Marco Rossi

On the correspondence between classical and quantum integrable theories

The starting point is a functional relation, called TQ system, which appears in the context of a quantum integrable theory. From that we derive from a linear integral equation, which can be extended, by introducing dynamical variables, to become an equation with the form of the Marchenko equation. Then, we derive from the latter a classical (differential) Lax pair. We exemplify our method by focusing on the massive version of the ODE/IM (Ordinary Differential Equations/Integrable Models).

Niels Benedikter

The Luttinger model

Francesco Olivi

Unified approach to different bases of Heun equations with applications to gauge and black hole theories

Thanks to a previous comparative study of Heun equations by means of integrability and supersymmetric gauge theories, we can here propose a method for solving them in a new form. This method applies at different classes of solutions, namely the Floquet ones and also those with decaying boundary conditions. In fact, the first ones play a new role in integrability and have well-known importance in gauge and black hole theories, while the second ones have been extensively used everywhere. The very same approach can be used for all Heun-like equations, i. e. the original Heun equation and all its confluences and reductions, so opening the way to new expressions for the so-called waveforms in BH perturbation theory.

Adam Chalabi

Surface defects and integrability

Integrability of planar N=4 super-Yang-Mills (SYM) theory enables exact computations of unprotected observables, even with the insertion of certain extended operators. While integrability techniques have been successfully applied to some domain walls and line defects, it is an open question whether there are any integrable surface defects in N=4 SYM theory. In this talk, I will examine a class of 1/2-BPS surface defects known as Gukov-Witten defects. I will argue that these defects are generically not integrable but they are likely to become integrable at a corner in parameter space. I will present closed-form factorised expressions for leading-order one-point functions of unprotected scalar operators, hinting at the existence of all-loop asymptotic formulas at this special point.

Nikita Titov

From Laplacian-to-Adjacency matrix for continuous spins on graphs

The study of spins and particles on graphs has applications across many areas, from time dynamics on networks to combinatorial optimization. In this talk, I will discuss the large n limit of the O(n) model on general graphs. The absence of translational invariance leads to an infinite set of saddle point constraints in the thermodynamic limit. I will show that the free energy at low and high temperatures T is controlled by two central graph-theoretic objects: the Laplacian matrix at low T and the Adjacency matrix at high T. Their interplay will be illustrated across several classes of graphs. On trees, on can obtain an exact solution in which the Lagrange multipliers depend only on the local coordination numbers. I will highlight the physical consequences using the example of a Y-junction. For graphs allowing a phase transition, I will show that the singular part of the free energy is governed by the Laplacian spectrum, whereas the full free energy coincides with it only in the zero-temperature limit. I will conclude by presenting analogous results for the quantum version of the model.

Giacomo Gori

Local scaling in critical systems via holography

What would you do if you were a system at criticality? You would of course forget about the microscopic length scales (lattice spacing). But if you were in a confined system you would also try to loose track of the boundaries. The simplest implementation (we could figure out) of above requirement in absolute geometric language leads us to the fractional Yamabe problem. We are looking, within the class of metrics differing from the starting flat one by a local rescaling factor, for a metric making a generalized (anomalous in physics vernacular) notion of curvature constant. The above problem is set up mathematically and solved with holographic techniques leading to novel, testable and successfully tested predictions in $d>2$ systems. In the context of the above program we will put some emphasis on upcoming results on the verification of local scaling in Ising 3d.

Chiara Paletta

Nicolò Brizio

More on TTbar and non-linear field theories

Michelangelo Mannatzu

The Arctic Curve of the two-periodic Aztec diamond with a vertical bias

Pierpaolo Fontana

Renormalized Dual Basis for scalable simulations of higher dimensional lattice gauge theories