

Frontiers in Analysis and Probability  
6th Strasbourg / Zurich - Meeting  
Université de Strasbourg and University of Zurich

Abstracts

Place: University of Zurich,  
Aula RAA G-01

October 31 - November 1, 2017

Tue, October 31, 2017, 09:30 - 10:30 h

**Brownian motion in an interval and the loop group  $\widehat{SU(2)}$**   
by Philippe Bougerol, Université Pierre et Marie Curie (Paris 6)

Abstract: Some representation theory of the loop group  $\widehat{SU(2)}$  suggests a Pitman type theorem for the real Brownian motion conditioned to stay in an interval. This uses Littelmann paths and approximation by finite dihedral groups. (Ongoing work with Manon Defosseux)

Tue, October 31, 2017, 11:00 - 12:00 h

**Space-time Brownian motion in an affine Weyl chamber and Hermitian Brownian sheet**  
by Manon Defosseux, Université René Descartes (Paris 5)

Abstract: It is well known that if one considers the adjoint action of the compact Lie group  $SU(2)$  on its Lie algebra, the process of positive eigenvalue of a Brownian motion in the Lie algebra is distributed as a Bessel process, i.e. a Brownian motion conditioned to remain positive.

In this talk, we will show a similar result in the framework of loop algebra. For this we will consider the coadjoint action of a Loop group of a compact group on the dual of the

corresponding centrally extended Loop algebra and show that a Brownian motion in a Cartan subalgebra conditioned to remain in an affine Weyl chamber - which can be seen as a space time conditioned Brownian motion - is distributed as the radial part process of a Brownian sheet on the underlying Lie algebra. We will consider for this talk only the loop group of  $SU(2)$ .

Tue, October 31, 2017, 14:00 - 15:00 h

**Differential transcendence of the generating series of the walks in the quarter plane**

by Thomas Dreyfus, Université de Strasbourg

Abstract: The algebraic nature of the generating series of the walk in the quarter plane has attracted the attention of many authors. More precisely, consider the walks in the quarter plane with direction included in a prescribed set. We attach to them a certain generating series that count the number of walks ending at a certain point in a fixed number of paths. We are interested to understand what are the algebraic and/or differential relations satisfied by such series. In this talk, we will explain how differential Galois theory give a powerful tool in order to prove that in several cases, such series do not satisfy any algebraic differential equations. (Joint work with Charlotte Hardouin, Julien Roques, and Michael Singer)

Tue, October 31, 2017, 15:30 - 16:30 h

**Quantum dilogarithm**

by Vladimir Fock, Université de Strasbourg

Abstract: Quantum dilogarithm is a building block of plenty of construction in analysis, difference equations, combinatorics and number theory. We will define quantum dilogarithm, discuss its properties and use it to construct a unitary representation of a mapping class group analogous to the Weil representation of a symmetric group.

Tue, October 31, 2017, 16:30 - 17:30 h

**Two-dimensional Yang-Mills theory and the Makeenko-Migdal equations**

by Thierry Lévy, Université Pierre et Marie Curie (Paris 6)

Abstract: Given a compact surface and a compact Lie group, the Yang-Mills measure is the distribution of a family of random variables with values in the group, indexed by the set of loops traced on the surface. The master field is, in this context, a deterministic real-valued function on the set of loops, which satisfies a remarkable set of equations called the Makeenko-Migdal equations.

I will present these objects, explain how the Yang-Mills measure can be understood as the distribution of a random homomorphism from the group of loops on the surface to the chosen compact Lie group, and how, as the rank of this Lie group tends to infinity, this random morphism converges to a deterministic representation of which the master field is the character.

Wed, November 1, 2017, 09:00 - 10:00 h

**Regularity of stationary measures**

Jean-François Quint, CNRS - Université de Bordeaux

Abstract: In this talk, I will present result and conjectures on the regularity properties of stationary measures for certain actions of Lie groups, equipped with probability measures.

Wed, November 1, 2017, 10:30 - 11:30 h

**Asymptotics of stochastic particle systems via Schur generating functions**

by Alexey Bufetov, Massachusetts Institute of Technology

Abstract: We will discuss a new approach to the analysis of the global behavior of stochastic discrete particle systems. This approach links the asymptotics of these systems with properties of certain observables related to the Schur symmetric functions. It can be viewed as a certain analog of Fourier analysis in infinite-dimensional space.

As applications of this method, we prove the Law of Large Numbers and the Central Limit Theorem for various models of random lozenge and domino tilings, non-intersecting random walks, and decompositions of tensor products of representations of unitary groups. (Based on joint works with V. Gorin and A. Knizel)

Wed, November 1, 2017, 11:30 - 12:30 h

**From longest increasing subsequences to Whittaker functions and random polymers**

by Neil O'Connell, University College Dublin

Abstract: The Robinson-Schensted-Knuth (RSK) correspondence is a combinatorial bijection which plays an important role in the theory of Young tableaux and provides a natural framework for the study of longest increasing subsequences in random permutations and related percolation problems. I will give some background on this and then explain how a birational version of the RSK correspondence provides a similar framework for the study of  $GL(n)$ -Whittaker functions and random polymers. (Based on joint works with Ivan Corwin, Timo Seppalainen and Nikos Zygouras.)

October 26, 2017