

Rencontres Probabilistes
à l'occasion du
60^{ème} Anniversaire de
Marc Yor



Institut Henri Poincaré
Rue Pierre et Marie Curie, Paris 5
26 - 27 Juin 2009

Conférenciers

Pr Jean Bertoin
Université Pierre et Marie Curie

Dr Marc Atlan
Bluecrest Capital

Pr Philippe Biane
Ecole Normale Supérieure

Dr Fabrice Baudoin
Purdue University

Pr Hans Föllmer
Humboldt Universität

Dr Luciano Campi
Université Paris Dauphine

Pr Jean-François Le Gall
Université Paris-Sud et
Institut Universitaire de France

Dr Joseph Najnudel
Institut für Mathematik
Universität Zürich

Pr Gilles Pagès
Université Pierre et Marie Curie

Pr Ashkan Nikeghbali
Institut für Mathematik
Universität Zürich

Pr Philip Protter
Cornell University

Dr Jan Obloj
University of Oxford

Pr Giovanni Peccati
Université Paris Ouest

Organisateur

Pr Hélyette Geman
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Programme

Vendredi 26 Juin

14h00
à
14h15

Pr Helyette Geman, Birkbeck, University of London et ESCP-EAP
Dr Marc Atlan, Bluecrest Capital

Allocution de bienvenue

Pr Jean-François Le Gall
Université Paris XI et Institut Universitaire de France

The continuous limit of large random planar maps

14h15
à
15h05

Planar maps are graphs embedded in the plane and considered up to continuous deformation. They have been studied extensively in combinatorics, and they have been used in theoretical physics, where they serve as models of random geometry. Our goal is to discuss the convergence of rescaled random planar maps viewed as random metric spaces. More precisely, we consider a random planar map $M(n)$, which is uniformly distributed over the set of all planar maps with n vertices in a certain class. We equip the set of vertices of $M(n)$ with the graph distance rescaled by the factor n to the power $-1/4$. We then discuss the convergence in distribution of the resulting random metric spaces as n tends to infinity, in the sense of the Gromov-Hausdorff distance between compact metric spaces. In the case of $2p$ -angulations, we first establish a compactness result showing that a limit exists along a suitable subsequence. We then prove that this limit can be written as a quotient space of the so-called Continuum Random Tree (CRT) for an equivalence relation which has a simple definition in terms of Brownian labels assigned to the vertices of the CRT. This limiting random metric space had been introduced by Marckert and Mokkadem and called the Brownian map. It can be viewed as a "Brownian surface" in the same sense as Brownian motion is the limit of rescaled discrete random paths. We discuss several geometric properties of the Brownian map.

Pr Philippe Biane
Ecole Normale Supérieure

Entrelacements de processus

15h05
à
15h55

La notion d'entrelacement entre deux processus ou deux noyaux markoviens a été beaucoup étudiée et utilisée par Marc Yor. Je ferai une revue de plusieurs exemples importants de tels entrelacements et je montrerai comment l'extension de cette notion à un cadre non-commutatif permet de trouver de nouveaux exemples "commutatifs" intéressants et parfois surprenants.

Pause Café

Pr Jean Bertoin
Université Pierre et Marie Curie

A limit theorem for trees of alleles in branching processes with rare neutral mutations

16h25
à
17h15

We are interested in the genealogical structure of alleles for a Bienaymé-Galton-Watson branching process with neutral mutations (infinite alleles model), in the situation where the initial population is large and the mutation rate small.
We shall establish that for an appropriate regime, the process of the sizes of the allelic sub-families converges in distribution to a certain continuous state branching process (i.e. a Jirina process) in discrete time. Itô's excursion theory and the Lévy-Itô decomposition of subordinators provide fundamental insights for the results.

Programme

Samedi 27 Juin

Pr Hans Föllmer
Humboldt Universität

Some probabilistic aspects of bubbles: A case study for the use of mathematics in finance

9h30
à
10h20

We discuss some recent advances in the mathematical analysis of bubbles in terms of (local) martingales and the corresponding measures on the predictable sigma-field. This will complement the talk by Philip Protter, and it will also include some general comments on the role of mathematics in finance, expressing some concerns shared with Marc Yor.

Pr Philippe Protter
Cornell University

Questions on filtration shrinkage and illusory arbitrage

10h20
à
11h10

Marc YOR has done fundamental work in many fields in modern stochastic process theory, including Brownian motion, Bessel processes, martingales, Markov processes, and stochastic integration. In the 1980s he helped to create and establish the theory of the expansion of filtrations, and more recently he has done much work in mathematical finance theory, among other interests. A closely related flip side to the expansion of filtrations is the shrinkage of filtrations. We will discuss Marc Yor's 30 year old results in this area, connect them to recent results, and show how it impacts some areas of mathematical finance theory. This talk is based on current work joint with Hans Föllmer, as well as current work joint with Robert Jarrow.

