One day workshop on stochastic differential geometry

12 May, 2017

Kawai Hall, Department of Mathematics, Tohoku University

Program

10:00-10:40	Atsushi Atsuji (Keio University) Leafwise Brownian motion and some function theoretic properties of laminations
11:00-11:40	Kohei Suzuki (Universität Bonn) Convergence of Brownian Motions on Metric Measure Spaces Under Riemannian Curvature-Dimension Conditions
13:30-14:10	Fabrice Baudoin (University of Connecticut) Integration by parts and quasi-invariance properties for the horizontal Wiener measure of a foliated manifold
14:30-15:10	Naotaka Kajino (Kobe University) The Laplacian on some finitely ramified self-conformal circle packing fractals and Weyl's asymptotics for its eigenvalues
15:30-16:10	Hiroshi Kawabi (Okayama University) Riemannian Wasserstein geometry on the space of Gaussian measures over the Wiener space

世話人 (Organizer): 桒田 和正 (東北大学)
(Kazumasa Kuwada (Tohoku University))

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Abstracts

Leafwise Brownian motion and some function theoretic properties of laminations

Atsushi Atsuji

We consider leafwise Browinan motions on (real or complex) laminations. We give a simple costruction of the processes by Dirichlet form technique. Using stochastic calculus of the processes we show some function theoretic properties of laminations, such as Liouville type theorems for leafwise subharmonic functions and Picard type theorems for leafwise meromorphic functions.

Convergence of Brownian Motions on Metric Measure Spaces Under Riemannian Curvature-Dimension Conditions

Kohei Suzuki

The goal of this talk is to characterize the weak convergence of Brownian motions in terms of a geometric convergence of the underlying spaces. As main results, we show that the pointed measured Gromov convergence of the underlying spaces implies (or under some condition, is equivalent to) the weak convergence of Brownian motions under Riemannian Curvature-Dimension conditions.

Integration by parts and quasi-invariance properties for the horizontal Wiener measure of a foliated manifold

Fabrice Baudoin

We generalize the Driver's integration by parts formula to foliated Riemannian manifolds and prove a quasi-invariance property of the horizontal Wiener measure with respect to flows generated by suitable tangent processes.

The Laplacian on some finitely ramified self-conformal circle packing fractals and Weyl's asymptotics for its eigenvalues

Naotaka Kajino

The purpose of this talk is to present the speaker's recent research in progress on the construction of a "canonical" Laplacian on finitely ramified circle packing fractals invariant with respect to a family of Moebius transformations and on Weyl's asymptotics for its eigenvalues.

In the simplest case of the Apollonian gasket, the speaker has obtained an explicit expression of a certain canonical Dirichlet form in terms of the circle packing structure of the fractal. Our Laplacian on a general circle packing fractal is constructed by adopting the same kind of expression as the definition of a (seemingly canonical) strongly local Dirichlet form. Weyl's eigenvalue asymptotics for this Laplacian can be also established, in the case where the fractal is finitely ramified in some nice way and at least in some important examples including the Apollonian gasket.

Riemannian Wasserstein geometry on the space of Gaussian measures over the Wiener space

Hiroshi Kawabi

The space of Gaussian measures on an abstract Wiener space being equivalent to the Wiener measure becomes a Hilbert manifold, and the manifold admits a non-positive Riemannian metric derived from the information geometry. We consider another geometric structure on the manifold, so-called the Wasserstein geometry, which is a metric geometry on the space of probability measures. We first show the convexity of the manifold with respect to the Wasserstein geometry, which enables us to restrict the Wasserstein geometry to the manifold naturally. We then construct a Riemannian metric on the manifold, which induces the Wasserstein distance function. The Riemannian manifold has a non-negative sectional curvature, which provides the difference from the information geometry. Finally, we mention a brief idea of a construction of Brownian motion on this infinite dimensional manifold. This talk is based on joint work with Asuka Takatsu (Tokyo Metropolitan University).