Murray Batchelor

Title: Coupled TL algebras
Abstract:

Vladimir Bazhanov

Title: Towards canonical quantisation of non-linear sigma models
Abstract: In this talk we revisit the problem of canonical quantization of two-dimensional non-linear sigma models (NLSM) in two dimensions. We unravel the integrability structure of the O(3) NLSM and its one-parameter deformation --- the sausage model. Our consideration is based on the continuous version of the Quantum Inverse Scattering Method enhanced by a powerful ODE/IQFT correspondence, which connects stationary states of Integrable QFT models with special solutions of classical integrable equations. Among the obtained results is a system of non-linear integral equations for computation of vacuum eigenvalues of the continuous analogs of quantum transfer-matrices for the O(3)/sausage NLSM. The talk is based on the recent article arXiv:1706.09941 (joint with Gleb Kotousov and Sergei Lukyanov).

Omar Foda

Title: Elliptic toroidal algebras and exact solutions
Abstract:

Tony Guttmann

Title: 1324 pattern-avoiding permutations
Abstract: The field of pattern-avoiding permutations was introduced by Knuth in the 1960s as a way of characterising certain data structures. Since then, it has grown into an important area in its own right. There are a number of classical problems, among which is the number of 1324-avoiding permutations. We will give some history, and then give details of a new algorithm we have developed for the generating function for this problem. As a result we can count these up to length 50.

A new method of analysis we have developed, which can in some circumstances be an alternative to Monte Carlo analysis, reveals some interesting features. In particular, we conjecture that the generating function is not D-finite, and has asymptotics that include a stretched-exponential term. (Joint work with Andrew Conway and Paul Zinn-Justin).

The late, great Mark Kac often said that his seminars assumed zero knowledge but infinite wisdom. This seminar only assumes zero knowledge and finite wisdom.

Christian Hagendorf

Title: On the supersymmetric eight-vertex model
Abstract: In this talk, I discuss the eight-vertex model with statistical weights a,b,c,d related by $(a^2+ab)(b^2+ab)=(c^2+ab)(d^2+ab)$. In 2001, Stroganov conjectured that its transfer matrix for $L=2n+1$ vertical lines and periodic boundary conditions along the horizontal direction possesses the doubly-degenerate special eigenvalue $\Theta_n = (a+b)^{2n+1}$. I show how to prove this conjecture. The proof utilises the supersymmetry of a related XYZ spin chain. The corresponding eigenstates are shown to be the spin-chain ground states. I describe how to compute

some of their components. For $d=0$ and a suitable normalisation, they can be expressed by integer sequences that enumerate alternating sign matrices. Furthermore, I present an extension to open boundary conditions.

Atsuo Kuniba

Title: Tetrahedron equation, 3D reflection equation and generalized quantum groups
Abstract: I shall survey the interrelation among the Isaev-Kulish 3D reflection equation, the Soibelman representations of quantized algebra of functions, connection coefficients of the PBW bases of the nilpotent subalgebra of quantum groups, 2D reductions of the tetrahedron equation and the relevant generalized quantum groups. If time allows, recent applications to the matrix product formula for stationary probabilities of the multispecies asymmetric simple exclusion process and zero range process will also be mentioned.

Jon Links

Title: A non-standard classical Yang-Baxter equation
Abstract: I will give an introduction to a non-standard version of the classical Yang-Baxter equation, where the solutions are generally not skew-symmetric. A notion of symmetries of solutions will be developed, which are not necessarily of Lie-type. A concrete example will be provided. Methods of constructing an exact solution for the associated transfer matrix, which does not possess U(1)-invariance, will be discussed.

Vladimir Mangazeev

Title: Integrable structure of products of random matrices and relation to Painleve systems
Abstract:

Paul Pearce

Title: Physical Combinatorics and analyticity in Yang-Baxter integrable systems
Abstract: The conformal energy spectra of a 2-d Yang-Baxter integrable system is determined by finite-size corrections to the eigenvalues of their commuting transfer matrices. These eigenvalues are obtained analytically by solving Y-system functional equations subject to analyticity assumptions related to the location of certain zeros in the complex plane of the spectral parameter u. In turn, the location of the relevant zeros are encoded in various combinatorial objects giving rise to physical combinatorics. We will discuss the notion of physical combinatorics with emphasis on the critical Yang-Lee model M(2,5) and the critical bond percolation model LM(2,3).

Thomas Quella

Title: Topological aspects of 1D quantum spin systems
Abstract: We describe how topological invariants can be used to characterise phases of 1D quantum spin systems with continuous symmetries (and their q-deformations).