Pause Café

Dr Jan Obloj
University of Oxford

Azema-Yor processes: three characterisation theorems

11h30
à
12h10

We study the class of Azema-Yor processes which are of the form $F(M_t) - f(M_t)(X_t - M_t)$, where $F' = f$, X_t is a semimartingale with no positive jumps and M_t is its running maximum. We show that these processes arise as unique strong solutions to the Bachelier SDE which we also show is equivalent to the DrawDown SDE. The proofs are greatly simplified thanks to (algebraic) group property of the set of AY processes indexed by functions. We then restrict our attention to the case when X is a martingale. It turns out that the AY martingales are the only local martingales of the form $H(X_t, M_t)$ for a Borel function H . Furthermore, they can also be characterised by their optimal properties: all uniformly integrable martingales whose maximum dominates a given target are dominated by an AY martingale in the concave ordering of terminal values. We mention how these results find direct applications in portfolio optimisation/insurance theory. Joint work with Laurent Cararro and Nicole El Karoui.

Pr Ashkan Nikeghbali
Institut für Mathematik - Universität Zürich

12h10
à
12h50

We introduce a new type of convergence in probability theory, directly inspired by theorems and conjectures in random matrix theory and number theory. After stating some elementary probabilistic facts about this type of convergence, we mention some of its occurrence in the asymptotic study of value distribution of some well known arithmetic functions.

This talk is based on joint work with J. Jacod and E. Kowalski.

Pause Déjeuner

Dr Fabrice Baudoin
Purdue University

Generalized Ricci lower bounds for two-step sub-Riemannian manifolds

13h50
à
14h30

This is a joint work with Nicola Garofalo (Purdue University). We study a new class of rank two sub-Riemannian manifolds encompassing Riemannian manifolds, CR manifolds with vanishing Webster-Tanaka torsion, orthonormal bundles over Riemannian manifolds, and graded nilpotent Lie groups of step two. These manifolds admit a canonical horizontal connection and a canonical sub-Laplacian. We construct on these manifolds an analogue of the Riemannian Ricci tensor and prove Bochner type formulas for the sub-Laplacian. As a consequence, it is possible to formulate on these spaces a sub-Riemannian analogue of the so-called curvature dimension inequality. Sub-Riemannian manifolds for which this inequality is satisfied are shown to share many properties in common with Riemannian manifolds whose Ricci curvature is bounded from below.

Pr Giovanni Peccati
Université Paris Ouest

Stein's method and universality

14h30
à
15h10

We present a new universality principle for the Gaussian Wiener chaos. Our techniques involve Stein's method, the Lindeberg invariance principle and Malliavin calculus.

Dr Luciano Campi
Université Paris Dauphine

Markovian bridges with applications to insider's trading

15h10
à
15h50

Given a Markovian Brownian martingale Z , we construct a Markov process X which is a martingale in its own filtration and satisfies $X_1 = Z_1$. We compute explicitly its semimartingale decomposition under both its own filtration and the filtration generated jointly by X and Z , so making a connection with (dynamic) enlargement of filtrations theory. As an application, we explicitly solve an equilibrium model with insider trading, that can be viewed as a generalization of Back and Pedersen's (Journal of Financial Markets 1, 1998) where stock price evolution exhibits a local volatility dynamics.

This talk is based on a joint work with U. Cetin and A. Danilova.

Pause Café

Dr Joseph Najnudel
Institut für Mathematik - Universität Zürich

Scaled limit and rate of convergence for the largest eigenvalue from the generalized Cauchy random matrix ensemble

16h10
à
16h50

In this presentation, we are interested in the characterization of the law of the largest eigenvalue, of a Hermitian matrix of size N under a generalized Cauchy weight. In particular, we give a convergence in law of the appropriately scaled largest eigenvalue when N tends to infinity, and we characterize this scaling limit in terms of a Painlevé-V equation. Moreover, we give the rate of convergence as a function of N .

Pr Gilles Pagès
Université Pierre et Marie Curie

Functional quantization viewed through Brownian motion: a few results and some questions.

16h50
à
17h40

We will illustrate on the typical case of Brownian motion several recent results obtained on functional quantization. By functional quantization, we mean the optimal quantization of processes viewed as random variables taking values in their paths space. We will point out some sharp quantization rates, the connection with small deviation problems, the constructive rate optimal quantization of diffusions. We will conclude by mentioning several open problems which naturally arise by contrast with some classical finite dimensional results established in Optimal Vector Quantization Theory.

Dr Catherine Donati-Martin, Université Pierre et Marie Curie
Pr Bernard Roynette, Université de Nancy

17h40
à
18h00

Allocution de Clôture



Certains exposés seront en anglais, d'autres en français.



La participation à ces journées est gratuite. Il est néanmoins important de s'inscrire auprès de isabelle.mariage@upmc.fr afin que les pauses cafés puissent être organisées.