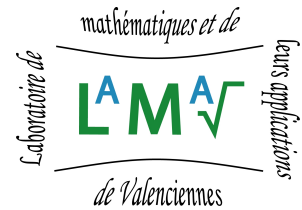




Fédération de Recherche
Mathématique
du Nord-Pas de Calais



Journée Mécanique Statistique et Géométrie Aléatoire

Cette journée se déroulera à l'université de valenciennes le
Vendredi 26 novembre 2010.

Organisateurs :

- David Coupier : coupier@math.univ-lille1.fr
- David Dereudre : david.dereudre@univ-valenciennes.fr
- Myriam Fradon : myriam.fradon@univ-lille1.fr

Programme de la journée

- **9h00-9h30** Accueil des participants
- **9h30-10h20** Exposé de Jesper Møller de l'Université d'Aalborg,
Transforming spatial point processes into Poisson processes using random superpositioning
- **10h20-11h10** Exposé de Pierre Calka de l'Université de Rouen,
Limit theory and stabilization for random polytopes in multidimensional balls
- **11h10-11h40** Pause café
- **11h40-12h30** Exposé de Olivier Garet de l'Université de Nancy,
Almost subadditive ergodic theorems

Le déjeuner est offert aux participants de cette journée (inscription obligatoire).

- **14h00-14h50** Exposé de Hans-Otto Georgii de l'Université de Munich,
Supercritical multitype branching processes : the type evolution along surviving lineages
- **14h50-15h40** Exposé de Sylvie Roelly de l'Université Potsdam,
Infinite systems of Brownian balls and their equilibrium states

Résumés des exposés

Exposé de **Pierre Calka** : *Limit theory and stabilization for random polytopes in multidimensional balls*

We consider the convex hull generated in the unit-ball of \mathbb{R}^d by a Poisson point process with intensity regularly varying at the boundary. Variance estimates and central limit results for functionals of such random polytopes in smooth convex bodies have been recently obtained by M. Reitzner, V. Vu, I. Bárány, F. Fodor and V. Vigh. In a recent paper, T. Schreiber and J. Yukich use stabilization techniques to prove a central limit theorem with an explicit limiting variance for the number of vertices of the convex hull. In this talk, we are interested in extending this work in several directions : first we develop a local scaling theory for the boundary itself of the random polytope, seen as a random process. Limits for the rescaled support and radius-vector functions are called paraboloid growth and hull processes. We then deduce by stabilization arguments central limit theorems and Brownian limits with explicit limiting variances. The functionals considered include volumes, mean widths and more generally intrinsic volumes of all orders as well as number of faces of arbitrary dimensions. We finally show extreme value results and we conclude by extending the techniques to zero-cells of isotropic Poisson hyperplane tessellations with large inradius. This is joint work with T. Schreiber and J. E. Yukich.

Exposé de **Olivier Garet** : *Almost subadditive ergodic theorems*

The talk proposes a tour around Kingman's subadditive ergodic theorem, with a special interest for almost-subadditive extensions by Kesten, Hammersley, Derriennic and Schürger. We will attempt to explain why growth models where extinction is possible require more flexibility than Kingman's theorem can give, and we will propose some tools.

Exposé de **Hans-Otto Georgii** : *Supercritical multitype branching processes : the type evolution along surviving lineages*

For supercritical multitype Markov branching processes in continuous time, we consider the evolution of types along those lineages that survive up to some large time t . We establish almost-sure convergence theorems for both time and population averages of ancestral types (conditioned on non-extinction), and identify the mutation process describing the type evolution along typical lineages. A variational principle shows that the associated stationary type distribution, the so-called ancestral distribution, results from a mutation-selection balance. In the so-called quasispecies model of sequence evolution, this balance gives rise to a phase transition for the fitness of subpopulations.

Exposé de **Jesper Møller** : *Transforming spatial point processes into Poisson processes using random superpositioning*

Most finite spatial point process models specified by a density are locally stable, implying that the Papangelou intensity is bounded by some integrable function β defined on the space for the points of the process. We show how to superpose such a locally stable spatial point process X with a complementary spatial point process Y to obtain a Poisson process $X \cup Y$ with intensity function β , and introduce a fast and easy simulation procedure for Y conditional on X . This may be used for model checking : given a model for the Papangelou intensity of the original spatial point process, this model is used to generate the complementary process, and the resulting superposition is a Poisson process with intensity function β if and only if the true Papangelou intensity is used. Whether the superposition is actually such a Poisson process can easily be examined using well known results and fast simulation procedures for Poisson processes. We illustrate this approach to model checking in the case of a Strauss process.

Exposé de **Sylvie Rœlly** : *Infinite systems of Brownian balls and their equilibrium states*

We consider an infinite system of non overlapping globules undergoing Brownian motions in \mathbb{R}^3 . The term globules means that the objects we are dealing with are spherical, but with a radius which is random and time-dependent. The dynamics is modeled by an infinite-dimensional Stochastic Differential Equation with local time. Existence and uniqueness of a strong solution is proven for such an equation. We also describe a class of equilibrium measures.

Inscription

L'inscription pour cette journée est **gratuite** et **obligatoire**. Veuillez préciser aux organisateurs si vous participez aux exposés de la matinée, de l'après midi et au déjeuner buffet qui est offert.

Accès

Les exposés se dérouleront à l'université de Valenciennes, le Mont Houy Bâtiment ISTV2. Ce bâtiment est indiqué par la croix rouge sur le plan.

En voiture : suivre la flèche rose et se garer sur le parking indiqué par la croix verte.

En train : depuis la gare de Valenciennes, prendre le tram direction "université" et descendre au terminus. Vous arrivez alors à l'emplacement indiqué par la croix bleue.

