

Six Vertex model dimers, shapes, and all that workshop Talk Schedule

Events for:
Monday, March 14th - Friday, March 18th

Monday, March 14th

9:00am **Pavel Bleher: Welcome Address - SCGP 102**

9:10am **Pierre Van Moerbeke - SCGP 102**

Title: Edge-tacnode phenomena in random tilings

Abstract: Lozenge tilings of non-convex polygons will be discussed in this talk. Letting the polygons grow to infinity in an appropriate way yields new statistical fluctuations in regions of non-convexity. These fluctuations will be governed by a determinantal process given by the so-called edge-tacnode kernel.

10:00am **Coffee Break - SCGP Lobby**

10:30am **Omar Foda - SCGP 102**

Title: A one-point function in 4D $N=4$ supersymmetric Yang-Mills using six-vertex model methods

Abstract: Based on work with K Zarembo, I wish to compute the one-point function of a class of composite operators in 4D $N=4$ supersymmetric Yang-Mills theory, in the presence of a wall. The basic idea is to map this one-point function to a partition function of six-vertex model configurations on a finite lattice with domain-wall boundary conditions in the presence of a partially-reflecting boundary. The result is a modified version of Tsuchiya's determinant. If time allows, I wish to show that this determinant is a tau function of a reduction of KP.

11:20am **Luigi Cantini - SCGP 102**

Title: Asymmetric simple exclusion process with open boundaries and Koornwinder polynomials

Abstract: In this talk I shall present a new approach to the study of the steady state of the Asymmetric Simple Exclusion Process (ASEP) on a finite strip with two particle reservoirs at the two ends. Our approach consists in exploiting the integrability of the model in order to introduce a set of "extra" parameters, usually called spectral parameters. The (unnormalized) probabilities of the particle configurations get promoted to Laurent polynomials in the spectral parameters and are constructed in terms of non-symmetric Koornwinder polynomials. In particular we show that the normalization coincides with a symmetric Macdonald-Koornwinder polynomial. As an outcome we compute the steady current and the average density of first particles.

12:10pm **Lunch - SCGP Café**

2:00pm **Alexander Stolin - SCGP 102**

Title: Classification of quantum groups of Kulish-Reshetikhin type

2:50pm **Giuliano Ribeiro - SCGP 102**

Title: Influence of boundary conditions on bulk properties of six-vertex model

3:40pm **Coffee Break - SCGP Lobby**

4:10pm **Carlo Meneghelli - SCGP 102**

Title: Prefundamental representations and Q-operators

Tuesday, March 15th

9:00am **Ivan Corwin - SCGP 102**

Title: Stochastic higher-spin vertex models and their self-duality.

Abstract: We introduce the higher-spin vertex models (which will be discussed in talks of Borodin and Petrov as well) and show how they can be studied using Markov dualities along with their Bethe ansatz diagonalization. This class of models covers essentially all known integrable KPZ class models and unifies the duality approach to their study. This is based on a cycle of joint works with Borodin, Petrov and Sasamoto.

9:50am **Coffee Break - SCGP Lobby**

10:20am **Hjalmar Rosengren - SCGP 102**

Title: Elliptic pfaffians and solvable lattice models

Abstract: The Izergin-Korepin formula expresses the partition function of the domain wall six-vertex model as a simple determinant. It has proved very useful for investigating relation to combinatorics as well as thermodynamic properties of various physical quantities. In spite of recent progress, there is no very pleasing extension of the Izergin-Korepin formula to elliptic lattice models. In our talk, we will discuss expressions involving pfaffians rather than determinants. We introduce twelve pfaffians with elliptic function entries, which are all related by modular transformations. The domain wall partition function for the 8VSOS model (at the combinatorial line) is expressed as a linear combination of two such pfaffians. Similar expressions can be given for certain eigenvalues of Q-operators on inhomogeneous XYZ spin chains. In the homogeneous limit, we obtain new Hankel determinant formulas for the corresponding quantities.

11:10am **Jonathan Novak - SCGP 102**

Title: Equilibrium measures and limit shapes revisited.

12:00pm **Lunch - SCGP Café**

1:00pm **SCGP Weekly Talk - SCGP 102**

Speaker: Alexei Borodin, MIT

Title: The six vertex model and randomly growing interfaces in $(1+1)$ dimensions

Abstract: The goal of the talk is to explain how the six vertex model gives rise to models of $(1+1)$ d random growth in the KPZ universality class, and how the Yang-Baxter integrability of the former leads to solvability of the latter.

2:10pm **Filippo Colomo - SCGP 102**

Title: Arctic curve of the six-vertex model in an L-shaped domain

3:00pm **Guilherme Silva - SCGP 102**

Title: The mother body phase transition in the normal matrix model

3:40pm **Coffee Break - SCGP Lobby**

4:10pm **Robert Buckingham - SCGP 102**

Title: Large-degree asymptotics of rational Painleve functions

Wednesday, March 16th

9:00am **Robert Weston - SCGP 102**

Title: Conserved currents and discrete holomorphicity in vertex and face models

9:50am **Coffee Break - SCGP Lobby**

10:20am **Paul Zinn-Justin - SCGP 102**

Title: TBA

11:10am **Tony Dorlas - SCGP 1202**

Title: Rigorous analysis of the 6-vertex model

Abstract: I shall examine the Bethe Ansatz equations for the six-vertex model rigorously and establish in certain regions that in the thermodynamic limit the solution is given by the known formulas. In particular this involves establishing the uniqueness of solutions.

