

**Conference ProbaGéo, 10-12 June 2014**  
**Participants**

**Angst Jürgen** (Rennes 1)

9-12 June

Talk : Kinetic Brownian motion on Riemannian manifolds.

Abstract: We consider the so-called Kinetic Brownian motion, with values in the unitary tangent bundle  $T^1M$  of a Riemannian manifold  $M$ . We show that the flow associated to the process interpolates between the geodesic flow on  $T^1M$  and the classical Brownian flow on  $M$ . We then describe the long-time asymptotic behavior of the process when the base manifold is rotationally invariant.

This is joint work with Ismael Bailleul et Camille Tardif

**Arnaudon Marc** (Bordeaux)

**Bailleul Ismaël** (Rennes 1)

10-11 June

Talk : Rough paths on Banach manifolds

**Bercu Bernard** (Bordeaux)

**Bonnefont Michel** (Bordeaux)

Talk : Spectral gap for spherically symmetric log-concave probability measures

(joint work with Alderic Joulin and Yutao Ma).

In this talk, we improve a well-known estimate due to Bobkov for the spectral gap of spherically symmetric log-concave probability measures on  $R^n$ . The proof is remarkably simple and relies on a convenient one-dimensional spectral gap estimate. Our approach can be extended beyond the log-concave case leading to weighted Poincaré inequalities.

**Cebon Guillaume** (Paris 6)

10-12 June

Talk : Lévy processes on the unitary group in large dimension

**Coulibaly Koléhè** (université de Lorraine, Nancy)

9-13 June

**Cruzeiro Ana Bela** (Lisbon)

9-12 June

Talk : Navier-Stokes equation and forward-backward stochastic differential systems

**Demni Nizar** (Rennes 1)

10-11 June

Talk : Joint distribution of the moduli of  $k$ -tuple sampled from the heat kernel on the complex projectif space

**Du Roy De Chaumaray Marie** (Bordeaux)

**Emery Michel** (Strasbourg)

10-12 June

**Fang Shizan** (Dijon)

9-13 June

Talk : Hydrodynamics and Stochastic Differential Equations

**Franchi Jacques** (Strasbourg)

9-13 June

Talk : Small time asymptotics for an example of strictly hypoelliptic heat kernel

**Gilliers Nicolas** (Paris 6)

10-12 June

**Grong Erlend** (Luxembourg)

9-13 June

Talk : Sub-Riemannian manifolds with a metric preserving complement and their diffusions

**Harter Jonathan** (Bordeaux)

**Hsu Elton** (Northwestern University)

9-13 June

Talk : Brownian Motion and Gradient Estimates of Positive Solutions of Heat Equations

Abstract: Many gradient estimates in differential geometry can be naturally treated by stochastic methods involving Brownian motion on a Riemannian manifold. In this talk, we discuss Hamilton's gradient estimate of bounding the gradient of the logarithm of a positive harmonic function in terms of its supremum. We will see how naturally this gradient estimate follows from Ito's formula and extend it to manifolds with boundary by considering reflecting Brownian motion. Furthermore, we will show that in fact Hamilton's gradient estimate can be embedded as the terminal case of a family of gradient estimates which can be treated just as easily by the same stochastic method.

**Juillet Nicolas** (Strasbourg)

9-12 June

Talk : An optimal transport problem for two measures in the convex order

**Kupin Stanislas** (Bordeaux)

**Lassalle Rémi** (Lisbon)

9-13 June

Talk : A propos des principes de moindre action stochastiques pour l'équation de Navier-Stokes

**Le Brigant Alice** (Bordeaux)

**Le Jan Yves** (Paris 11)

10-12 June

**Lévy Thierry** (Paris 6)

9-12 June

Talk : Third order phase transition in unitary matricial models

**Li Xue-Mei** (Warwick)

9-13 June

**Neel Robert** (Lehigh)

9-12 June

Talk: Degenerate martingales arising from various geometric structures, including minimal surfaces.

Abstract: We first discuss a class of degenerate martingales (which we will call rank-n martingales) that arises naturally as the diffusion associated with minimal submanifolds, mean curvature flow, and some sub-Riemannian structures. This provides a unified approach to "coarse" properties, such as transience, of such structures. We then specialize to minimal surfaces in  $\mathbf{R}^3$ , in which case the associated rank-2 martingale (which is just Brownian motion on the surface, viewed as a process in  $\mathbf{R}^3$ ) has the additional property that the tangent plane evolves as a martingale as well. Taking advantage of this extra structure, we develop an extrinsic analogue of the mirror coupling of two Brownian motions. This allows us to study finer geometric and analytic properties of minimal surfaces, such as intersection results (strong halfspace-type theorems) and Liouville properties.

**Philipowski Robert** (Luxembourg)

9-13 June

Talk : Martingales on manifolds with time-dependent connection

**Picard Jean** (Clermont-Ferrand)

9-12 June

Talk : Semi-stochastic mechanics and geodesics,

**Popescu Ionel** (Georgia Tech)

10-12 June

Talk : Shy and Fixed distance couplings on Riemannian manifolds

Abstract: We show that on any Riemannian manifold with the Ricci curvature non-negative (and some other technical conditions) we can construct a coupling of two Brownian motions which are staying fixed distance for all times. We show a more general version of this for the case of Ricci bounded from below uniformly by a constant  $k$ . In the terminology of Burdzy, Kendall and others, a shy coupling is a coupling in which the Brownian motions do not couple in finite time with positive probability. What we construct here is a strong version of shy couplings on Riemannian manifolds. On the other hand, this can be put in contrast with some results of von Renesse and K. T. Sturm which give a characterization of the lower bound on the Ricci curvature in terms of couplings of Brownian motions and our construction optimizes this choice in a way which will be explained. This is joint work with Mihai N. Pascu.

**Richou Adrien** (Bordeaux)

Talk : Some recent advances for existence and uniqueness of solutions for quadratic backward stochastic differential equations

Abstract: Since the first work of Pardoux and Peng in 1990, the theory of backward stochastic differential equations (BSDEs) has developed considerably thanks to applications to PDEs, optimal stochastic control and finance. Quadratic BSDEs are a particular case of such equations with quadratic non-linearities that, for example, naturally appear when you are looking for martingales with prescribed limit in some compact manifolds. In this talk we will give an overview of recent existence and uniqueness results for quadratic BSDEs.

**Savona Catherine** (Clermont-Ferrand)

9-12 June

**Tardif Camille** (Paris 6)

10-12 June

**Thalmaier Anton** (Luxembourg)

9-12 June

**Thieullen Philippe** (Bordeaux)

**Thompson James** (Warwick)

9-13 June