David Ridout (9/11)

Title: A (gentle) introduction to logCFT

Abstract: It is well known that conformal field theory (CFT) provides excellent models for the continuum scaling limits of many critical lattice theories and string dynamics pulled back to the worldsheet. Textbooks indoctrinate us into a beautiful world of primary fields, critical exponents and conformal Ward identities. But, research has progressed far beyond textbook examples and one eventually has to face up to the fact that textbook descriptions of CFT are often inadequate.

This is where logarithmic CFT (logCFT) comes in.

In this lecture, I will review some of the basic concepts of logCFT with the focus being on what differs from the (hopefully) familiar textbook treatments and how to deal with these differences.

David Ridout (15/11)

Title: The standard module formalism: the modular group and logCFT

Abstract: One of the most powerful and useful constraints on a conformal field theory (CFT) is that its partition function must be invariant under the action of an appropriate group of modular transformations. These modular transforms also help determine fusion products through the celebrated Verlinde formula. But, there are many examples of CFTs for which the Verlinde formula seems to fail. There are even examples where modular transforms seem to fail. In this talk, I will report on a promising approach to fix these failures.

Philippe Ruelle

Title: Trees, forests and groves

Abstract: We will review some recent developments concerning the combinatorics of spanning trees, spanning forests and other related geometric structures. Two applications of these will be discussed, one in the form of a discrete version of Schramm's formula, the other in the sandpile model.

Elena Tartaglia

Title: Classifying Potts Critical Lines

Abstract: In this talk I will discuss our recent work in which we study the critical behaviour of the q-state Potts model using scale invariant scattering theory. I will begin with an introduction to the Potts model and scattering theory. I will then explain how this formalism allows us to account for known results in the Potts model by studying its permutational S_q symmetry. In particular, we obtain lines of renormalisation group fixed points, which describe the critical points for theories with S_q -invariance and match some of these solutions to the ferromagnetic and square lattice antiferromagnetic critical lines of the q-state Potts model. Furthermore, we obtain that an S_q-invariant fixed point can be found up to maximal value $q = (7 + \sqrt{17})/2$, which is larger than the usually assumed maximal value of 4.

Alessandra Vittorini-Orgeas

Title: Yang-Baxter solution of Dimers as a Six-Vertex Model

Abstract: Using Yang-Baxter integrability we study dimers as a free-fermion six-vertex model with crossing parameter $\lambda=\pi/2$. A one-to-many mapping of vertex onto dimer configurations allows the free-fermion solutions to be applied to the anisotropic dimer model on a square lattice where the dimers are rotated by $45\degree$ compared to their usual orientation. The dimer model is described by a fermion algebra and the Temperley-Lieb algebra with loop fugacity $\beta=2\cos\lambda=0$. Using commuting transfer matrices, we establish and solve inversion identities on the torus for arbitrary finite size. By calculating the partition function at the isotropic point $u=\pi/4$, we obtain an explicit formula for the counting of the rotated dimer configurations on a finite $M\times N$ periodic lattice. Remarkably, the modular invariant partition function on the torus is the same as symplectic fermions and critical dense polymers. On the strip, with vacuum boundary conditions, the dimer Hamiltonian and double row transfer matrices exhibit nontrivial Jordan cells. We therefore argue that, in the continuum scaling limit, the dimer model gives rise to a {\em logarithmic} conformal field theory with central charge $c=-2$, minimal conformal weight $\Delta_{\text{min}}=-1/8$ and effective central charge $c_{\text{eff}}=1$.

Robert Weston

Title:

Abstract:

Michael Wheeler

Title: Non-symmetric Macdonald polynomials and integrable lattice models

Abstract:

Paul Zinn-Justin

Title: Integrable tiling models and Schubert calculus

Abstract: We discuss two integrable tiling models (lozenge tilings and square/triangle/shield/rhombus tilings) and then, motivated by ``puzzles'' in Schubert calculus, introduce their higher rank generalizations.

Bernard Nienhuis

Title: Universality in the hyperbolic plane

Abstract:

Alexandr Garbali

Title: Lattice integrable stochastic processes

Abstract: Using a certain twisting procedure XXZ-type integrable Hamiltonians can be turned into Markov matrices which define integrable stochastic processes. Integrability provides numerous tools to study non-equilibrium characteristics of these processes giving new insights about their universality class (typically Kardar-Parisi-Zhang). Famous examples of these processes include Asymmetric Simple Exclusion Process (ASEP) and Zero Range Process (ZRP). I will give an algebraic description of ASEP, ZRP and their multi-species generalizations. In the most general setting of the multi-species ZRP process I will discuss the steady state vector and its relation to the Macdonald theory of symmetric functions. This information is important for computing current and density profiles as well as observable quantities.