12:00pm **Lunch - SCGP Café**

2:00pm **Benjamin Young - SCGP 102**

Title: How to invert the Kasteleyn matrix of the 2-periodic Aztec diamond

2:50pm **Sunil Chhita - SCGP 102**

Title: At the 'liquid-gas' boundary of the two-periodic Aztec diamond

Abstract: The two-periodic Aztec diamond is a random domino tiling model whose limit shape contains three macroscopic regions called 'solid', 'liquid' and 'gas'. These regions are determined by the correlations between dominoes and are not related to physical states of matter. Continuing from Benjamin Young's talk, we present some asymptotic results for the two-periodic Aztec diamond, including a partial understanding of the behavior at the so-called 'liquid-gas' boundary. The talk is based on projects with Vincent Beffara, Kurt Johansson and Benjamin Young.

3:40pm **Coffee Break - SCGP Lobby**

4:10pm **Manuela Girotti - SCGP 102**

Title: Smallest singular value distribution and large gap asymptotics for products of random matrices

Abstract: "We study the distribution of the smallest singular eigenvalues for the finite product of certain random matrix ensemble, in the limit where the size of the matrices becomes large. The limiting distributions that we will study can be expressed as Fredholm determinants of certain integral operators, and generalize in a natural way the extensively studied hard edge Bessel kernel determinant. We will express such quantities in terms of a 2×2 Riemann-Hilbert problem, and use this representation to obtain so-called large gap asymptotics."

Thursday, March 17th

9:00am **Richard Kenyon - SCGP 102**

Title: Dimers and Geometry

Abstract: We discuss the geometric meaning of the Kasteleyn matrix, and use it to prove several results about spaces of embeddings of planar graphs. For example the space of embeddings of a 3-connected planar graph, with convex faces and pinned boundary is a topological ball. We give global coordinates on this space as well as natural probability measures.

9:50am **Coffee Break - SCGP Lobby**

10:20am **Ivan Kostov - SCGP 102**

Title: The six-vertex model on a hexagon

11:10am **Greta Panova - SCGP 102**

Title: Lozenge tilings with symmetries

12:00pm **Lunch - SCGP Café**

2:00pm **Leonid Petrov - SCGP 102**

Title: Exponential jump model in continuous inhomogeneous medium

Abstract: I will talk about a stochastic interacting particle system on the continuous real line equipped with a function $\xi(x)$ determining the speed of jumping particles at each location x . The waiting times and jump lengths of particles are exponentially distributed, and the behavior of the system is somewhat similar to a queuing model. By relating this system to the inhomogeneous stochastic higher spin six vertex model, it can be shown that the exponential jump model is exactly solvable for an arbitrary speed function $\xi(x)$. In particular, q -moments of the height function admit explicit multiple contour integral expressions. I will discuss the asymptotic behavior of the system (as time and the number of particles grows), which leads to limit shapes with new unusual phase transitions. The fluctuations of the random height function around the limit shape are governed by the GUE Tracy--Widom distribution.

2:50pm **Vadim Gorin - SCGP 102**

Title: Lozenge tilings: universal bulk limits, global fluctuations and all that

3:40pm **Coffee Break - SCGP Lobby**

4:10pm **Christian Hagendorf - SCGP 102**

Title: The spin-one XXZ chain and symmetry classes of alternating sign matrices

Abstract: In this talk, I discuss some recent progress on the ground states of the integrable spin-one XXZ chain with diagonal and anti-diagonal twists. Several components and scalar products of the ground state vectors are related to polynomials which appear in problems of enumeration of alternating sign matrices with symmetries. I show how these relations can be proved by means of the algebraic Bethe ansatz and the quantum separation of variables method. Furthermore, I present a generalisation to models with arbitrary (integer) spin. This talk is based on joint work with Alexi Morin-Duchesne.

Friday, March 18th

9:00am **Jasper Stokman - SCGP 102**

Title: Loop models and skein theory

9:50am **Coffee Break - SCGP Lobby**

10:20am **Michael Wheeler - SCGP 102**

Title: Higher rank generalisations of the six vertex model and Macdonald-Koornwinder polynomials

11:10am **Karl Liechty - SCGP 102**

Title: TBA

12:00pm **Lunch - SCGP Café**

2:00pm **Thomas Bothner - SCGP 102**

Title: Deformations of the Tracy-Widom distribution and transition asymptotics for Painlevé II

Abstract: The distribution functions of the largest eigenvalue of random matrices drawn from the three classical Gaussian ensembles were derived in the early 1990s by Tracy and Widom. For the famous GUE ensemble this result first expresses the distribution function as Fredholm determinant of the Airy integral operator and secondly identifies the underlying integrable system as a distinguished solution of the second Painlevé equation. During the following 25 years many links of Tracy-Widom distribution functions to other probabilistic models were discovered, here we will discuss a thinning model in which the Tracy-Widom distribution undergoes a deformation: drop a certain fraction of edge scaled eigenvalues in the GUE. As shown by Bohigas, Carvalho and Pato the Fredholm determinant formalism naturally extends to such incomplete spectra and we have now a one parametric family of Fredholm determinants for the distribution function of the largest eigenvalue in the new particle system. The underlying integrable system in this new system is different from the standard one, still the model offers the possibility to interpolate between random matrix theory statistics and classical Weibull statistics. We will discuss this interpolation process on the level of the large negative transition asymptotics of the Painlevé II

2:50pm **Estelle Basor - SCGP 102**

Title: Dimer Models and Block Toeplitz Determinants

3:40pm **Coffee Break - SCGP Lobby**