will also mention some extensions of the EFT of phenomenological interests, such as the quarks' spin, and the pseudo-axion, a massive string mode identified in lattice simulations of 4d fluxtubes. Finally, I will comment on the comparison with data in 4d QCD, and discuss the prospects for applying a similar EFT to the study of the glueball spectrum in Yang-Mills theory.

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NLO in the large charge sector in the critical O(N) model at large N

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Baby steps toward Lorentzian CFT at large charge

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An EFT approach to large charge convexity

I will present recently understood aspects of large charge convexity, and its violation, using an EFT approach. We first distinguish between "quantum" and "semi-classical" violations of convexity. We then show that the latter, if they exist, are extremely constrained by the EFT. Based on work with Riccardo Rattazzi, Alexander Monin, and Tim Cohen.

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Welcome to IPMU

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